TABLE OF CONTENTS

CHAPTER 2.0

SITE CHARACTERISTICS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2 - LIST OF FIGURES

*Refer to Section 1.6 and Table 1.6-3. Controlled drawings were removed from the USAR at Revision 17 and are considered incorporated by reference.

CHAPTER 2.0

SITE CHARACTERISTICS

During the PSAR stage, when the power block envelopes were being developed, Wolf Creek was one of four sites (Callaway, Wolf Creek, Sterling and Tyrone) upon which five plants were to be built using the SNUPPS standard design. Now, there are two sites upon which two plants were built.

The SNUPPS design envelopes were developed by use of the most restrictive site conditions imposed by any one of the four original sites or by generic design criteria which were conservative for each of the sites. With the cancellation of the Tyrone plant, however, the four site enveloping approach was modified in the seismic design area (development of spectra et. al) for work not yet completed to include only the three remaining sites. Refer to Sections 2.5 and 3.7(B) for details. The design envelopes were not revised to reflect the cancellation of Sterling.

The elevations given are based on the 1929 mean sea level (msl) datum.

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 SITE LOCATION AND DESCRIPTION

2.1.1.1 Specification of Location

The Wolf Creek Generating Station, Unit No. 1 (WCGS) is located in eastern Kansas approximately 75 miles southwest of Kansas City, 53 miles south of Topeka, and 100 miles east-northeast of Wichita, Kansas. The plant site is near the center of Coffey County in Hampden Township, 3.5 miles northeast of the city of Burlington and 3.5 miles east of the Neosho River and the main dam at John Redmond Reservoir. Figure 2.1-1 shows the location of the site in Kansas, and Figure 2.1-2 locates it in Coffey County.

The plant site is located in Township 21 South, Range 16 East of the Sixth Principal Meridian, and Townships 20 and 21 South, Range 15 East of the Sixth Principal Meridian. The reactor is located 4,235,500 meters north and 264,600 meters east within zone 15 at Universal Transverse Mercator Coordinates Latitude 38°14'20" North and Longitude 95°41'20" West. The WCGS is a Standardized Nuclear Unit Power Plant System (SNUPPS) plant, which locates the reactor centerline at hypothetical SNUPPS coordinates Latitude 100,000 North and Longitude 100,000 East. The Kansas state plane coordinates corresponding to these hypothetical coordinates are Latitude 584,670 North and Longitude 2,807,250 East.

2.1.1.2 Site Area

Of the 11,882 acres owned by the applicant on and near to the WCGS site, 9,818 acres are occupied by the site, and 1,976 acres lie outside of the site boundary. The acreage beyond the site boundary is leased as farmland and pastureland. The railroad right-of-way to the site boundary occupies about 148 acres, 88 acres of which are owned by the applicant. Figure 2.1-3 shows the lands owned by the applicant. The station property lines include both the land inside the site boundary and the leased land outside the boundary. Areas modified by construction of the plant include 135 acres for the station, 60 acres for the cooling lake dams and dikes, and 5,090 acres for the cooling lake at a normal elevation of 1,087 feet (msl). Figure 1.2-44 shows the location and orientation of principal plant structures, and Figure 2.1-5 shows the layout of the cooling lake, dams, dikes, and spillways.

The plant exclusion-restricted area, shown on Figure 2.1-6, lies within the site boundary and encompasses approximately 1,118 acres, which are owned by the applicant. This area is traversed only by the access road to the plant.

There are no residential, commercial, or industrial structures within either the exclusion-restricted area of the plant site area. The effects of the Wolf Creek lake are discussed in Section 2.1.2.5.

The transportation network in the site vicinity is shown on Figure 2.1-7. The main highway artery in the plant site area is U.S. Highway 75, which runs in a north-south direction about 0.25 mile west of the site boundary and 2.8 miles west of the reactor location at its closest point. The four other major roads within a 5-mile radius of the plant are the federal-aid secondary routes 10, 149, 153, and 1472. The nearest existing railroad to the site is the Missouri Pacific Railroad located 9.5 miles southeast of the site boundary. A spur connecting the site with this track was constructed to provide rail access to the site. Another railroad (Santa Fe Railroad) running in a north-south direction through the site property was abandoned in 1972. There is no commercial water traffic on the Neosho River or the John Redmond Reservoir.

2.1.1.3 Boundaries for Establishing Effluent Release Limits

The restricted area, which is used for establishing effluent release limits, enables the applicant to fulfill their obligations with respect to the requirements of 10 CFR 20. This area and the distance from the station vent stack to the boundary line of the restricted area is shown on Figure 2.1-6. The restricted area boundary location coincides with the exclusion area boundary.

Information regarding radioactive gaseous and liquid effluents, which will allow identification of structures and release points as well as definitions of unrestricted areas within the site boundary that are accessible to members of the public is shown in Figure 2.1-6. The definition of unrestricted area used in implementing the ODCM requirements for radiological effluents has been expanded over that in 10 CFR 20.1003. The unrestricted area boundary may coincide with the Exclusion Area boundary, as defined in 10 CFR 100.3(a), but the unrestricted area does not include areas over water bodies. The concept of unrestricted areas, established at or beyond the site boundary, is utilized to keep levels of radioactive materials in liquid and gaseous effluents as low as is reasonably achievable, pursuant to 10 CFR 50.36a.

2.1.2 EXCLUSION AREA AUTHORITY AND CONTROL

2.1.2.1 Authority

The exclusion area is a 1,200-meter radius circle centered on the WCGS, Unit No. 1 reactor and consists of approximately 1,100 acres. The exclusion area boundary location coincides with the restricted area boundary. Figure 2.1-6 depicts the exclusion-restricted area boundary. The Licensees own and control (including mineral rights) all land within the exclusion area. Consequently, they have full authority to determine all activities within the exclusion area, including exclusion or removal of personnel and property from the area.

Easements through the exclusion area have been granted to:

1. United Telephone System - Midwest Group - for telephone service to the plant. The easement extends north and then east out of the plant site in the exclusion area.

2. Rural Electric Cooperative - for a 69-kV line out of the switchyard for local electrical service. The easement extends north out of the plant site in the exclusion area.

The exclusion area is not traversed by any public highway or railroad. The Licensees own and operate the plant railroad from the plant to its junction with the Missouri Pacific Railroad approximately 11 miles from the plant. As Figure 2.1-6 shows a portion of the Wolf Creek lake comprises the majority of the area within the exclusion area and is subject to the waterway exclusion provided in 10 CFR Part 100.3(a). Refer to Section 2.1.2.5 for a discussion of controls on the lake.

2.1.2.2 Control of Activities Unrelated to Plant Operation

Activities unrelated to plant operation which may be permitted within the exclusion area include the maintenance of the telephone and transmission lines described in Section 2.1.2.1, refuse collection, equipment servicing, special maintenance, and tours, visits or fishing by the public. The Licensee controls these activities.

Refer to Section 2.1.2.5 for a discussion of the controls placed upon the activities allowed on the Wolf Creek lake.

Via the controls described above, the plant staff will have knowledge of the approximate number and location of persons within the exclusion area. Emergency procedure objectives state that normal evacuation of personnel within the exclusion area will be accomplished within 2 hours.

2.1.2.3 Arrangements for Traffic Control

In the event of an emergency, evacuation of specific sub-zones and traffic control are described in the Emergency Plan.

2.1.2.4 Abandonment or Relocation of Roads

Numerous unpaved county roads were abandoned by the action of the Coffey County Commissioners to effect the construction of the Wolf Creek lake and the WCGS plant site. The roads inside the exclusion area that were abandoned are the ones that meet at the junction of Sections 5, 6, 7 and 8, Township 21 South, Range 16 East (see Figure 2.1-6). The plant access road heading north out of the plant site between Sections 5 and 6 and inside the exclusion area was paved and upgraded and is maintained and controlled by the Licensees.

2.1.2.5 Cooling Lake Exclusion Area Effects

The Licensees have evaluated the feasibility of public use of the cooling lake. Public use of the lake is allowed. Areas of the lake restricted from public use are the Ultimate Heat Sink and Circulating Water intake areas, the Circulating Water discharge area, and areas around the active bald eagle nests and those areas north of the plant access road. The public is informed of these restrictions by instructional material, buoys or other appropriate markers.

A feasibility study of the uses of the Wolf Creek lake was provided in Appendix 2A of the Wolf Creek Generating Station Environmental Report - Operating License Stage.

2.1.3 POPULATION DISTRIBUTION

In general, east-central Kansas is predominantly a low-population density, rural, agricultural area. Table 2.1-1 presents the 1960, 1970 and 1980 populations of incorporated places (Figure 2.1-8) within 50 miles of the site. The populations of both the rural areas and the communities which serve the rural economy declined during the 1960 to 1970 decades; this decline has stabilized in the 1980s.

Population studies in support of this application were directed toward estimating the distribution of 1970 population figures and estimating the projected population from 1980 to 2020 (by 10-year increments) within a 50-mile radius of the plant site. Data sources and methodology used for the studies are summarized in the following paragraphs. The 1980 projections have been updated to include data from the 1980 census and the Wolf Creek Emergency Plan, Revision 15.

The distributions of the current and projected populations were determined by first establishing a network of geographic sectors and then apportioning the available census data.

To establish the geographic sectors, the 50-mile-radius area (using the plant site as the center) was divided by superimposing concentric circles and radial lines over a base map. Within 5 miles of the plant site, the concentric circles were located at 1-mile radial increments; for the area from 10 to 50 miles of the site, the circles were located at increments of 10 miles. These concentric circles were then divided in 16, 22.5 degree segments, each centered on one of the 16 cardinal compass points. This rose format is illustrated on Figures 2.1-9 through 2.1-20.

The population distribution within 50 miles of the site was based on 1970 census data (Reference 67). The population data for the area within 5 miles of the plant site were supplemented by a field survey in which each occupied house was located on a county map and the number of residents tallied. This detailed survey, which did not include the incorporated areas of Burlington and New Strawn (since actual populations of these towns were known), was conducted to provide an accurate distribution of population among the small sectors, ranging from 0.1 to 4.5 square miles, within 5 miles of the plant site. Beyond 5 miles, the sectors formed by the concentric circles and radial lines are large enough to include both inhabited and vacant areas, and thus an area-distribution method was used. With this method the populations of all Minor Civil Divisions (MCD) were allocated to sectors by area (Reference 67). Where 10 percent of an MCD was within a given sector, 10 percent of the census population was allocated to that sector. The sum of MCD population portions within a sector was presented as the sector total.

The population projections were based largely on federal census projections to 2020 for the nation, and state projections to 1990. These projections were stepped down from the national and state levels to the county level (References 68 and 69). In addition, 1975 county projections formulated by Dr. Cornelia Flora in 1975 were used (Reference 21).

The step-down technique (Reference 26) was applied in extending state projections past 1990 to obtain projections at the local level. This method involves reproportioning of state projections based on change in share of the state's overall population relative to the nation.

Also, as these projections offer a selection of fertility and migration rates, a conservative national fertility rate, of 2.1 children per woman through the year 2020, was assumed for these projections. (In 1978 the average monthly general fertility rate was 66.4 births per 1,000 women 15-44 years of age. This fertility rate is equivalent to about 2.0 children per woman completed fertility (Reference 54). Interstate migration similar to that observed by the state between 1965 and 1975 was chosen.

Since projections for specific Minor Civil Divisions (MCD) were lacking, historic trends were investigated, and the average percent change by decade from 1940 to 1970 was continued to 2020 for each MCD. County sums derived from these divisions were then reproportioned to county totals derived from the step-down procedure (Reference 26). Thus, if an area had grown in the past, it was assumed it would continue to grow. The MCD projections were allocated to various segments in the 0-to 50-mile area with the area-distribution method previously described.

In cases where new residential developments occurred within the 0-to 5-mile area and historic population trends were not reliable, projections were based on the number of planned home sites within each development. An occupancy factor of 2.9 people per dwelling (determined from a field survey and verified by the 1970 census data) was used to derive a total population for each new residential area. This approach provides a conservative or high population projection for these areas.

No permanent residents live within 1-mile of the plant site or within the area occupied by the cooling lake.

2.1.3.1 Population Within 10 Miles

The total 1980 population within the 10-mile area was 6,652, which results in a density of 21 people per square mile and clearly depicts the area's rural nature (Table 2.1-2). Within 5 miles of the plant site, the 3,924 residents provide a density of 50 people per square mile. However, when Burlington with its population of 2,901 is excluded, the area within 5 miles of the plant site then has a density of 13 people per square mile.

The 2020 population projection for the area within 10 miles of the plant site indicates a decline in nearly all segments except in those which encompass Burlington and New Strawn. These communities are located principally in the 3-to 4-and 4-to 5-mile segments described in Table 2.1-2 and on Figure 2.1-8. However, the 2020 projection is not the maximum. As shown in Tables 2.1-1 and 2.1-2, the 10-mile population increases very slowly from 6,652 in 1980 and is expected to drop to 6,120 in 2000. (The 1980 population figures reflect a large number of transient workers employed on the construction of Wolf Creek Generating Station.) After the year 2000 the 10-mile population declines to 5,370 in 2020. The increase and decline is related to the age-structure of the population and the out-migration history of the area. Figures 2.1-9 through 2.1-14 present the originally projected populations in the 0-to 10-mile area from 1970 to 2020.

The only incorporated communities within 10 miles of the plant site are at Burlington, 3.5 miles to the southwest, and New Strawn, 3 miles to the west-northwest of the plant site (Table 2.1-1).

Burlington had a 1980 population of 2,901 and is expected to undergo only moderate growth by 2020.

New Strawn was created when the U.S. Army Corps of Engineers relocated Strawn (an unincorporated settlement) from the area to be inundated by the John Redmond Reservoir, and was incorporated in 1971 (Reference 8). The town did not appear in the 1970 U.S. Census. Therefore, in the absence of historic population trends, estimates for the future have been based on the number of planned lot sites.

New Strawn is currently growing, and has the capability to accommodate significant new residential development. Within New Strawn 668 home and trailer lots have been subdivided, with approximately 150 single family homes and 63 trailers presently occupied within the town (References 39 and 6). Growth in New Strawn is estimated at 12 to 15 single family homes per year (Reference 39).

From the 1980 Census, the 1980 population of New Strawn was 457 residents. As New Strawn occupies parts of two of the geographic sectors, approximately 305 of these people live in the west-northwest segment from 3 to 4 miles from the site, and 152 residents live in the northwest segment from 3 to 4 miles from the site.

In addition to incorporated New Strawn, there are two adjacent developments, Remer's Point and Hillview, in an unincorporated area west of New Strawn. Presently, there are a total of 11 homes and 2 mobile homes in the two developments - 7 homes and 2 trailers in Hillview, and 4 homes in Remer's Point. It is estimated that there exists space for approximately 40 additional dwelling units within the two developments (References 60 and 30). Full development of these two areas would result in a total population of approximately 150 residents (assuming 2.9 persons per dwelling unit). However, this development is unlikely to occur until well after 1980 (References 60 and 30).

Of this potential total of 150 residents in Remer's Point and Hillview, 10 would locate in the west-northwest segment, 5 to 10 miles from the plant, and the remainder would locate in west-northwest segment, 4 to 5 miles, from the site.

It should be noted that, as the historic growth trends for the region suggest decreased population growth for most communities, the above increased projections are therefore likely to be conservative or high estimates of future populations for these communities.

2.1.3.2 Population Between 10 and 50 Miles

Cities and towns within 10 to 50 miles of the plant site are shown on Figure 2.1-8 and their 1960, 1970 and 1980 census populations are listed in Table 2.1-1. Many of these incorporated places experienced a decline in population from 1960 to 1970 and returned to their previous level in 1980.

Emporia, Kansas, with 25,287 residents in 1980 is the largest city in the 10 to 50-mile region, while the next largest is Ottawa with 11,016 people in 1980 (Reference 47). The majority of the incorporated places contain less than 1,000 people.

The population for the area from 10-to-50 miles is divided into 64 segments ranging in size from 59 to 177 square miles. The projected population distribution from 10 to 50 miles is listed in Table 2.1-3. The projected 1970 through 2020 population distributions are compared on Figures 2.1-15 through 2.1-20. The total cumulative 1980 population within the entire 50-mile area surrounding the site was approximately 178,596 or about 22.7 persons per square mile.

In the region within 10 to 50 miles of the plant site, the projections depict a decline in the rural areas with moderate growth occurring only in the vicinities of major cities and towns (Figure 2.1-8 and Table 2.1-1). A net population decline of 4 percent over the entire 0 to 50-mile area is projected for the 50-year period from 1970 to 2020.

2.1.3.3 Transient Population

Transient population within 10 miles of the site is low. Most seasonal or daily shifts in population are associated with public facilities such as the John Redmond Reservoir, schools, etc.

Figure 2.1-21, Public Facilities and Institutions, illustrates the geographic location of the transient population centers within 5 miles. Tables 2.1-4 through 2.1-7 provide descriptions of the facilities shown on Figure 2.1-21. The Flint Hills National Wildlife Refuge (Table 2.1-7) is primarily outside the 10-mile study area.

By comparing the population statistics (enrollment and usage) on Tables 2.1-4 through 2.1-7 with the geographic locations (Figure 2.1-21), current transient concentrations can be identified in relation to the plant location.

One Federal-Aid Primary highway (FAP 75) and four Federal-Aid Secondary highways (FAS 10, FAS 149, FAS 153, and FAS 1472) occur within 5 miles of the site (Figure 2.1-21). Based on the 1978 annual average daily traffic (ADT) count for FAP 75 and the 1975 ADT counts for the secondary highways, the following ranges of traffic volumes were recorded within 5 miles of the site (Reference 36):

Route	Orientation	Range of ADT (Vehicles per day)
FAP 75	N-S	2,810 - 3,800
FAS 10	E-W	485 - 875
FAS 149	N-S	95 - 110
FAS 153	E-W	75 - 225
FAS 1472	E-W	90 - 125

The majority of this traffic volume is associated with travel to and from the city of Burlington. The other roads in the immediate area are unpaved rural farm roads or low capacity (weight and volume) blacktop roads.

The most important source of transient seasonal population in the general area is the recreational usage of John Redmond Reservoir and Wolf Creek Lake. The conservation pool of John Redmond Reservoir extends 3.5 to 7.2 miles west of the site. The facilities that attract a transient population are boat launching ramps, fishing, picnic facilities, and campgrounds. The peak monthly usage at John Redmond Reservoir was 79,400 during July 1978 (Reference 17). The yearly visitation at John Redmond Dam and Reservoir averages about 380,000 (yearly change in visitation is largely dependent on weather conditions [Reference 9]). Actual 1972 visitation was reported to be 692,300 (Reference 40). Wolf Creek Lake access is limited to approximately 250 people per day. The recreational season is year round, but the peak months are during the summer. Major sources of transient or seasonal populations, such as that experienced during recreational use of John Redmond Reservoir and Wolf Creek Lake, have established visitor trends which can be utilized as a guide for future usage of these areas.

With the exception of visitation at Kansas reservoirs and state parks, transient populations at distances of 5 to 50 miles are minimal due to the absence of major industrial facilities or recreational attractions. The Pomona, Melvern, Toronto, and Fall River reservoirs and state parks are located within 50 miles of the site. The recreational facilities available at each of these reservoirs consist of boat launching ramps, picnic shelters, sanitary facilities, campgrounds and swimming beaches. Location and actual 1978 visitation for each of these reservoirs are given below (Reference 33):

Reservoir and State Park	Location	1978 Visitation
Pomona	29 miles north	885,380
Melvern	19 miles north	896,054
Toronto	34 miles south-southwest	419,900
Fall River	45 miles south-southwest	433,500

The two largest cities within 50 miles are Emporia (28 miles west-northwest and Ottawa 32.5 miles northeast). The 1980 populations of these cities, 25,287 and 11,016 respectively, reflect the absence of a large population-industrial source in the 16-county area surrounding the site. Transient population in the area is not expected to increase due to the projected population decline (4 percent, Section 2.1.3.2) in the next 50 years.

2.1.3.4 Low Population Zone

The low population zone (LPZ) is defined as the area within 2.5 miles (4,023 meters) from the reactor center as shown on Figures 2.1-6 and 2.1-21. The LPZ meets the requirements as stated in 10 CFR Part 100. The LPZ does not include Burlington, New Strawn, or Highway 75, nor does it contain any areas of heavy residential use.

The 1970 population of the 20-square mile area of the LPZ was 96 people. By 1980, the permanent resident population was about 114 people. Table 2.1-8 presents the estimated distribution of population in 1970 and 1980 within the LPZ.

Most exit routes within the LPZ are unsurfaced two-lane county roads. Some of these roads may be impassable during periods of rainy weather except for tracked vehicles, four-wheel drive vehicles, and farm tractors. Detailed evacuation provisions are addressed in the detailed emergency procedures. Two improved access roads (one all-weather) have been constructed and provide exit routes within the site property boundary and from the LPZ area.

There are no sources of transient population within the LPZ. (There is presently no commitment by the Licensees to public use of the cooling lake or surrounding land.) With the exception of residential traffic, there is no transient population in the LPZ, neither during the working day nor seasonally. No data are available on the frequency of residential traffic within the LPZ. The roads are not major highways but are unsurfaced country roads which serve scattered residences. The railroad passing through the site area was abandoned, and the rails have been removed. There are no commercial facilities within 2.5 miles of the site.

2.1.3.5 Population Center

The population center or city closest to the site with a population greater than 25,000 persons is Emporia, Kansas, 28 miles west-northwest of the site. In 1980 its population was 25,287 persons. The next city eligible for designation as a population center is Topeka, Kansas, 53 miles north of the site. Topeka's reported population for 1980 is 115,266.

2.1.3.6 Population Density

The site is located in a very low population density area. The range of density variation, from 13 persons per square mile to 62 persons per square mile, is very small. This low density indicates a relatively homogeneous rural population characteristic of an agricultural or ranching economy.

As shown on Figure 2.1-22 the projected population from 1980 to 2020 never exceeds 70 persons per square mile. Indeed the cumulative maximum density (62 persons per square mile) occurs in the year 2000 for the 0-to 5-mile distance. Thereafter the densities decline. Varying the fertility and migration assumptions does not influence the levels of population density significantly. Tables 2.1-9 and 2.1-10 show comparisons of population distributions for various fertility and migration patterns for 1980 and 2020, respectively. The most conservative projection (i.e. high) is the no migration, 2.7 children per woman fertility which results in a maximum density (66 persons per square mile) which is still considerably less than 500 or 1,000 persons per square mile.

2.1.4 REFERENCES

1. Anderson, E., 1973, Owner, Anderson Air Strip, written communication (June 23).

2. Bahr, J., 1973, Vice President, Fair Association, Burlington, Kansas, written communication.

3. Barton, A.M., 1973, Owner, A.M. Barton Hatchery, written communication.

4. Beeghly, B.E., 1973, Director, Pipeline Protection and Mechanical Maintenance, Phillips Petroleum Company, written communication (December 11).

5. Board of Commissioners of Coffey County, 1968, Coffey County zoning resolution (January 29).

6. Boyce, E.M., 1979, Owner, Arrowhead Hills Golf Course, Burlington, Kansas, oral communication (May 23).

7. Brinkman, D. 1979, ICON Boatworks, Inc., Burlington, Kansas, oral communication.

8. Brown, S., 1979, Coffey County Tax Assessor, Coffey County Courthouse, Burlington, Kansas, oral communication.

9. Chester, M., 1979, Project Manager, U.S. Army Corps of Engineers, John Redmond Reservoir, Kansas, oral communication.

10. Coffey County Tax Assessor, 1973, Kansas statistical schedule, Agriculture: Coffey County Tax Assessor's Office, Coffey County, Kansas.

11. Cordell, L., 1973, Resident Engineer, U.S. Army Corps of Engineers, written communication.

12. Cummins, E.J., 1973, 127th Tactical Fighter Training Squadron, Kansas Air National Guard, written communication: (May 8).

13. Danner, M., 1973, Owner, Danner Farm, written communication.

14. Defense Mapping Agency, 1973, Military training routes, Section IIA: Defense Mapping Agency, St. Louis, map IIA-60 (March 29).

15. DeMott, S., 1979, County Appraiser's Office, Lyon County, Kansas, oral communication.

16. Department of Economic Development, 1969, Kansas aviation needs study: Department of Economic Development, Salina, Kansas.

17. Duncan, D., 1979, Project Headquarters, John Redmond Reservoir, U.S. Army Corps of Engineers, Tulsa, Oklahoma, oral communication.

18. Emerson, M.J., 1973, Interindustry projections of the Kansas economy, Industry and regional forecasts for 1980, 1990, 2000, 2010, and 2020 - Prepared for the U.S. Bureau of Reclamation: Department of Economic Development, Topeka, Kansas.

19. Federal Aviation Administration, 1971, FAA airport master record, Federal Aviation Administration (May 20).

20. Ferman, B.B., 1973, Battery C, 1st Battalion, 127th Field Artillery, Kansas Army National Guard, written communication (April 19).

21. Flora, C., 1975, Department of Administration, Division of State Planning, Topeka, Kansas.

22. Fortenberry, H.Y., 1972, John Redmond Reservoir area, Coffey County, Kansas, The Coffey County zoning resolution, Board of County Commissioners, Coffey County, Kansas (January 14).

23. _____, 1973, County Engineer, Coffey County, written communication.

24. Freeman, E., 1979, Sheriff, Coffey County, Burlington, Kansas, oral communications.

25. Garrett, Mrs., 1979, Administrator, Golden Age Lodge of Burlington, Burlington, Kansas, oral communication.

26. Greenberg, M.R., Krueckeberg, D.A., and Mautner, R., 1973, Long-range population projections for minor civil divisions, Computer programs and user's manual: Center for Urban Policy Research, Rutgers University, New Brunswick, New Jersey (program revised by Dames & Moore staff, Cranford, New Jersey).

27. Griffith, W., 1979, Administrator, Coffey County Hospital, Burlington, Kansas, oral communication (May 22).

28. Hall, L., Jr., 1973, Part-owner of the HBH Rock Company, Inc., written communication (November 20).

29. Hagen, R.E., 1973, Acting State Administrative Officer, Soil Conservation Service, Salina, Kansas, written communication.

30. Harris, J.H., 1979, Hillview Development, New Strawn, Kansas, oral communication.

31. Hayen, B., 1973, Co-owner of Glassco, New Strawn, Kansas, written communication (April 23).

32. Helbert, J.R., 1973, Manager, Rock Creek Country Club, Inc., written communication.

33. Herndon, Wayne, 1979, State Recreation Planner, Kansas Park and Resources Authority, Topeka, oral communication (October 30).

34. Hoag, R., 1973, Manager, Burlington Elevator, written communication (April 30).

35. Huff, R., 1973, Owner, Huff's Gardens, written communication (April 30).

36. Ijans, C., 1978, Kansas Department of Transportation, Planning and Development Department, Topeka, Kansas, oral communication (December 28).

37. Interstate Commerce Commission, Division 3, 1973, The Atchison, Topeka and Santa Fe Railway Company -- Abandonment -- Franklin and Coffey Counties, Kansas, Finance Docket No. 26591, Washington, D.C. (March 7).

38. Jackson, D., 1979, County Appraiser's Office, Coffey County, Kansas, oral communication.

39. Jones, 0., 1979, Mayor, New Strawn, Kansas, oral communication.

40. Kansas Park and Resources Authority, and Oblinger-Smith Corporation, 1975, Outdoor Recreation Plan for Kansas.

41. Kansas State Board of Agriculture, 1978, Population of Kansas, January 1, 1970 through January 1, 1978.

42. Kansas State Department of Agriculture, 1973, Water Resources Board, Open files.

43. Kansas State Department of Health, 1973, Division of Environmental Health, Open files.

44. Kansas Water Resources Board, 1967, Kansas water atlas, 701' Project No. Kansas, Report Number 16(A).

45. ______, 1971, Kansas State Water Plan Studies, Statewide Land Classification, In cooperation with U.S. Department of Interior, Bureau of Reclamation.

46. ______, 1972, State Water Plan Studies, Part B, Kansas Long-Range Water Requirements.

47. Knight, Mrs., 1979, County Appraiser's Office, Franklin County, Kansas, oral communication.

48. Likes, G., 1973, Owner, Pleasant Valley Tourist Farm, Coffey County, Kansas, written communication.

49. Livergood, J., 1979, Kansas Department of Transportation, Planning and Development Section, Topeka, Kansas, oral communication.

50. Logan, M., 1973, City Clerk, Burlington, Kansas, written communication.

51. Long, M., 1979, Refuge Manager, Flint Hills National Wildlife Refuge, U.S. Fish and Wildlife Service, Hartford, Kansas, oral communication.

52. Mackey, H.L., 1974, Kansas State Board of Agriculture, Division of Water Resources, oral communication.

53. Murphy, G., 1973, Manager of Katy Elevator, written communication.

54. National Center for Health Statistics, 1979, Vital Statistics Report, Births, Marriages, Divorces, and Deaths for January 1979, DHEW Publication Number (PHS) 79-1120, Vol. 28, No. 1.

55. National Ocean Survey, 1973, Kansas City sectional aeronautical chart, National Ocean Survey, Washington, D.C., 9th edition.

56. Nusz, A., 1973, Owner, Nusz Elevator, written communication (May 3).

57. Oros, M. 0., 1963, Oil and gas pipelines and industries in Kansas, Oil and Gas Journal.

58. Rainbolt, R. H., 1973, Owner, Rainbolt and Son Wholesale Bait and Tackle, written communication (April 30).

59. Reilly, R. C., 1973, Employee of Phillips Pipeline Company, written communication (May 3).

60. Remer, M., 1979, Remer's Point Development, New Strawn, Kansas, oral communication.

61. Schlicher, V., 1979, County Appraiser's Office, Shawnee County, Kansas, oral communication.

62. Shotliff, H.E., 1973, Chief, Kansas City ARTC Center, written communication (June 6).

63. State Geological Survey of Kansas, 1973, Well logs, Open files.

64. State Highway Commission of Kansas, 1978, Traffic flow map, State highway system of Kansas, Topeka, Kansas.

65. Superintendent of Unified School District 244, 1979, Burlington, Kansas, oral communication.

66. Sutton, G.A., 1973, Engineer of planning and development, State Highway Commission of Kansas, written communication (August 1).

67. U. S. Bureau of the Census, 1971, Number of inhabitants, U. S. census of population--1970, U.S. Bureau of the Census, Final Report P.C. (1)-A18, Kansas.

68. _______, 1977, Projections of the population of the United States: 1977 to 2050, Current Population Reports, U.S. Bureau of the Census, Series P-25, No. 704.

69. _______, 1978, Illustrative Projections of State Populations: 1975 to 2000. Current Population Reports, U.S. Bureau of the Census, Department of Commerce, Series P-25, No. 735.

70. U. S. Department of Transportation, 1971, Motor carrier safety regulations--rules and regulations, Federal register, U.S. Department of Transportation, Vol. 36, No. 241.

71. Vajne, Mrs. J., 1979, Honey Tree Preschool, New Strawn, Kansas, oral communication.

72. Yokum, T., 1979, Biology Instructor, Burlington High School, Burlington, Kansas, oral communication.

73. Wolf Creek Radiological Emergency Response Plan, Revision 15.

74. Bureau of the Census, 1981, Number of inhabitants, U.S. Census of population -- 1980, U.S. Bureau of the Census, Final Report.

TABLE 2.1-1 Sheet 1 of 4

POPULATION OF INCORPORATED
PLACES WITHIN 50 MILES OF THE SITE

	1960	1970	1960/1970 Percent Change	1980	1970/1980 Percent Change	Location (miles from site)
Allen County						
Basset	67	62	- 7.5	31	-50	27.7 SE
Elsmore	128	116	- 9.4	104	-10.3	42.0 SE
Gas	342	438	28.1	543	24	28.3 SE
Humboldt	2,285	2,249	- 1.6	2,230	- 0.8	32.1 SSE
Iola	6,885	6,493	- 5.7	6,938	6.9	25.9 SE
La Harpe	529	509	- 3.8	686	34.8	29.6 SE
Mildred	60	42	-30.0	64	52.4	31.1 ESE
Moran	549	550	0.2	643	16.9	35.4 SE
Savonburg	131	109	-16.8	113	3.7	44.2 SE
Anderson County						
Colony	419	382	- 8.8	474	24.1	20.8 ESE
Garnett	3,034	3,169	4.4	3,310	4.4	23.3 E
Greeley	415	368	-11.3	405	10.1	31.8 ENE
Harris	36	41	13.9	80	95.0	13.7 NE
Kincaid	220	189	-14.1	192	1.6	30.5 ESE
Lone Elm	69	66	- 4.3	55	16.7	26.2 ESE
Westphalia	249	185	-25.7	204	10.3	10.6 ESE
Bourbon County						
Bronson	354	397	12.1	414	4.3	41.1 SE
Mapleton	127	112	-11.8	121	8.0	46.0 ESE
Uniontown	211	286	35.5	371	30.7	46.6 SE
Butler County						
(none)						
Chase County						
Cottonwood Falls	971	987	1.6	954	- 3.3	46.4 WNW
Matfield Green	95	77	-18.9	71	- 7.8	47.3 W
Strong City	659	545	-17.3	675	23.9	46.9 WNW

Source: References 67 and 74

TABLE 2.1-1 (continued) Sheet 2 of 4

	1960	1970	1960/1970 Percent Change	1980	1970/1980 Percent Change	Location (miles from site)
Coffey County						
Burlington	2,113	2,099	- 0.7	2,901	38.2	3.5 SW
Gridley	321	328	2.2	404	23.2	14.2 SW
Lebo	498	589	18.3	966	64.0	14.5 NW
Le Roy	601	551	- 8.3	701	27.2	10.8 SSE
New Strawn*	-	-	-	457	-	3.0 NW
Waverly	381	510	33.9	671	31.6	11.1 NNE
Douglas County						
Baldwin City	1,877	2,520	34.3	2,829	12.3	45.8 NE
Elk County						
(none)						
Franklin County						
Lane	282	254	- 9.9	249	- 2.0	35.0 ENE
Ottawa	10,673	11,036	3.4	11,016	- 0.2	32.5 NE
Pomona	489	541	10.6	868	60.4	29.9 NNE
Princeton	174	159	- 8.6	244	53.5	27.4 NE
Rantoul	157	163	3.8	212	30.1	35.2 NE
Richmond	352	464	31.8	510	9.9	25.4 ENE
Wellsville	984	1,183	20.2	1,612	36.3	46.0 NE
Williamsburg	255	286	12.2	362	-26.6	19.2 NE
Greenwood County						
Climax	81	64	-21.0	81	26.6	45.9 SW
Eureka	4,055	3,576	-11.8	3,425	- 4.2	42.9 SW
Fall River	226	191	-15.5	173	- 9.4	46.1 SSW
Hamilton	400	349	-12.8	363	4.0	31.3 SW
Madison	1,105	1,061	- 4.0	1,099	3.6	23.6 SW
Virgil	229	179	-21.8	169	- 5.6	24.2 SW
Johnson County						
(none)						

* New Strawn was incorporated in 1971.

TABLE 2.1-1 (continued)

	1960	1970	1960/1970 Percent Change	1980	1970/1980 Percent Change	Location (miles from site)
Linn County						
Blue Mound	319	308	- 3.4	319	3.6	37.7 ESE
La Cygne	810	989	22.1	1,025	3.6	48.0 E
Mound City	601	714	8.0	755	5.7	47.6 E
Parker	181	255	40.9	270	5.9	37.5 E
Lyon County						
Admire	149	144	- 3.4	158	9.7	34.9 NW
Allen	205	175	-14.6	205	17.1	38.4 NW
Americus	300	441	47.0	915	107.5	35.7 WNW
Bushong	51	39	-23.5	62	59.0	41.5 NW
Emporia	18,190	23,327	28.2	25,287	8.4	28.0 WNW
Hartford	337	478	41.8	551	15.3	14.8 WNW
Neosho Rapids	178	234	31.5	289	23.5	17.2 WNW
Olpe	722	453	-37.3	477	5.3	25.5 W
Reading	249	247	- 0.8	244	- 1.2	23.6 NW
Miami County						
Fontana	138	160	15.9	173	8.1	47.0 ENE
Osawatomie	4,622	4,294	-71.1	4,459	3.8	42.8 ENE
Paola	4,784	4,622	- 3.4	4,557	- 1.4	48.2 ENE
Morris County						
Dunlap	134	102	-23.9	82	-19.6	43.2 WNW
Neosho County						
Chanute	10,849	10,341	- 4.7	10,506	1.6	40.0 SSE
Earlton	104	102	- 1.9	79	-22.5	45.6 SSE
Stark	96	124	29.2	143	15.3	47.5 SE
Osage County						
Burlingame	1,151	999	-13.2	1,239	24.0	35.7 NNW
Carbondale	664	1,041	56.8	1,518	45.8	39.0 N
Lyndon	953	958	0.5	1,132	18.2	24.6 N
Melvern	376	455	21.0	481	5.7	17.7 N
Olivet	116	64	-44.8	65	1.6	16.3 N
Osage City	2,213	2,600	17.5	2,667	2.6	27.0 N
Overbrook	509	748	47.0	930	24.3	37.4 N
Quenemo	434	429	- 1.2	413	-3.7	24.8 NNE
Scranton	576	575	- 0.2	664	15.5	37.4 N

TABLE 2.1-1 (continued) Sheet 4 of 4

	1960	1970	1960/1970 Percent Change	1980	1970/1980 Percent Change	Location (miles from site)
Shawnee County						
Auburn	-	261	-	890	241.0	46.2 N
Wabaunsee County						
Eskridge	519	589	13.5	603	2.4	48.3 NNW
Harveyville	204	279	36.8	280	0.4	32.4 NNW
Wilson County						
Altoona	490	475	-3.1	564	18.7	48.8 S
Benedict	128	91	-28.9	111	22.0	41.5 S
Buffalo	422	321	-23.9	386	20.2	35.7 S
Coyville	133	93	-30.1	98	5.4	40.1 SSW
Fredonia	3,233	3,080	-4.7	3,047	-1.1	48.2 S
New Albany	104	59	-43.3	78	32.2	47.4 SSW
Woodson County						
Neosho Falls	222	184	-17.1	157	-14.7	16.8 SSE
Toronto	524	431	-17.7	466	8.1	32.8 SSW
Yates Center	2,080	1,967	- 5.4	1,998	1.6	23.9 S

TABLE 2.1-2 Sheet 1 of 4

RESIDENT POPULATION DISTRIBUTION
BY SECTOR AND RADIAL DISTANCE UP TO 10 Miles(1) (2)

		Radial Distance from Reactor (Miles)						
Sector	Year	0-1	1-2	2-3	3-4	4-5	5-10	10-Mile Total
N	1970	0	3	2	9	1	75	90
	1980	0	3	8	0	9	108	153
	1990	0	10	10	10	10	60	100
	2000	0	10	10	10	10	60	100
	2010	0	10	10	10	0	40	70
	2020	0	10	10	10	0	30	60
NNE	1970	0	1	1	5	18	147	172
	1980	0	0	7	10	18	260	295
	1990	0	10	10	10	20	140	190
	2000	0	10	10	10	20	140	190
	2010	0	10	10	10	10	110	150
	2020	0	0	0	10	10	90	110
NE	1970	0	1	4	11	6	74	96
	1980	0	1	8	15	7	131	162
	1990	0	10	10	10	10	70	110
	2000	0	10	10	10	10	60	100
	2010	0	0	10	10	10	50	80
	2020	0	0	10	10	10	40	70
ENE	1970	0	0	7	3	4	77	91
	1980	0	0	8	4	8	136	156
	1990	0	0	10	10	10	70	100
	2000	0	0	10	10	10	60	90
	2010	0	0	10	10	10	50	80
	2020	0	0	10	10	10	40	70

(1) If the projected population is less than 10, the projections have been rounded upward. Thus, if there are 2 persons projected, the number has been rounded to 10.

(2) 1980 data has been updated to reflect the results of the 1980 census and information from the Wolf Creek Emergency Plan. Sector populations were determined by distributing population figures minus known incorporated township populations in the same proportions as those present in 1970. Incorporated township populations were added back into the appropriate sector populations. Projections for 1990 thru 2020 have not been modified.

TABLE 2.1-2 (continued) Sheet 2 of 4

Sector	Year	0-1	1-2	2-3	3-4	4-5	5-10	10-Mile Total
		Radial Distance from Reactor (Miles)						
E	1970	0	3	1	1	1	61	67
	1980	0	3	1	1	2	108	115
	1990	0	10	10	10	10	50	90
	2000	0	10	10	10	10	40	80
	2010	0	10	0	0	0	30	40
	2020	0	10	0	0	0	20	30
ESE	1970	0	9	7	3	18	90	127
	1980	0	9	11	14	15	159	208
	1990	0	10	10	10	10	80	120
	2000	0	10	10	10	10	70	110
	2010	0	10	10	10	10	50	90
	2020	0	10	10	10	10	40	80
SE	1970	0	4	7	7	8	107	133
	1980	0	4	6	17	8	190	225
	1990	0	10	10	10	10	90	130
	2000	0	10	10	10	10	90	130
	2010	0	10	10	10	10	70	110
	2020	0	10	10	10	10	50	90
SSE	1970	2	7	7	1	9	260	286
	1980	0	7	1	8	15	460	491
	1990	0	0	0	10	10	250	270
	2000	0	0	0	0	10	240	250
	2010	0	0	0	0	10	200	210
	2020	0	0	0	0	10	150	160
S	1970	0	4	7	14	8	84	117
	1980	0	4	0	27	14	149	194
	1990	0	0	0	10	10	70	90
	2000	0	0	0	10	10	60	80
	2010	0	0	0	10	10	50	70
	2020	0	0	0	10	10	30	50
SSW	1970	0	0	0	0	7	89	96
	1980	0	0	0	0	10	158	168
	1990	0	0	0	0	10	80	90
	2000	0	0	0	0	10	80	90
	2010	0	0	0	0	10	60	70
	2020	0	0	0	0	10	50	60

TABLE 2.1-2 (continued) Sheet 3 of 4

		Radial Distance from Reactor (Miles)						
Sector	Year	0-1	1-2	2-3	3-4	4-5	5-10	10-Mile Total
SW	1970	2	0	6	652	1,431	211	2,302
	1980	0	0	13	910	1,978	374	3,275
	1990	0	0	10	790	1,730	230	2,760
	2000	0	0	10	860	1,880	230	2,980
	2010	0	0	10	780	1,700	200	2,690
	2020	0	0	10	690	1,500	170	2,370
WSW	1970	0	0	11	29	13	66	119
	1980	0	0	18	16	41	117	112
	1990	0	0	10	30	10	50	100
	2000	0	0	10	30	10	50	100
	2010	0	0	10	20	10	40	80
	2020	0	0	10	20	10	30	70
W	1970	1	0	13	1	0	43	58
	1980	0	0	17	3	0	76	96
	1990	0	0	10	10	0	30	50
	2000	0	0	10	10	0	30	50
	2010	0	0	10	10	0	20	40
	2020	0	0	10	10	0	10	30
WNW	1970	0	0	3	49	14	24	90
	1980	0	0	13	507	15	43	578
	1990	0	0	10	760	90	20	880
	2000	0	0	10	990	100	20	1,120
	2010	0	0	10	1,220	110	10	1,350
	2020	0	0	10	1,240	120	10	1,380
NW	1970	1	0	22	46	9	54	132
	1980	0	0	11	22	76	96	205
	1990	0	0	20	390	10	40	460
	2000	0	0	20	510	10	40	580
	2010	0	0	10	630	10	30	680
	2020	0	0	10	650	10	20	690
NNW	1970	0	0	13	5	5	60	83
	1980	0	0	19	14	0	106	139
	1990	0	0	10	10	10	50	80
	2000	0	0	10	10	10	40	70
	2010	0	0	10	10	10	30	60
	2020	0	0	10	10	10	20	50

TABLE 2.1-2 (continued) Sheet 4 of 4

Radial Distance from Reactor (Miles)

Sector	Year	0-1	1-2	2-3	3-4	4-5	5-10	10-Mile Total
Total	1970	6	32	111	836	1,552	1,522	4,059
	1980	0	32	141	1,709	2,215	2,696	6,652
	1990	0	60	140	2,080	1,960	1,380	5,620
	2000	0	60	140	2,490	2,120	1,310	6,120
	2010	0	50	120	2,740	1,920	1,040	5,870
	2020	0	40	110	2,690	1,730	800	5,370

TABLE 2.1-3 Sheet 1 of 3

RESIDENT POPULATION DISTRIBUTION
BY SECTOR AND RADIAL DISTANCE BETWEEN 10 AND 50 MILES(1)

			Radial Distance from Reactor (Miles)				
Sector	Year	10-Mile Total	10-20	20-30	30-40	40-50	50-Mile Total
N	1970	90	612	2,006	2,280	11,298	16,286
	1980	153	643	2,370	3,001	12,097	18,264
	1990	100	510	2,030	2,550	16,900	22,090
	2000	100	460	2,000	2,680	20,100	25,340
	2010	70	360	1,720	2,480	23,100	27,730
	2020	60	270	1,440	2,260	26,100	30,130
NNE	1970	172	650	1,593	1,453	3,627	7,495
	1980	295	855	2,061	1,556	3,884	8,651
	1990	190	570	1,360	1,330	2,950	6,400
	2000	190	530	1,240	1,260	2,710	5,930
	2010	150	420	990	1,050	2,410	5,020
	2020	110	330	780	860	2,100	4,180
NE	1970	96	716	1,101	12,846	4,297	19,056
	1980	162	906	1,689	12,879	5,153	20,789
	1990	110	650	940	15,000	4,430	21,130
	2000	100	620	850	15,100	4,520	21,190
	2010	80	500	690	14,000	4,160	19,430
	2020	70	400	540	12,800	3,750	17,560
ENE	1970	91	477	1,449	2,248	9,120	13,385
	1980	156	930	1,592	2,364	9,230	14,272
	1990	100	330	1,210	2,000	11,400	15,040
	2000	90	270	1,100	1,880	12,700	16,040
	2010	80	190	890	1,540	12,000	14,700
	2020	70	140	710	1,230	11,100	13,250
E	1970	67	563	4,266	1,030	1,553	7,479
	1980	115	603	4,456	1,090	1,328	7,592
	1990	90	380	3,940	810	1,410	6,630
	2000	80	310	3,760	730	1,350	6,230
	2010	40	220	3,240	560	1,110	5,170
	2020	30	160	2,730	420	890	4,230

(1) 1980 data has been updated to reflect the results of the 1980 census. Each zone was assumed to have a total population percentage change equal to the change in populations of cities in that zone between 1970 and 1980. Zones which contain no cities or cities whose populations are a small fraction of the total zone population were assumed to have a total population percentage change equal to the change in population of all cities within a 50 mile radius of Wolf Creek between 1970 and 1980.

TABLE 2.1-3 Sheet 2 of 3

RESIDENT POPULATION DISTRIBUTION
BY SECTOR AND RADIAL DISTANCE BETWEEN 10 AND 50 MILES(1)

		Radial Distance from Reactor (Miles)					
Sector	Year	10-Mile Total	10-20	20-30	30-40	40-50	50-Mile Total
ESE	1970	127	466	562	1,212	1,532	3,899
	1980	208	514	544	1,326	1,655	4,247
	1990	120	310	370	870	1,290	2,960
	2000	110	250	300	740	1,190	2,590
	2010	90	180	210	550	960	1,990
	2020	80	130	150	400	750	1,510
SE	1970	133	305	7,525	2,433	1,779	12,175
	1980	225	327	8,277	2,856	1,974	13,659
	1990	130	210	7,450	2,180	1,370	11,340
	2000	130	170	7,370	2,060	1,190	10,920
	2010	110	120	6,450	1,720	930	9,330
	2020	90	80	5,510	1,410	700	7,790
SSE	1970	286	754	1 176	3,810	13,388	19,414
	1980	491	880	1,259	3,778	13,570	19,978
	1990	270	630	850	3,550	12,300	17,600
	2000	250	580	720	3,410	11,600	16,560
	2010	210	450	540	2,920	10,100	14,220
	2020	160	350	400	2,450	8,710	12,070
S	1970	117	152	2,798	986	4,367	8,420
	1980	194	163	2,842	1,189	4,436	8,824
	1990	90	100	2,430	720	4,730	8,070
	2000	80	80	2,240	620	4,930	7,950
	2010	70	60	1,860	460	4,360	6,810
	2020	50	40	1,500	340	3,770	5,700
SSW	1970	96	336	660	290	947	2,329
	1980	168	360	707	314	964	2,513
	1990	90	220	450	210	680	1,650
	2000	90	180	370	170	580	1,390
	2010	70	130	270	130	430	1,030
	2020	60	90	200	90	310	750
SW	1970	2,302	495	452	524	4,332	8,105
	1980	3,275	606	427	545	4,173	9,026
	1990	2,760	430	210	280	3,570	7,250
	2000	2,980	410	140	200	3,200	6,930
	2010	2,690	320	90	130	2,590	5,820
	2020	2,370	240	50	80	2,040	4,780

TABLE 2.1-3 Sheet 3 of 3

RESIDENT POPULATION DISTRIBUTION
BY SECTOR AND RADIAL DISTANCE BETWEEN 10 AND 50 MILES(1)

			Radial Distance from Reactor (Miles)				
Sector	Year	10-Mile Total	10-20	20-30	30-40	40-50	50-Mile Total
WSW	1970	119	418	986	868	260	2,651
	1980	192	448	1,021	930	278	2,869
	1990	100	320	560	480	130	1,590
	2000	100	280	410	350	90	1,230
	2010	80	210	280	230	60	860
	2020	70	150	180	150	40	590
W	1970	58	460	1,908	1,415	993	4,834
	1980	96	492	2,009	1,515	915	5,027
	1990	50	380	1,730	1,280	920	4,360
	2000	50	340	1,620	1,220	910	4,140
	2010	40	260	1,290	1,000	760	3,350
	2020	30	190	1,000	800	620	2,640
WNW	1970	90	415	19,119	6,382	1,491	27,497
	1980	578	490	20,725	6,842	1,561	30,196
	1990	880	370	28,200	8,800	1,320	39,570
	2000	1,120	350	33,800	10,300	1,260	46,830
	2010	1,350	280	34,300	10,200	1,030	47,160
	2020	1,380	220	33,900	9,870	810	46,180
NW	1970	132	851	783	1,056	828	3,650
	1980	205	1,396	773	1,202	1,316	4,892
	1990	460	910	670	900	650	3,590
	2000	580	930	620	820	580	3,530
	2010	680	800	480	640	440	3,040
	2020	690	670	360	480	330	2,530
NNW	1970	83	252	3,168	1,314	2,342	7,159
	1980	139	270	3,250	1,630	2,508	7,797
	1990	80	190	3,350	1,150	2,720	7,490
	2000	70	160	3,380	1,070	2,930	7,610
	2010	60	120	2,960	850	2,600	6,590
	2020	50	90	2,520	650	2,260	5,570
Total	1970	4,059	7,922	49,552	40,147	62,154	163,834
	1980	6,652	9,883	54,002	43,017	65,042	178,596
	1990	5,620	6,510	55,750	42,110	66,770	176,760
	2000	6,120	5,920	59,920	42,610	69,840	184,410
	2010	5,870	4,620	56,260	38,460	67,040	172,250
	2020	5,370	3,550	51,970	34,290	64,280	159,460

TABLE 2.1-4

SCHOOLS WITHIN 10 MILES OF THE SITE

School District	School	Enrollment	Location (miles from site)
244	Elementary School	305	4.3 SW
	Middle School	236	4.3 SW
	High School	231	4.3 SW
	Outdoor Laboratory for Environmental Education	Transient from enrollment listed above	4.3-5.7 WNW
Private	Honey Tree Preschool (New Strawn)	30	3.0 NW
		10 3-year olds	
	Alleluia Academy	9	4.3 SW
	Immanuel Baptist Academy	17	4.3 SW
	Life Christian School	14	9.5 SW

Sources: References 65, 71, 72 and 73

Note: For locations of some of these facilities, see Figure 2.1-21.

TABLE 2.1-5

HOSPITALS AND NURSING HOMES
WITHIN 10 MILES OF THE SITE

	Capacity (beds)	Staff	Planned Expansion	Location (miles from site)
Coffey County Hospital	26	80	None	3.7 SW
Golden Age Lodge	102	70	None	3.7 SW

Sources: - References 25, 27 and 73

Note: For location of these facilities, see Figure 2.1-21.

TABLE 2.1-6

CORRECTIONAL FACILITIES
WITHIN 10 MILES OF THE SITE

Facility	Maximum Capacity (prisoners)	Employees	Location (miles from site)
Coffey County Jail	19	7	4.2 SW

Source: Reference 24

Note: For location of this facility, see Figure 2.1-21.

TABLE 2.1-7

RECREATION FACILITIES WITHIN 10 MILES OF THE SITE

Location	Activities	Visitor Statistics	Location (miles from site)
Coffey County Fairgrounds	Baseball Football Tractor Pulling	100-150/game 500-600/game 1,700-2,000/contest	4.2 SW
Drake Park	Fishing Camping Picnicking	25-35	3.3 SW
Floral Park	Band Concerts General Use Picnicking	75	4.2 SW
Flint Hills National Wildlife Refuge	Warmwater Fishing Other Sightseeing	4,098/month 3,868/month 8,827/month 16,791/top peak month (June 1978)	6.8 - 20.8 NW
John Redmond Reservoir	Boating Fishing Picnicking	380,000/year	3.5 W
Katy Park	Tennis Baseball Swimming	 50-75 /game 300 daily	4.6 SW
Pleasant Valley Tourist Farm	Campsites	8 permanent 5 maximum transient	3.2 WSW

TABLE 2.1-7

RECREATION FACILITIES WITHIN 10 MILES OF THE SITE

Location	Activities	Visitor Statistics	Location (miles from site)
Wolf Creek Lake	Warmwater Fishing	Approximately 250 people per day	Wolf Creek Lake is adjacent to the site
Rock Creek Country Club	Golf Dancing Billiards Dining	90-120 at one time	4.8 SW
Arrowhead Hills	Golf	85-90 day on summer weekend	3.5 NW

Sources: References 1, 6, 9, 17, 31, 32, 48, 50, and 51

Note: For locations of these facilities, see Figure 2.1-21.

TABLE 2.1-8 Sheet 1 of 2

POPULATION DISTRIBUTION WITHIN THE
LOW POPULATION ZONE, 1970 and 1980*

Sector	Year	0-1	1-2	2-2.5	Total
N	1970	0	3	1	4
	1980	0	3	4	7
NNE	1970	0	1	1	2
	1980	0	7	5	12
NE	1970	0	1	2	3
	1980	0	1	4	5
ENE	1970	0	0	4	4
	1980	0	0	4	4
E	1970	0	3	1	4
	1980	0	3	1	4
ESE	1970	0	9	4	13
	1980	0	9	6	15
SE	1970	0	4	4	8
	1980	0	4	3	7
SSE	1970	2	7	4	13
	1980	0	7	1	10
S	1970	0	4	4	8
	1980	0	4	0	4
SSW	1970	0	0	0	0
	1980	0	0	0	0
SW	1970	2	0	3	5
	1980	0	0	7	7
WSW	1970	0	0	6	6
	1980	0	0	9	9

*For the 2- to 2.5-mile area outside the cooling lake, the population was apportioned 1/2 in the LPZ and 1/2 out of the LPZ (Table 2.1-2).

TABLE 2.1-8 (Continued)

Sector	Year	0-1	1-2	2-2.5	Total
W	1970	1	0	4	5
	1980	0	0	9	9
WNW	1970	0	0	2	2
	1980	0	0	7	7
NW	1970	1	0	11	12
	1980	0	0	6	6
NNW	1970	0	0	7	7
	1980	0	0	10	10
Grand	1970	6	32	58	96
Total	1980	0	38	76	114

TABLE 2.1-9

COMPARISON OF PROJECTED POPULATION DENSITY DISTRIBUTIONS FOR 1980 FOR VARIOUS FERTILITY AND MIGRATION PATTERNS

Distance from Site	Cumulative Population Density (Persons per Square Mile): 2.1 Fertility[a] 1965 to 1975 Migration	2.1 Fertility[a] No Migration[c]	2.7 Fertility[b] 1965 to 1975 Migration	2.7 Fertility[b] No Migration[c]
0 - 1	0	0	0	0
0 - 2	10	10	10	10
0 - 3	10	10	10	10
0 - 4	38	38	38	39
0 - 5	47	48	48	49
0 - 10	16	16	16	16
0 - 20	10	10	10	10
0 - 30	23	23	23	23
0 - 40	21	21	21	21
0 - 50	21	22	22	22

[a]Replacement fertility.

[b]Growth fertility.

[c]The no-migration assumption means that continuing out-migration trends would cease.

TABLE 2.1-10

COMPARISON OF POPULATION DENSITY DISTRIBUTIONS
FOR 2020 FOR VARIOUS FERTILITY AND MIGRATION PATTERNS

Distance from Site	Cumulative Population Density (Persons per Square Mile)			
	2.1 Fertility(a) 1965 to 1975 Migration	2.1 Fertility(a) No Migration(c)	2.7 Fertility(b) 1965 to 1975 Migration	2.7 Fertility(b) No Migration(c)
0 - 1	0	0	0	0
0 - 2	5	5	5	6
0 - 3	7	7	7	8
0 - 4	21	21	24	26
0 - 5	57	59	63	66
0 - 10	15	16	17	18
0 - 20	7	7	8	8
0 - 30	22	22	25	27
0 - 40	19	20	23	24
0 - 50	20	21	24	26

aReplacement fertility.

bGrowth fertility.

cThe no-migration assumption means that continuing out-migration trends would cease.

2.2 NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES

2.2.1 LOCATIONS AND ROUTES

Information in this section is historical and reflects conditions at the time of plant licensing. This material will not be updated as a whole as it establishes the conditions relevant to plant siting. Changes to facilities or conditions will be reviewed and updated only when potential hazards not previously analyzed are identified.

2.2.1.1 Military Facilities

The Kansas Army National Guard Armory, located 3.9 miles southwest of the plant site in Burlington, is the only military facility within a 5-mile radius of the plant site. It is currently used by Battery "C", 1st Battalion, 127th Field Artillery, Kansas Army National Guard 35th division. Battery "C" is composed of three officers and 40 enlisted men. Two self-propelled 155-millimeter howitzers are located at the armory. No explosive ordnance or ammunition for the howitzers is stored at the armory. Only a classified amount of small arms ammunition is stored on the premises (Reference 1). Pertinent data regarding the armory are presented in Tables 2.2-1 and 2.2-2 and its location is shown on Figure 2.2-1. No projections concerning the future status of the facility or the future storage of ordinance or ammunition are currently available.

A deactivated Nike missile base is located near the town of Melvern, approximately 10 miles north of the plant site. There are no military firing or bombing ranges within 10 miles of the plant site.

2.2.1.2 Manufacturing Plants, Storage Facilities, and Mining

2.2.1.2.1 Manufacturing Plants

The Clarkson Construction Company field office is located 3.1 miles south-southeast of the plant site (Figure 2.2-1). At this facility, Clarkson Construction employs nine persons and stores six twin engine scrapers, two water wagons, a double ganged disc and a shop crane. There is one 2,000-gallon gasoline storage tank located underground. The Company stores up to 20 barrels (55-gallons each) of lube oil and hydraulic fluid.

2.2.1.2.2 Offsite Storage Facilities

There are a number of offsite storage facilities for petroleum and agricultural products within a 5-mile radius of the plant site (Figure 2.2-1). The number of personnel employed at the facilities is shown on Table 2.2-1. Petroleum bulk storage facilities are usually unattended except during loading and unloading operations. There are no current plans for expansion at any of the offsite storage facilities.

The Bolton Oil Company has a bulk storage facility located 4.7 miles southwest of the plant site in Burlington. This facility consists of three 12,000-gallon gasoline storage tanks (Reference 3).

The Burlington Municipal Light Plant, located 4.6 miles southwest of the plant site in Burlington, has four 10,000-gallon storage tanks. The tanks store diesel fuel used for electricity generation during peak demand periods (Reference 2).

United Oil Company has a plant facility located in Burlington, 4.4 miles southwest of the plant site. There are five storage tanks at this site. Three tanks, two 10,000-gallon, and one 5,000-gallon, are used for gasoline; and two 10,000-gallon tanks are used for diesel fuel (Reference 27).

United Oil Company has a bulk storage facility located 4.6 miles southwest of the plant site. There are six tanks at this site; four of these tanks are for gasoline storage, one 10,000 gallon, one 15,000 gallon, and two 3,000 gallon. One 15,000 gallon tank is used for diesel fuel and one 10,000 gallon tank sits empty (Reference 27).

Conoco Oil has a bulk storage facility located in Burlington, 4.7 miles southwest of the plant site. There are four bulk tanks at this facility. Two are 15,000-gallon tanks, one for diesel fuel and one for gasoline. One 4,000-gallon tank stores heating oil, and another 3,000-gallon tank is used for gasoline (Reference 12).

The Standard Oil Company has three bulk storage tanks located 4.7 miles southwest of the plant site in Burlington. There is one 17,600-gallon split tank (8,800 gallons on each side). This stores diesel fuel in half and heating oil in the other half. There is also a 17,600-gallon gasoline storage tank and a 10,000-gallon premium diesel fuel tank (Reference 17).

The Union Gas Company has a bulk storage facility located 4.4 miles southwest of the plant site. It consists of one 30,000-gallon propane storage tank (Reference 31).

There are three bulk grain and fertilizer storage facilities within 5 miles of the plant site. The fertilizer stored is usually ammonium nitrate.

The KEPCo Generating Facility, located 2.5 miles north of the plant site, has ten 4,200 gallon diesel fuel storage tanks.

The Katy Elevator & Co. is located 4.5 miles southwest of the plant site in Burlington. The elevator has a 120,000-bushel capacity that stores bulk grains such as wheat, milo, and soybeans. The grain is used primarily for livestock feed (Reference 21).

The McCurry Feed and Supply Company is located 2.9 miles north of the site at Sharpe. There is one 20,000-bushel bin, one 13,000-bushel bin, and two 7,500-bushel bins, one wood frame storage 8,500 bushel, all used for grain storage. A dry fertilizer building has a storage capacity of 150 tons. There are also two liquid storage tanks: a 24,000-gallon tank for liquid fertilizer and a 6,000-gallon tank for liquid feed (Reference 18).

2.2.1.2.3 Mining

Quarrying of limestone is the only mining activity near the plant site. Quarrying in the area is a small-scale operation. The amount of limestone extracted from an individual quarry usually ranges from 30,000 to 50,000 tons. The operating life of quarries in Coffey County is usually from several months to 2 years (Reference 10).

The only operating quarry within 5 miles of the site is owned by Nelson Quarry, Inc. It is located 3 miles south-southeast of the plant site (Figure 2.2-1). The quarry has a potential reserve of approximately 150,000 tons of rock. The maximum quantity of explosives stored at the quarry is approximately 15 tons of ammonium nitrate-fuel oil mixture (Reference 25). This quarry is in operation approximately 1/4 of the year; the rest of the time it is unoccupied.

Coal resources are negligible in Coffey County (Reference 5). In the area of the site, only one coal seam of extent is present, the Williamsburg Coal. Throughout the site, this coal ranges in thickness from 0.1 to 0.8 foot and is present in the subsurface at the plant site at a depth of about 104 feet (elevation 1,002) (Section 2.5.1.2).

From approximately 1890 to 1916, five small mines were operated near the site with the coal used for home use and threshing operations. These mines were located in Section 21, Township 20 South, Range 17 East (approximately 9 miles northwest of the plant site); Section 29, Township 20 South, Range 17 East (approximately 7.5 miles northwest of the plant site); Section 14, Township 21 South, Range 16 East (approximately 4 miles south-southeast of the plant site); Section 28, Township 21 South, Range 16 East (approximately

3.5 miles south-southeast of the plant site); and Section 33, Township 21 South, Range 16 East (approximately 4.5 miles southeast of the site) (Reference 4).

No mines in the immediate area have been in operation since approximately 1916 and none are proposed. It is presently not economically feasible to remove the thin Williamsburg Coal; therefore, instability due to removal of coal is not a factor to be considered in plant design.

The locations of oil fields in and near Coffey County are discussed and illustrated in Section 2.5. The closest producing oil field is the Avon Field, located 5.5 miles south-southwest of the plant site. The production quantities are also discussed in Section 2.5.

2.2.1.2.4 Onsite Storage Facilities

Storage vessels, which are not part of the standard plant, will be provided in the plant site area for the following chemicals:

Stored under pressure:
- Oxygen
- Hydrogen
- Nitrogen
- Ethanolamine (cover gas may be slightly pressurized)

Not stored under pressure:
- Heating Fuel Oil
- Sulfuric Acid
- Sodium Hydroxide
- Ammonium Hydroxide or Ethanolamine
- Sodium Hypochlorite
- Soldium Bromide
- Anti-Scale

Refer to Section 9.5.8 on the effects of stored gasses on the operability of the Emergency Diesel Engines. A description of the storage vessels for each of these substances is given below.

2.2.1.2.4.1 Hydrogen

Hydrogen is used as a coolant for the generator and for maintaining water chemistry in the plant. Hydrogen is stored as a gas in high pressure storage vessels located near the 345-kilovolt switchyard and adjacent to the carbon dioxide storage area as shown on Figure 1.2-44. The vessels have been designed to accommodate a maximum pressure of 2,450 psig and have a combined capacity of approximately 120,000 standard cubic feet of hydrogen. Safety relief valves are provided to prevent a rupture of the vessels.

The bulk hydrogen storage facility is located 975 feet from the nearest safety-related structure which is the Auxiliary Building. Due to the distance this structure is from any safety-related structure, a postulated fire within this facility does not pose a hazard to systems required for safe shutdown. The bulk storage area is rocked and kept brush free to prevent any brush fire from impinging on the storage tanks. There is a fire hydrant within 100 feet of the facility and portable fire extinguishers. Within the facility, the truck unloading piping is provided with one check valve, one shutoff valve and one purge valve. The purge pipe is piped away from the operator and vented upwards to the atmosphere. The purge pipe is also protected from entrance of rain, snow, dust, and other debris.

The truck unloading stanchion has equipment to electrically ground the trucks, control cabinet piping, steel framing, and the storage tubes.

The main generator is maintained at a minimum of 90% H_2 purity. During normal operation hydrogen is supplied to the main generator from the bulk storage through the regulator and into the upper sparging line. If maintenance is required, the main generator is first purged with CO_2, from the bulk storage through the repositioned 2-port selector valve and into the lower sparging line. The hydrogen is forced through the upper sparging lines and out the vent on the Turbine Building roof. There is a portable gas monitor connected to the test plug on the exhaust line to measure the purity of hydrogen or carbon dioxide going out the vent. When the hydrogen concentration in the generator is about 5% (95% CO_2) the generator is then opened to atmosphere. After maintenance is complete, the generator is purged with CO_2 again. The CO_2 concentration leaving the vent line is measured and when the CO_2 concentration is above 75% then the generator can be purged with hydrogen.

The generator seal oil system is designed to provide the hydrogen seal. There is a normal pump and an emergency D.C pump for backup protection and the main turbine lube oil system can be used if needed. The seal oil that returns first enters a hydrogen detraining tank to allow any hydrogen to be vented back to the generator. The seal oil system is protected from fire by an automatic water spray system actuated by thermal detectors which alarm in the main control room. Any hydrogen leakage from the generator that enters the upper floor of the Turbine Building is exhausted by the Turbine Building roof fans.

The Volume Control Tank is the only other piece of equipment that uses bulk hydrogen. There is only a hydrogen and a nitrogen supply to this tank. There is no interface with the atmosphere.

During normal plant operations the operating agent's Administrative procedures specify the use of proper tools and safety precautions while working in areas or on equipment that contains hydrogen.

2.2.1.2.4.2 Carbon Dioxide

Carbon dioxide is used for purging the turbine generator. Carbon dioxide is supplied from a tanker truck connected to plant piping in the turbine building. (Reference M-10KH section 3.1.1.)

Carbon dioxide is a hazardous chemical that can act as an asphyxiant. Concentrations of 10 percent (100,000 ppm) can produce unconsciousness and death from oxygen deficiency. The federal standard for permissible exposure limits to carbon dioxide is a time-weighted average of 5,000 ppm (9,000 mg/m3) for a normal 8-hour day or 40 hour work week (Reference 29).

2.2.1.2.4.3 Nitrogen

Nitrogen is used as an inert blanket gas for piping and for the accumulator tanks in the high pressure injection system. Nitrogen is stored as a liquid in a 3,200-gallon (gross), 3,082-gallon (net), (287,000 standard cubic feet of nitrogen) capacity cryogenic vessel located southwest of the plant and adjacent to the oxygen storage area as shown on Figure 1.2-44. The cryogenic vessel was designed to accommodate a maximum pressure of 245 psig; the tank is provided with safety relief valves and rupture discs to prevent a rupture of the cryogenic vessel. This low-pressure nitrogen system may be used for an emergent purge of the Main Generator.

At the same location, nitrogen gas is also stored in high pressure storage vessels. These vessels have been designed to accommodate a maximum pressure of 2,450 psig and have a combined maximum capacity of approximately 35,520 standard cubic feet of nitrogen. A safety relief is provided to prevent a rupture of the high pressure vessels.

2.2.1.2.4.4 Oxygen

Oxygen gas is utilized in the chemical volume and control system hydrogen recombiner. Oxygen gas is stored in high pressure storage vessels located southwest of the plant and adjacent to the nitrogen storage area as shown on Figure 1.2-44.

The storage vessels were designed to accommodate a maximum pressure of 2,450 psig and have a combined capacity of approximately 60,900 standard cubic feet of oxygen. Safety relief valves are provided to prevent a rupture of the vessels.

2.2.1.2.4.5 Heating Fuel Oil

A maximum of 470,000 gallons of No. 2 grade fuel oil is stored at the site. The storage tank is located southwest of the power block (Figure 1.2-44) and is confined by a berm which prevents the release of fuel oil if failure of the tank should occur. The spillage from the tank would be handled according to a spill prevention control and countermeasure plan and would have no adverse environmental impact. No. 2 grade fuel oil has a low volatility since its vapor pressure is usually less than 0.1 pound per square inch.

2.2.1.2.4.6 Sulfuric Acid

A maximum of 11,000 gallons of a 66 Baume solution of sulfuric acid is stored indoors at the shop building. The acid is stored in a carbon steel tank lined with a protective coating which is confined by a berm. This prevents the accidental release of sulfuric acid to the immediate area.

A maximum of 6400 gallons of a 66 Baume' solution of sufuric acid is stored indoors at the wastewater treatment facility. The acid is stored in a carbon steel tank lined with a protective coating which is confined by a curbed area which drains to a sump that discharges into the wastewater treatment system retention basins. This prevents the accidental release of sulfuric acid to the immediate area.

Sulfuric acid is a hazardous chemical that is irritating to the skin, eyes and mucous membranes. The federal standard for permissible exposure limits is a time-weighted average of 2 mg/m^3 for a normal 8-hour day or 40-hour work week (Reference 29).

2.2.1.2.4.7 Sodium Hydroxide

A maximum of 16,000 gallons of a 50-percent solution of sodium hydroxide is stored in a carbon steel tank lined with a protective coating indoors at the shop building (Figure 1.2-44). This tank is confined by the same berm used to confine the sulfuric acid tank to prevent any accidental releases to the immediate area.

A maximum of 17,900 gallons of 50-percent solution of sodium hydroxide is stored indoors at the wastewater treatment facility in a carbon steel tank lined with a protective coating. This tank is confined by a curbed area which drains to a sump that discharges into the wastewater treatment system retention basins in order to prevent accidental releases to the immediate area or mixing with the contents of the adjacent acid storage tank.

Sodium hydroxide is a hazardous chemical that is very corrosive to body tissue. The federal standard for permissible exposure limits is 2 mg/m^3 for an 8-hour time-weighted average concentration (Reference 29).

2.2.1.2.4.8 Ammonia Hydroxide (28-30%)

A maximum of (22) 55 gallon barrels of ammonium hydroxide is stored in a separate storage room in the Turbine Building.

Ammonium hydroxide is a hazardous chemical that is irritating and corrosive to the eyes, skin and mucous membranes. The current federal standard (NIOSH) recommends a ceiling of 50 ppm for ammonia gas.

2.2.1.2.4.9 Hydrazine (35% solution)

Hydrazine is purchased in a 35% contained hydrazine solution and transferred into various permanent site storage tanks. After hydrazine is added to a permanent site storage tank, the hydrazine solution is further diluted to less than 17.0% solution before being injected into the process fluid systems. A maximum of 1200 gallons of 35% hydrazine solution may be stored in the turbine building in any combination of 55 gallon drums or totes in room 4326 or in the bermed area for tanks TAQ01A/B and TAQ02A/B (totes are a returnable stainless steel small bulk tanks). An alternate less toxic chemical known as Carbohydrazide is also used for oxygen control in place of hydrazine.

Hydrazine is a hazardous chemical that is a suspect human carcinogen and is irritating to the skin, eyes and membranes. The federal standard for permissible exposure limits is a time-weighted average of 1 ppm (1.3 mf/m^3) for a normal 8-hour workday of a 40 hour workweek.

2.2.1.2.4.10 Sodium Hypochlorite, 7-15% solution

Sodium hypochlorite, in conjunction with sodium bromide, is used to control biological growth in the service water and circulating water systems. Sodium hypochlorite is a liquid, and it is stored in a single, nominal 10,000 gallon, fiber glass tank. The tank is located inside the Chemical Addition Building (CAB) and is vented to the outside. The CAB berm is designed to contain accidental leakage.

Sodium hypochlorite is corrosive, and it is an irritant when inhaled, ingested or contacts the skin and eyes. It is not volatile, flammable or explosive.

2.2.1.2.4.11 Sodium Bromide, 40% solution

Sodium bromide, in conjunction with sodium hypochlorite, is used to control biological growth in the service water and circulating water systems. Sodium bromide is a liquid, and it is stored in a single, nominal 6,000 gallon, polyolefin tank. The tank is located inside the CAB and is vented to the outside. The CAB berm is designed to contain accidental leakage.

Sodium bromide is moderately irritating to the eyes. It is not volatile, flammable or explosive.

2.2.1.2.4.12 Dispersant/Antiscalant (Anti-Scale)

Anti-scale chemical is used to prevent precipitation of scale-forming salts in the service water and circulating water systems. The anti-scale chemical is a liquid and it is stored in a single nominal 6,000 gallon polyethylene tank. The tank is located inside the CAB and is vented to the outside. The CAB berm is designed to contain accidental leakage.

The anti-scale chemical is a dispersant/anti-scalant.

2.2.1.3 Airports and Air Routes

2.2.1.3.1 Airports

The Burlington Municipal Airport evaluated below has been replaced by the Coffey County Airport which opened in 1989 and is within five miles of the plant. Hazards associated with this airport are evaluated in USAR Section 3.5.1.6.

There is one small airport within 10 miles of the plant site (Figure 2.2-2) (Reference 22).

The Burlington Municipal Airport, located 6.6 miles west-southwest of the plant site, is a public airport serving Burlington. It has a turf runway 3,500 feet long and 98 feet wide with an orientation of 19 north-northeast and 199 south-southwest. The airport has no facilities and is unattended. Communications are through the Emporia Flight Service Station (Reference 23). No figures are currently available for frequency of aircraft operations. It is currently classified as a small aircraft airport and has no based aircraft. The Kansas Airport System Plan projected the Burlington Airport to have 10 based aircraft in 1980 with 4,000 total operations. By 1995, there are expected to be 22 based aircraft with a total of 12,500 operations (Reference 32).

2.2.1.3.2 Air Routes

The centerlines of ten federal airways pass within 20 miles of the plant site. Five of these are Low Altitude (below 18,000 feet) Air Routes, three are High Altitude (18,000 feet and above) Jet Routes, one is a High Altitude (18,000 to 24,000 feet) Military Refueling Route, and one is a Military Low Level Training Route. There are no established holding or landing patterns within 10 miles of the plant site.

Low Altitude Federal Air Routes, sometimes known as Victor air routes, are flown primarily by general aviation aircraft. These routes have a width of 8 nautical miles and occupy the airspace between 18,000 feet and the floor of controlled airspace, 700 to 1,200 feet above the surface. Traffic counts for these air routes were taken in September 1978 and updated in October 1982. These counts include only those aircraft operating under Instrument Flight Rules (IFR). No data are available on aircraft operating under Visual Flight Rules (VFR) which may also use these federal airways. Low Altitude Federal Airways within 20 miles of the site are shown on Figure 2.2-2 (Reference 22).

High Altitude Jet Routes are primarily used by commercial air carriers, the military, and high performance general aviation aircraft. These routes have a width of 8 or 16 nautical miles and are flown from 18,000 feet to the top of controlled airspace, 60,000 feet. All flights above 18,000 feet are required to be IFR flights; hence, all altitudes and routes are assigned by air traffic controllers. High Altitude Jet Routes within 20 miles of the plant site are shown on Figure 2.2-3 (Reference 24).

J-110 is a major east-west jet route passing within 1.5 miles of the plant site. This route travels between Oakland and New York (Kennedy Airport) passing through Denver, Kansas City, Indianapolis, and Cleveland. Daily traffic in the vicinity of the plant site was 132 flights (Reference 15). J-19 and J-134 are two major east-west routes sharing the same centerline and passing within 12.5 miles of the plant site. J-19 connects Phoenix and St. Louis; J-134 travels between Los Angeles and Washington, D.C., passing through Albuquerque, Kansas City, and Indianapolis. Peak daily traffic reported for both routes in the vicinity of the plant site was 90 (Reference 30).

Chanute One is a Standard Terminal Arrival Route that is flown between the Chanute and Kansas City VOR. The centerline's closest approach to the plant site is 13 miles east. No traffic data were available on this arrival route (Reference 19).

AR-330 is a High Altitude Military Refueling Route that passes within 10.5 miles of the plant site. This route is an east-west route flown between 18,000 and 24,000 feet by U.S. Air Force jet tankers. This airspace is under the control of the FAA Kansas City Air Traffic Control Center (Reference 30). The location of this route is shown on Figure 2.2-4.

The nearest Military Low Level Training Route is IR-502. Effective December 20, 1984, the centerline of this route is 17 miles east of the WCGS site with annual traffic of 1,560 flights (Reference 26) and the route width is 4 nautical miles (4.6 statute miles) on either side of the centerline. No bombs or ammunition are carried on these flights. The training route is flown at altitudes between 550 feet above ground level and below 3,000 feet mean sea level (Reference 28).

Previously, Wichita Low Level Training Route 694 was within 7.8 miles of the plant site but is no longer in operation. Other military aircraft that have flown low level within a 10-mile radius of the site area were C-130s of the 313th Tactical Airlift Wing, based at Forbes Air Force Base. The flights of the C-130s at Forbes Air Force Base have been discontinued.

2.2.1.4 Land Transportation Routes

The main highway artery within a 5-mile radius of the plant site is U.S. Highway 75. Its alignment is north-south, and its closest approach is 2.8 miles west of the WCGS site. The annual average daily traffic (ADT) counts in 1978 within 5 miles of the plant site ranged from 2,810 to 3,800 vehicles (Reference 13).

There are four other roads within a 5-mile radius of the plant site that have Federal-Aid Secondary Highway System (FAS) designation. They are FAS 10, FAS 149, FAS 153, and FAS 1472. The most recent ADT counts for these roads were taken in 1975 (Reference 13) and are given below.

FAS 10 is aligned east-west. Presently, its closest approach to the plant site is 2.8 miles south-southeast. The ADT count in 1975 ranged from 485 to 875 vehicles. The traffic volume is greatest near Burlington and decreases eastward from Burlington.

FAS 149 is aligned north-south. The road's closest approach to the plant site is 3.6 miles east-southeast. ADT count in this vicinity, north of FAS 10, ranged from 95 to 110 vehicles in 1975.

FAS 153 is aligned east-west and its nearest approach to the plant site is 2.6 miles north. The 1975 ADT count of vehicles ranged from 75 to 225 vehicles.

The remaining road within a 5-mile radius of the plant site is FAS 1472 with east-west alignment. The road is located 4.7 miles south of the site. The ADT count in 1975 ranged from 90 to 125 vehicles. The other roads in the immediate area are unpaved rural farm roads or are of a low quality blacktop.

The most hazardous materials that may be shipped by highway are labeled Class A explosives and include such materials as dynamite, blasting caps, bombs, and other high explosives. The maximum amount of explosives that may be shipped by truck is 42,000 pounds. These shipments are routed through less populated areas to their destination. The closest route to the plant site that would be used by firms hauling such materials through the area would be U.S. Highway 75. U.S. Highway 75 is located approximately 2.8 miles from the plant site at its closest point. The amount of explosives shipped along U.S. Highway 75 is unknown. There are no federal, state, or local agencies that are required by law to keep records on transportation of hazardous materials; no data are available (Reference 8).

The nearest existing railroad is the Missouri Pacific Railroad, located 9.5 miles southeast of the plant site. A spur has been constructed to this line in order to provide rail access to the plant site. Presently, the Applicants have no plans to make the spur available for private and/or public development.

The Santa Fe Railroad and right-of-way located 0.3 miles west of the plant site is abandoned. By Interstate Commerce Commission Order in Finance Docket No. 26591, dated February 4, 1972, captioned Atchinson, Topeka and Santa Fe Railroad Company Abandonment, B.H. Junction and Gridley, Franklin and Coffey Counties, it was ordered that the branch line of the railroad extending between milepost 0.0 at B.H. Junction, Kansas, and milepost 52 plus 1,518 feet at Gridley, Kansas, be abandoned. With this abandonment, title of the right-of-way property reverted to the fee simple title owners.

2.2.1.5 Water Transportation Routes

There is no commercial water traffic on the John Redmond Reservoir or on the Neosho River. However, Commercial fishing on the Neosho River and John Redmond and other reservoirs in Kansas began in 1978. This Kansas Fish and Game Commission controlled program only allows the harvesting of large rough fish. All other vessels are used for recreational purposes (Reference 7).

Refer to Section 2.1.2.5 for a discussion of recreational water traffic on the cooling lake and potential collision hazard with the plant cooling water intake structure.

2.2.1.6 Oil and Gas Pipelines

There are two product lines within 5 miles of the plant site. The two product lines are operated by the Phillips Pipe Line Company. The five natural gas pipelines are operated by the Union Gas Company and Phenix Transmission Company (Figure 2.2-1).

All of the Phillips pipelines are buried at a depth of approximately 30 inches. Gate valves on two of the lines are located 3.0 miles NW of the plant site (Figure 2.2-1).

Two of the Phillips petroleum pipelines carry refined products. The refined products pipelines are 12 and 16 inches in diameter and pass within 3.0 miles of the plant site. The 12-inch product pipeline was built in 1952, carries a maximum of 92,000 barrels per day, and operates at 1,180 psig. The 16-inch product pipeline was built in 1980, carries a maximum of 100,000 barrels per day, and operates at 960 psig. The hydrocarbons transported through these lines are propane, butane, iso-butane, iso-pentane, No. 8 Natural Aviation gasoline, furnace oil, stove oil, diesel fuel, and kerosene. All of these hydrocarbons are flammable.

The Phenix Transmission Company, operated by Bam Energy of Wichita, KS, has four Natural Gas Lines. They are located 2.6 miles NW of the plant site and consist of three-eight inch in diameter and one 12 inch pipe. Two of the 8 inch lines operate at 30-40 psig, one 8 inch line operates at 400 psig and the 12 inch line is not in use at the present time (See Table 2.2-1 for distances) (Reference 20).

None of the lines are used for gas storage and there are no plans to use the pipelines to carry other products (References 11, 14 and 20).

The natural gas pipeline operated by the Union Gas Company is 8 inches in diameter. It terminates 4.7 miles southwest of the plant site. From there, the gas is distributed throughout the city of Burlington. It was constructed in 1966 and is buried at a depth of approximately 24 inches. The maximum operating pressure is 70 to 72 psig. Nordstrom plug valves are located at the termination point in Burlington. The pipeline carries only natural gas and there are no plans to use the pipeline for other products. The pipeline is not used for gas storage at higher than normal pressure (Reference 6). There are no natural gas storage facilities within 5 miles of the plant site (Reference 31). Pipe-line routes are shown on Figure 2.2-1.

2.2.1.7 Projections of Industrial Growth

Projected growth for the various nearby industries listed in this section is expected to be minimal and thus will pose no future conflicts with the plant. This projection is based on the historic growth patterns population in the area (Section 2.1.3.1). Those industries or facilities that do plan some minor short-term expansion are discussed in Section 2.2.1.2. The local economy is expected to retain its agricultural orientation. In view of the absence of specific local resources to attract new industry, future industrial development is likely to be concentrated in the major industrial cities of Topeka, Wichita, and Kansas City.

2.2.2 DESCRIPTIONS

The descriptions of products manufactured, stored, or transported offsite, as well as the maximum quantities of hazardous material likely to be processed, stored, or transported, are fully described in Section 2.2.1, Locations and Routes. Offsite hazardous materials are listed in Table 2.2-2. Onsite hazards are also discussed in Sections 2.2.1 and 2.2.3.

2.2.3 EVALUATION OF POTENTIAL ACCIDENTS

For this section, the term "significant hazard" is defined as any hazard against which design provisions must be considered to protect the plant or which must be assessed in detail for consequences serious enough to affect the safety of the plant.

There are no onsite or offsite hazards which are expected to have an adverse effect on the plant structures.

Safety evaluations of the accidents described below are based on the information provided in Subsections 2.2.1 and 2.2.2.

2.2.3.1 Determination of Design-Basis Events

The accident categories discussed below have been evaluated as required by Regulatory Guide 1.70.

2.2.3.1.1 Explosions

No potential hazard has been found involving the detonation of high explosives, munitions, chemicals or fuels in the vicinity of the plant where such materials are manufactured, processed, stored, used or transported in substantial quantities.

The Kansas Army National Guard Armory is the only active military facility within 5 miles of the plant site. No explosive ordinance or ammunition is stored at the armory. The closest route to the plant site on which explosives are shipped is U.S. Highway 75, which is located 2.8 miles from the plant. At this distance, any accidental explosion will not pose a hazard to the plant.

The nearest existing railroad is the Missouri Pacific Railroad, which is located 9.5 miles from the plant. At this distance, any accidental explosion will not endanger the safe operation of the plant.

There is no commercial water traffic on the John Redmond Reservoir or on the Neosho River. All vessels are used for recreational purposes.

An accidental explosion of onsite storage of hydrogen (120,000 scf) has been evaluated, and a safe stand-off distance of 658 feet has been determined in accordance with Regulatory Guide 1.91. Since all safety-related structures are located farther than 900 feet from the hydrogen storage, an explosion of hydrogen does not pose a hazard to the safe operations of the plant.

2.2.3.1.2 Flammable Vapor Clouds (Delayed Ignition)

There is no industry in the vicinity of the plant which can produce a flammable vapor cloud in significant amounts.

The nearest pipelines carrying flammable liquid are the Phillips pipelines, which pass within 2.6 miles of the plant site.

The potential hazards associated with the ignition of vapor clouds which would form as a result of an accidental rupture in the 12 or 16-inch refined products (propane was considered for this analysis) and the 8-inch gas pipelines have been evaluated. For each pipeline, maximum rates of discharge were calculated assuming double ended (guillotine) pipeline break and frictionless and infinitely long pipelines. The horizontal motion and the configuration of the gas cloud were determined for each pipeline rupture from a gas dispersion analysis using a Gaussian plume model. The model determines the extent of the flammable region of the cloud for a given meteorological condition, by calculating the gas concentration as a function of time and space coordinates relative to the point of release. The elevation of the centerline of the flammable region as a function of downwind distance from the source and time was determined for the natural gas line using a plume rise model.

All seven atmospheric stability classes and six wind speed conditions selected as the averages of the intervals given in Section 2.3 were considered in the analysis. The concentration limits of 2.8 percent to 7 percent gas by volume were used to define the flammable region of the cloud for propane. The corresponding limits for natural gas were assumed to be 5 percent and 15 percent. Through this analysis the volume and centroidal location of the flammable cloud relative to the plant were calculated.

The equivalent TNT mass yield recommended in Regulatory Guide 1.91 of 240 percent was used to calculate the weight of the flammable volume of the cloud.

The detonation hazards were determined by calculating the yearly probability of exceeding one psi overpressure at the plant. Combinations of various rupture locations, meteorological conditions and detonation times were evaluated in estimation of this probability. The probability of exceeding the one psi overpressure at the plant from each pipeline was calculated by dividing the line in question into a number of segments and by performing a similar analysis which was described as acceptable in NUREG-0014, "Safety Evaluation Report for Hartsville Nuclear Plants". For each segment the point closest to the plant on the segment is chosen as the assumed point of rupture. On this basis the probability of overpressure hazard, P, at the plant per year from a pipeline is calculated by:

dividing the line in question into a number of segments and by performing a similar analysis which was described as acceptable in NUREG-0014, "Safety Evaluation Report for Hartsville Nuclear Plants". For each segment the point closest to the plant on the segment is chosen as the assumed point of rupture. On this basis the probability of overpressure hazard, P, at the plant per year from a pipeline is calculated by

$$P=P_d \sum_{N=1}^{NP} \sum_{S=1}^{7} \sum_{V=1}^{6} \sum_{T=1}^{8} \sum_{D=1}^{16} P_w (S,V,D) x P_t (T) x L(N) x d(S,V,D,T,N)$$

where:

P_d = probability of detonation per year per mile of pipeline;

P_w (S,V,D) = probability that wind of Stability Class S, Speed V and Direction D is blowing when detonation occurs;

$P_t(T)$ = probability that detonation occurs between times

$$T_1 = T \frac{\Delta T}{2} \text{ and } T_2 = T + \frac{\Delta T}{2}$$

L(N) = length of pipe segment N, in feet;
NP = number pipeline segments considered in the analysis;

d(S,V,D,T,N) = 1 if overpressure exceeds the one psi criterion for S,V,D,T,N
0 if overpressure does not exceed the one psi criterion

The values of P_d and P_t used in the above expression are based on gas pipeline rupture and explosion rates and mean time to detonation reported in the Preliminary Safety Analysis Report for Hartsville Nuclear Plants. They are: P $=7.7x10^{-6}$ detonations per year per mile of pipeline and $P_t(T)=exp(-T_1/B_I)-exp-T_2/B_I)$, where the mean time to detonation B_I=6.6 minutes.

The probabilities of pipeline accident in which a detonation occurs resulting in an overpressure at the plant in excess of one psi, are: $1.3x10^{-10}$ per year for the 16-inch propane line, $4.8x10^{-11}$ per year for the 12-inch propane line and $5.1x10^{-10}$ per year for the closest 8-inch natural gas line.

These probabilities are less than the value of 10^{-7} per year listed in Section 2.2.3 of Regulatory Guide 1.70, for these three pipelines. The remaining four pipelines within 5 miles of the plant do not constitute a greater source of hazard. Based on these facts, it is concluded that accidental rupture of nearby pipelines need not be considered as design basis events.

The Phillips Pipeline Company has an 80,000-gallon propane tank and an unused butane tank of 24,486-gallon capacity, 3.2 miles north of the plant site at Sharpe. Any accidental rupture of the propane tank may lead to a vapor cloud formation. A continuous release rate of 300 lb/sec is conservatively assumed which corresponds to a rupture of 6 inches in diameter in the wall at the bottom of the tank. Using a wind speed of 5.25 ft/sec, the ratio of mass flow release rate and wind speed is calculated as 57 lb/ft. The 1 psi overpressure safe standoff distance under the most stable weather condition is obtained from Reference 9 as 2.5 miles. Since this distance is smaller than the actual distance between the propane tank and the plant structures, an accidental leakage of the tank contents does not pose any hazard to the plant structures.

2.2.3.1.3 Toxic Chemicals

There are no industries in the plant vicinity using or producing toxic chemicals.

Chlorine is stored in 150-pound vessels approximately 475 feet from the control room air intake. These vessels are provided with fusible metal type safety relief devices to prevent rupture. Even if there is any accidental release of chlorine, it will not affect the control room habitability. See Section 2.2.3.1.7 for a further discussion for onsite chlorine storage. Similarly, the onsite storage of carbon dioxide and ammonium hydroxide or ethanolamine does not pose any hazard to the plant operation.

2.2.3.1.4 Fires

Since there are no other industrial or military installations near the plant and the transportation routes carrying flammable material are at a sufficient distance from the station as described in Section 2.2.1.4, the plant is not exposed to any fire hazard. The plant fire protection system is able to handle brush fires in the vicinity of the plant.

2.2.3.1.5 Collisions with Intake Structures

There is no commercial water traffic on the John Redmond Reservoir or on the cooling lake. Thus, there is no potential for collision of vessels with the intake structure.

2.2.3.1.6 Liquid Spills

There is no commercial water traffic on the cooling lake. Recreational boats and service stations are not capable of producing liquid spills in significant amounts. The maximum loss for the pipelines located about 3 miles from the site is estimated to be approximately 2,000 barrels of hydrocarbons. The loss due to seepage cannot exceed 24 barrels because the pipelines pass under a small floating spill in the northern area of the cooling lake. The screen house of the plant is separated from this area by baffle dike "A" and by the central portion of the cooling lake, so that the traveling distance for the spill to reach the screen house is over 6 miles. Furthermore, a very special meteorological condition involving wind changes timed to the spill movement would be required in order for the intact spill to approach channels leading to the screen house. Therefore, liquid spills do not pose a hazard to the safe operation of the plant.

2.2.3.1.7 Chlorine Gas

Quantities of chlorine (i.e., less than 20 pounds) are allowed for routine laboratory applications at distances within 328 feet (Regulatory Guide 1.95) without the need for a hazard analysis. The maximum amount of chlorine stored at the Wolf Creek site conforms to the recommendations of Regulatory Guide 1.95 for Type I control room characteristics.

2.2.3.1.8 Ammonimum Hydroxide

Ammonium hydroxide will be stored in a separate, cooled storage room at the north end of the Turbine Building. Liquid ammonium hydroxide shall be stored in 55 gallon drums at a solution concentration not to exceed 30%. Since the ammonium hydroxide is within the 5-mile limit of Regulatory Guide 1.78, an ammonium hydroxide accident must be postulated and analyzed as a potential hazard to control room habitability.

The accident scenario postulated below requires the following unlikely sequence of events:

a. 22 barrels of ammonium hydroxide are assumed to spill instantaneously.

b. The spill instantaneously fills the curbed area around the storage area.

c. The ammonium hydroxide diffuses into the air as described in NUREG 570.

d. The ammonia cloud travels directly to the Control Building supply air intake and is distributed to the control room.

The assumptions used for this analysis are as follows:

a. The spill instantaneously occurs and fills the entire curbed area, assumed to be 1000 square feet.

b. The ammonium hydroxide is stored in 28-30% solution.

c. Ambient temperature is 100°F, atmospheric pressure is 14.7 psi.

d. The ammonia conservatively travels directly from the spill to the supply air intake.

e. Meteorology is conservatively assumed as neutral, with a wind speed of 1.0 meter per second.

f. The equations used in the analysis assume that both the Control Room and Control Building concentrations result from perfect mixing in the ducts and in their respective volumes.

g. Transient time in ductwork is neglected.

h. Full-faced self-contained breathing apparatus are available for Control Room operators.

The maximum 2 minute rise in ammonia concentration in the Control Room is based on diffusion in still air. The rate of a vapor diffusing into still air (source strength) is taken from NUREG 570, equation (2.1-13) for the worst case scenario:

$$Q = \frac{dm_v}{dt} = \frac{A(t)p\rho_v 10^4}{P}\sqrt{\frac{D}{\pi t}} \quad \text{g/sec}$$

where:

$A(t)$ = area of spill taken as a constant (m^2)

p = vapor pressure of the liquid (mmHg)

P = ambient atmospheric pressure (mmHg)

ρ_V = vapor density of the liquid (g/cm^3)

t = time (sec)

D = Diffusing Coefficient of liquid into air (cm2/sec)

The ammonia is conservatively assumed to travel directly to the control room supply air intake by the diffusion equation for a plume release from NUREG 570 equation (2.2-9):

$$X = \frac{Q}{2\pi u \sigma_y \sigma_z} \quad e^{\frac{y^2}{2\sigma^2 y}} \quad e^{\frac{(z - h)^2}{2\sigma^2 z}} \quad + \quad e^{\frac{(z + h)^2}{2\sigma^2 z}}$$

where:

X = concentration of ammonia at coordinates x, y, z from a fixed origin on the ground plane (g/m3)

Q = continuous source strength (g/sec)

σ_y = standard deviation of the plume strength in the y-direction (m)

σ_z = standard deviation of the plume strength in the z-direction (m)

x = distance from the source in x-direction, horizontal along wind (m)

y = distance from the source in y-direction, horizontal cross-wind (m)

z = distance from the source in z-direction, vertical cross-wind (m)

h = effective above ground height of the ammonia source (m)

u = wind speed (m/sec), conservatively taken as 1 m/sec

The standard deviations of the plume concentration are evaluated using the following power function from NUREG 570, section 2.2.3 for a neutral weather condition:

$\sigma_y = 0.06(x)^{0.92}$

$\sigma_z = 0.15(x)^{0.70}$

The normal control building intake is a penthouse on the Auxiliary Building room 23(z) meters above ground level and taken as 88(x) meters from the ammonia source. The height (h) of the ammonia source above the ground level is zero. Since the wind direction is taken directly from the source to the intake, the value of the crosswind direction y would be zero.

After the plume reaches the control room supply air intake, the ammonia is drawn directly in the Control Room at a flow rate of 1950 cfm. It is then assumed to be ideally mixed with the air volume of the control room. Very conservative analysis show that the concentration of ammonia does not exceed the toxic limit within two minutes after detection as prescribed in Regulatory Guide 1.78. Thus, the operators would have sufficient time to don full-faced SCBA's. Furthermore, an ammonia accident as described in this section would not prevent safe shutdown of the Plant.

In reality, only one or two barrels are likely to spill at one time. Also, the ammonia gas would slowly mix with the large volume of free air in the Turbine Building, and be exhausted thru the roof before it is a potential hazard to the Control Room. These more realistic conditions would result in considerably lower ammonia concentrations in the Control Room compared to the above scenario.

Ethanolamine (ETA) may be stored in place of ammonium hydroxide as its chemical substitute for condensate pH control. ETA has an extremely low vapor pressure as compared to ammonium hydroxide, resulting in very small amounts becoming airborne after a spill. Since very small amounts become airborne, ETA does not pose any airborne hazard to control room habitability. This conclusion is further supported in that Sax's Dangerous Properties of Industrial Materials, which is referenced for toxicity limits in Regulatory Guide 1.78, does not list any inhalation toxicity limits for ETA.

2.2.3.2 Effects of Design-Basis Events

Since the external accidents discussed in Section 2.2.3.1 do not pose any hazard to the plant, no design-basis event is postulated.

2.2.4 REFERENCES

1. Brungardt, LeRoy, Robertson, James, 1986, Sergeant, Battery "C", Kansas Army National Guard, Burlington, Kansas, personal communication (February 27).

2. Bartlett, Curtis, 1986, Plant Foreman, Burlington Municipal Light Plant, Burlington, Kansas, personal communication (February 25).

3. Bolton, Phillip, 1986, Bolton Oil Company, Burlington, Kansas, personal communication (February 27)

4. Bowsher, A.L., and Jewett, J.M., 1943, Coal resources in the Douglas Group in east-central Kansas: Kansas Geological Survey, Bulletin 46.

5. Brady, L.L., and others, 1971, Kansas mineral industry report 1971: Kansas Geological Survey, Special Distribution Publication 61, p. 35.

6. Caudell, M.K., 1986, District Supervisor, Union Gas Systems, Inc. Yates Center, Kansas, personal communication (February 27).

7. Chester, Mark, 1978, Project Manager, John Redmond Reservoir, U.S. Army Corps of Engineers, Burlington, Kansas, personal communication (December 28).

8. Doyle, Dick, 1978, American Trucking Association, Safety and Security Department, Washington, D.C., personal communication (December 28).

9. Eichler, T., Napadensky, H., and Mavec, J., 1979, Evaluation of the risks to the Marble Hill Generating Station from traffic on the Ohio River: Public Service Company of Indiana, IITR/Final Report J8309, February 21, in Marble Hill FSAR, Appendix F.

10. Fortenberry, H.Y., 1973, County Engineer, Coffey County, written communication (April 16).

11. Kimber, Ed, 1986, Phillips Pipe Line Company, Bartlesville, Oklahoma, written communication (February 26).

12. Newkirk, Richard, 1986, Conoco Oil Company, Burlington, Kansas, personal communication (February 26).

13. Ijans, Clayton, 1978, Kansas Department of Transportation, Planning and Development Department, Topeka, Kansas, personal communication (December 28).

14. Jonas, N., 1979, Superintendent of Products Movements, Phillips Pipe Line Company, Bartlesville, Oklahoma, personal communication (February 21, March 14 and June 8).

15. Kaps, R.J., 1982, Kansas City Air Route Traffic Control Center, Federal Aviation Administration, Olathe, Kansas, written communication (November 2).

16. Kovack, J.L., 1973, Chlorine adsorption on activated carbon: U.S. Atomic Energy Commission, Division of Reactor Licensing (February).

17. Lewis, Larry, 1986, Lewis Standard Station, Burlington, Kansas, personal communication (February 26).

18. McCurry, Mrs. Steve, 1986, McCurry Feed and Seed, Sharpe, Kansas, personal communication (February 24).

19. McQueen, R.W., 1979, Chief, Kansas City Air Route Traffic Control Center, Federal Aviation Administration, Olathe, Kansas, written communication (September 18).

20. King, Wade, 1986, Phenix Transmission Co., Bam Energy, Wichita, KS, personal communications.

21. Murphy, George, 1986, Manager, Katy Elevator & Company, Burlington, Kansas, personal communication (February 26).

22. National Oceanic and Atmospheric Administration (NOAA), 1978, Kansas City sectional aeronautical chart: U.S. Dept. of Commerce, Washington, D.C., 21st edition, (December 28, 1978).

23. _______, 1978, Airport/Facility Directory, North Central U.S.: U.S. Dept. of Commerce, Washington, D.C. (effective date, November 1, 1978).

24. _______, 1978, H-3 Northeast, H-4 Southeast enroute high altitude - U.S. chart: U.S. Dept. of Commerce, Washington, D.C. (effective date, November 2, 1978).

25. Nelson, Ken, 1986, Nelson Quarry, Inc., La Harpe, Kansas, personal communication (February 25).

26. Oldroyd, D.; Col., 1984, Deputy Director of Training, Offutt Air Force Base, Nebraska (August 1984).

27. Rickabough, Larry, 1986, United Oil Company, Burlington, Kansas, personal communication (February 25).

28. Scherer, J., Col., 1979, Chief of Route Development Branch, 1st Combat Evaluation Group, Barksdale Air Force Base, Louisiana, personal communication (August 31).

29. Sittig, M., 1979, Hazardous and toxic effects of industrial chemicals: Noyes Data Corporation, Park Ridge, New Jersey, 460 pp.

30. Stevens, Dwayne, 1978, Federal Aviation Administration, Kansas City Center, Central Area Office, Olathe, Kansas, personal communication (December 27).

31. Veteto, Bill, 1986, Union Gas Company, Burlington, Kansas, personal communication (February 26).

32. Williams, Joyce, 1978, Kansas Department of Transportation, Aviation Division, Topeka, Kansas, personal communication (December 28).

33. "Calculating the Area Affected by Chlorine Releases", Chlorine Institute Pamphlet 74, Edition 1, January, 1981.

TABLE 2.2-1

NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES

Name	Location from Plant Site (a)	Employment
Bolton Oil Company - Bulk Storage	4.7 miles SW	0
Burlington Municipal Airport	6.6 miles WSW	0
Burlington Municipal Light Plant	4.6 miles SW	3
Clarkson Construction Company	3.1 miles SSE	9
Conoco Oil Company - Bulk Storage	4.7 miles SW	0
Kansas Army National Guard	3.9 miles SW	43
Katy Elevator & Company	4.5 miles SW	3
McCurry Feed & Supply	2.9 miles N	5
Nelson Quarry, Inc.	3.0 miles SSE	20
Phenix Transmission Company (4 Natural Gas Line)	2.6 miles NW (b)	0
Phillips Pipeline Company 2-Product Lines	3.0 miles NW (b)	0
Santa Fe Railroad and Right-of-Way (Abandoned)	0.3 mile W	0
Standard Oil Company - Bulk Storage	4.7 miles SW	0
Union Gas - Propane Storage	4.4 miles SW	0
Union Gas - Natural Gas Pipeline	4.7 miles SW	0
United Oil Company - Bulk Storage	4.4 miles SW	0
KEPCo Generating Facility	2.5 miles N	0

aCenter point of Unit No. 1.
bClosest approach to site.

TABLE 2.2-2

(Sheet 1 of 2)

DESCRIPTION OF HAZARDOUS MATERIALS

Name	Products	Hazardous Materials
Bolton Oil Company - Bulk Storage	Fuel Storage	36,000 gallons gasoline
Burlington Municipal Light Plant	Fuel Storage	40,000 gallons diesel fuel
Clarkson Construction Company	Construction Equipment Storage	2,000 gallons gasoline, 1,100 gallons lube oil and hydraulic fluid
United Oil Company - Bulk Storage	Fuel Storage	56,000 gallons gasoline, 35,000 gallons diesel fuel
Kansas Army National Guard	Ammunition Storage	Classified amounts of small arms ammunition
Katy Elevator & Company	Grain Storage	None
McCurry Feed & Supply	Grain and Fertilizer Storage	24,000 gallons liquid fertilizer, 150 tons solid fertilizer
Conoco Oil Company - Bulk Storage	Fuel Storage	18,000 gallons gasoline, 15,000 gallons diesel fuel, 4,000 gallons heating oil
Nelson Quarry, Inc.	Rock Products	15 tons explosives

TABLE 2.2-2 (continued)

(Sheet 2 of 2)

Name	Products	Hazardous Materials
Phillips Pipeline Company Products Line	Fuel Transport	Refined petroleum products (transported through a 12-inch and a 16-inch line)
KEPCo Generating Facility	Fuel Storage	42,000 gallons diesel fuel
Phenix Transmission Company Natural Gas Lines	Fuel Transport	Natural gas (transported through 3-8 inch and 1-12 inch line)
Standard Oil Company - Bulk Storage	Fuel Storage	17,600 gallons gasoline, 18,800 gallons diesel fuel, 8,800 gallons heating oil
Union Gas - Propane Storage	Fuel Storage	30,000 gallons propane
Union Gas - Natural Gas Pipeline	Fuel Transport	Natural gas (transported through an 8-inch pipeline)

Table 2.2-3 has been deleted.

TABLE 2.2-4

PARAMETERS FOR THE CONTROL BUILDING AND CONTROL ROOM CHLORINE CALCULATION

Parameter	Before Isolation Occurs	After Isolation Occurs
G_a	15,000 cfm	0
G_b	12,250 cfm	0
G_{b1}	1,000 cfm	1,000 cfm
G_{b2}	200 cfm	0
G_c	1,950 cfm	0
G_{ci}	800 cfm	0
G_d	13,450 cfm	0
G_e	1,960 cfm	0
G_{ei}	800 cfm	45 cfm**
G_f	10 cfm	10 cfm
G_g	0	1,600 cfm**
G_h	0	3,600 cfm**
G_i	0	2,565 cfm**
G_j	0	4,580 cfm**
G_k	0	980 cfm**
G_l	0	4,180 cfm**
G_m	0	24,070 cfm**
G_n	0	27,270 cfm**
G_o	0	945 cfm**
G_p	0	3,200 cfm**
R	0	0
V_B	422,813 ft^3	239,528 ft^3*

TABLE 2.2-4 (continued)

PARAMETERS FOR THE CONTROL BUILDING AND CONTROL ROOM CHLORINE CALCULATION

Parameter	Before Isolation Occurs	After Isolation Occurs
V	91,493 ft3	182,086 ft^3***
$V_{i(1501)}$	46,796 ft3	---
$V_{i(1512)}$	46,390 ft3	---
V_{ii}	---	19.4 ft^3

* Following control building isolation, the control room pressurization system supplies filtered air to the control building with the exception of the lower two elevations.

** Both trains of the pressurization system in operation, flows are total design flows (analysis included +10% tolerance).

*** Based on volume of both control room AC equipment rooms included.

TABLE 2.2-5

THE EFFECTS OF CHLORINE GAS ON HUMANS

Effect	Parts of Chlorine per Million Parts of Air by Volume
Least amount required to produce slight symptoms after several hours exposure, NIOSH/OSHA permissible exposure limit	1
Least detectable odor	3.5
Maximum amount that can be inhaled for 1 hour without serious disturbances	4
Noxiousness, difficulty in breathing, several minutes	5
Toxicity limit - maximum concentration that can be tolerated for 2 minutes without severe irritation of the throat and skin, severe coughing and eye burning	15
Amount dangerous for even short exposures	50
Most animals killed in a very short time	1,000

2.3 METEOROLOGY

2.3.1 REGIONAL CLIMATOLOGY

The data used in this section is derived from climatological summaries, meteorological data, and technical studies and reports. The climatological summaries include those of the National Weather Service Station and of others describing the State of Kansas and/or the region that includes the site of the Wolf Creek Generating Station. Figure 2.3-1 illustrates the location of the data sources relative to the station site. All data sources used are listed in the references.

2.3.1.1 General Climate

Due to its mid-continental location in east-central Kansas, the site region experiences a distinctly continental climate characterized by warm humid summers with considerable convective rainfall (including occasional violent thunderstorms) and highly variable winter weather with moderate amounts of rain and snow.

Maritime tropical air originating over the Gulf of Mexico is the dominant air mass from June through August. During this period drier air from the west and north infrequently affect the region. The maritime tropical air is quite humid, resulting in warm nights, occasional daytime cloudiness, and considerable thunderstorm activity. From November through February continental polar air dominates the regional climate. However, during this period there are infrequent intrusions of mild dry maritime tropical and maritime polar air masses. The transition months (March, April, May, September, and October) may be controlled by either maritime tropical or continental polar air masses.

High and low pressure systems generally pass over the region from west to east every few days, except during late summer and autumn when high pressure systems occasionally stagnate over the region for a week or more. These stagnating highs are characterized by light winds and low turbulence levels. These conditions greatly limit the dispersion of pollutants emitted into the atmosphere. Locally, dispersion conditions are poorest during very strong inversion situations accompanied by calm winds. Such conditions, which commonly persist only a few hours, occur most frequently during pre-dawn hours of autumn and winter. Low pressure systems, on the other hand, promote atmospheric mixing and provide favorable diffusion conditions. The track of low pressure systems is generally to the north of the region during summer and near or just to the south of the region during winter. Lows reach maximum intensity during winter and spring, but are quite weak during summer.

Frontal systems cross the region quite frequently and are frequently strong during all seasons except summer, when they are usually weak and only occasionally extend as far south as the site region. This is directly related to the intensity and trajectory of the low pressure systems which form along these fronts. Meso-scale squall lines occasionally move through the region during spring and summer.

Air flow is primarily from the south during most of the year. However, during winter and spring, winds from the west through north are frequent and may constitute the prevailing wind direction during some winter and early spring months. Average wind speeds are among the highest of any inland non-mountainous region in the United States. The highest wind speeds generally occur during spring and the lowest during summer.

Summers are warm to hot due to the dominance of maritime tropical air. Mid-summer temperatures average in the upper 70s F and temperatures exceed 90 F on approximately 40 percent of the days in July and August. From mid-December through early February, temperatures average below freezing with an average of five subzero (F) nights each winter. The difference in average temperature between mid-summer and mid-winter is approximately 50 F.

Precipitation is moderate to heavy during late spring and summer when moisture advected from the Gulf of Mexico is prevalent, and light in winter when polar continental air is generally dominant. Summer and some spring precipitation is generally convective, and occasionally intense. Autumn, winter, and some spring precipitation due to synoptic-scale cyclones is lighter and of greater duration than the convective precipitation. Snowfall is generally light to moderate; however, snowstorms are occasionally heavy and on rare occasions approach blizzard intensity. Freezing rain and sleet may occur from November through March; on infrequent occasions heavy accumulations of freezing rain cause substantial damage.

The terrain in the region is quite flat. The plant site is on a minor plateau between two minor north-south oriented creeks. The nearest river is the Neosho, which is oriented northwest-southeast and at an elevation approximately 140 feet below that of the plant site, and extends to within 3 miles to the southwest of the plant site. As a result of the inconsequential terrain, gravity-induced drainage of air in the region is insignificant. The John Redmond Reservoir, approximately 4 miles in diameter, is at its closest point 4 miles west of the plant site. This body of water probably affects winds on a very local scale, but it is too small to cause significant effects.

Prominent climatic features of the region are severe thunderstorms and tornadoes. These storms are most frequent during spring and early summer and are rare during late autumn and winter. Severe thunderstorm winds may gust in excess of 100 mph, and tornadic winds, though they rarely occur, may be substantially higher (References 8 and 12).

2.3.1.2 Regional Climatology for Design and Operating Bases

2.3.1.2.1 Heavy Precipitation

Heaviest short-period rainfall is associated with thunderstorms and can total 5 to 11 inches in 24 hours. The maximum amounts for short-period rainfalls are given in Table 2.3-1. Longer-period rainfall is associated with migratory frontal systems and cyclonic storms. Almost one-half of the total precipitation falls in daily amounts of 0.75 inches or less. Monthly precipitation totals of 20 inches or more have been recorded at stations in the general area. On the other hand, the region has experienced from 50 to 75 successive days with no more than 0.25 inches of rain on any day during the period from April to September (Reference 46).

2.3.1.2.2 Snow

Snowfall averages between 10 and 20 inches a year in the region around the site (Reference 12). The extreme 24-hour snowfall was 26 inches at Fort Scott; the extreme monthly snowfall was 55.9 inches at Olathe; and the extreme seasonal snowfall was 82.7 inches at Olathe, Kansas (Reference 2).

In winter, the snow ordinarily remains on the ground for a few weeks following most snowfalls. The longest period with snow cover on the ground was 51 days in 1939 (Reference 10).

Data in the publications Climatological Data-Kansas and Local Climatological Data-Wichita and Topeka, Kansas, for snow-on-ground and hence snowpack, are available since 1949 and were examined for Topeka, Wichita, and Burlington, Kansas up to 1979. These statistics list the amount of snow, ice pellets, and sleet on the ground (References 42 and 43). Snowpack statistics at Burlington, Kansas were intermittent and were not used. The maximum observed snow depth on the ground was 19 inches, which was observed on March 16, 1960 at Topeka.

A statistical analysis was performed using the maximum snowpack for each year for the 31-year period to determine the snowpack

with 100-year recurrence interval for Topeka and Wichita, Kansas (Table 2.3-2). The statistical analysis assumed that extreme value distribution best fits the annual maximum snowpack data (Reference 16). The Gumbel distribution is also sometimes known as the Fisher-Tippett Type I distribution.

Using the Fisher-Tippett Type I distribution, the snowpack with a recurrence interval of 100 years is 19.4 inches for Wichita and 20.0 inches for Topeka.

Data on snowpack recurrence were utilized in the snow and ice accumulation design consideration section (Section 2.4.2.3.3, titled "Ice and Snow").

To determine the weight of the snowpack, the density of the snowpack must be calculated. The density of the 100-year snowpack was estimated from the actual recorded water-equivalent measurements of some of the greatest snow depths on record at both Topeka and Wichita. A conservative estimate of the density of these large snowpacks was 14.4 pounds per cubic foot (0.23 grams per cubic centimeter). Therefore, the weight of the 100-year snowpack using 20.0 and 19.4 inches of snowpack is 23.9 and 23.2 pounds per square foot for Topeka and Wichita, respectively.

To provide a yet more conservative design, it was assumed that the 100-year snowpack weight is the antecedent condition to the superimposed maximum winter probable maximum precipitation (PMP) for a duration of 48 hours falling on an area of 10 square miles or less (Reference 45). The stress of the 48-hour winter PMP is 103.0, 98.8, 111.3, and 127.9 pounds per square foot for the months of December, January, February, and March, respectively.

Data on the PMP were utilized in Section 2.4.3.1, titled "Probable Maximum Precipitation PMP" in the PSAR. Due to hydrological considerations, the PMP values in that section were adjusted to the watershed drainage area (27.4 square miles). However, in this section, a PMP value for a 10-square-mile area (point rainfall for design purposes) was used and more conservative values of rainfall resulted.

It is highly unlikely that these weights would ever be experienced. Each safety-related structure was evaluated separately for the correct snowload coefficient to be applied by virtue of its geometry and exposure in accordance with ANSI A58.1-1972, "Building Code Requirements for Minimum Design Loads in Buildings and Other Structures", Section 7.2.1. Roof slope and winds would in most cases preclude snow accumulation to the theoretically possible depth.

Furthermore, if the PMP occurred as rain instead of snow, the existing, as well as additional precipitation would run off instead of accumulating.

2.3.1.2.3 Hail

The most commonly reported hailstones are less than three-quarter inch in diameter and cause little or no property damage. Hailstones equal to or larger than 3/4 inch in diameter are associated with severe thunderstorms. According to Pautz (Reference 31), there were 832 hailstorms reported in 400 days with hail equal to or larger than 3/4 inch in diameter in the State of Kansas during 1955-1967 (Figure 2.3-2). The diurnal distribution of these hailstorms indicates a maximum during the 3-hour period from 1500 to 1800 Central Standard Time (CST). In addition, Pautz shows that the number of hailstorm reports by 1-degree longitude-latitude squares is about 31 in the vicinity of the site over the 13-year study period (Figure 2.3-3). He also provides the total number of hailstorm reports averaged by 2-degree longitude-latitude squares (Figure 2.3-4). For the site vicinity there were about 200 reports between 1955 and 1967 or an average of 15 occurrences per year. The greater frequency of reports in the latter figure was due to the averaging of the 1-degree longitude-latitude square containing the site area with that surrounding Kansas City. This larger number of reports of storms in the Kansas City square is attributable to the presence of a highly organized severe-storm network and the large number of Severe Local Storms Unit personnel residing in the area (Reference 31). If this network were present over the entire State of Kansas, the number of hail reports would undoubtedly be greater. The frequency of hail is directly related to the probability of thunderstorm occurrence.

Using the U.S. Department of Commerce monthly publication, Storm Data (Reference 44), a 15-year literature survey of hail was conducted for an area within a 100-mile radius of the site. In this area, hail, especially that greater than 2 inches in diameter, is most frequent in the spring, with a maximum frequency in May. A secondary frequency peak exists in August and September. Hail of diameter less than 2 inches was not summarized. Hail of 3-inch diameter appears frequently in the records: Bourbon County (September 24, 1973), south of Emporia (June 3, 1973), around Wichita (June 2, 1971), around Butler County (May 21 and June 26, 1969), Crawford County (April 12, 1964), around Lyon County (May 24, 1962 and June 18, 1959), Sumner and Cowley Counties (May 30, 1962), Anderson and Linn Counties (April 21, 1961), and in southeast Kansas (August 20, 1960). Larger hailstones, although not as frequent, have been observed. For example, hail 4-1/2 inches in diameter and 14

inches in circumference fell in Coffey and Franklin Counties (May 4, 1963); hail 5 inches in diameter fell in Butler County (May 25, 1963). Hailstones of 7-9 inch diameter fell east of Wichita (May 10, 1970). Extremely large hail fell at Coffeyville, 80 miles south of the site area (September 3, 1970)--one hailstone measured 17-1/2 inches in circumference at its widest diameter; another measured 8 inches in diameter, and many hailstones measured 4-5 inches in diameter. The maximum observed hailstone in the United States also fell in Coffeyville, Kansas. This hailstone weighed 766 grams (1.67 pound) and measured 44 centimeters (17-1/2 inches) around its largest circumference, although it had an irregular shape (National Center for Atmospheric Research, 1971). Hail in this area occasionally covers the ground to some depth and may drift in strong winds, e.g., 6 to 8 inch depths with some spots having 2-foot drifts in Franklin County (May 14, 1963); 5 to 12 inch depths in Sumner and Cowley Counties (May 30, 1962); and 4-inch depths at Burlington (April 7, 1961).

In summary, the site area appears to be subject to frequent hail. Hailstones up to baseball size are not infrequent. Occasionally, larger sizes may fall.

In a study of freezing rain occurrence in the Central Plains region over the period 1919-69, It was concluded in Reference 38 that the relationship between maximum hail size and the annual probability of hail occurrence at a point in the site region is as follows:

Maximum Hail Radius (cm)	Annual Probability of Occurrence
0.3	0.9
1.4	0.5
2.1	0.2
2.4	0.1
5.0	0.04
7.2	0.02
>7.5	0.01

2.3.1.2.4 Ice Storms

Freezing rain can occur in the late fall, winter, and early spring. A 10-year study (Reference 4) indicated that there were 83 days with freezing rain observed at Wichita (Table 2.3-3). An accumulation of ice of 0.25 inch once every year and at least 0.50 inch every 2 years can be expected. The mean duration of glaze ice on utility wires if an ice storm occurs is 53 hours for the State of Kansas as a whole (Reference 4).

Ice or glaze results when water droplets associated with freezing rain fall from an above-freezing layer of air aloft through a shallow layer of below-freezing air at the surface of the earth. Ice accumulation results when water droplets fall on cold objects in the shallow cold layer and freeze. The nature of the shallow air layer at the surface is dependent on the local terrain and the micro-meteorological conditions of the area; hence, an extensive network of stations is needed to properly record this phenomenon.

The National Weather Service does not publish any summarized data on ice accumulations. Observations of ice incidence in the United States have recently begun, but no tabulated data on ice accumulations have yet been published.

Some observational ice data are found in the U.S. Department of Commerce monthly publication, Storm Data. A 15-year literature survey (Reference 44) of an area within a 100-mile radius of the site showed the area to be susceptible to glaze. On January 2-3, 1973, 1/2 to 1-1/2 inches of ice accumulated on exposed surfaces in the northeastern part of Johnson County. At Pittsburgh on January 24, 1969, 3/4 to 1 inch of ice was reported on telephone and power lines. On December 10, 1960, 1 inch of glaze accumulated in the Hutchinson and McPherson area. Between 1/8 and 1/2 inch of glaze was reported on February 9, 1959 over most of Kansas. On January 20, 1959, between 1/2 and 1-1/2 inches of ice was found on the ground and on wires in counties south of Burlington.

High wind speeds during or immediately following ice storms exacerbate damage by increasing stress on affected facilities. The annual probability of maximum wind gusts of 20 m/sec (44.7 mph) or greater associated with maximum ice thickness of 3.5 cm (1.4 in) is 0.02. Maximum wind gusts of 20 m/sec (44.7 mph) or greater associated with maximum ice thickness of 5.6 cm (2.2 in) occur with an annual probability of 0.01.

2.3.1.2.5 Thunderstorms and Lightning

Thunderstorms may occur during every month of the year. The most damaging thunderstorms are those associated with the passage of a cold front or a squall line. The average monthly and annual number of days with thunderstorms for both Topeka and Wichita are presented in Table 2.3-4. The maximum frequency of thunderstorms occurs in late spring and during the summer months with the wintertime minimum in December and January.

A thunderstorm day is defined as a day on which thunder is heard at least once at that location (Reference 1). Thunder cannot usually be heard if the lightning causing it is more than about 15

miles away. While thunderstorm incidence data are based upon the observation of thunder generated by lightning occurring within a region close to the observation station, these data do not contain a great deal of information which can be used to characterize lightning. For example, these data do not provide information regarding the type (e.g., cloud-to-ground versus cloud-to-cloud lightning) and severity of the disturbance or frequency of lightning occurrences.

Observations indicate that the magnitude and incidence of lightning strikes to ground are substantially greater in frontal storms than experienced in air mass convective storms (Reference 5). Storms of the air mass convection type account for the majority of annual thunderstorm days. Therefore, the mean annual number of days with thunderstorms probably over-estimates the actual number of lightning-producing thunderstorms with strikes to the ground.

Nevertheless, the number of thunderstorm days is used as a measure of lightning occurrences. The mean annual number of such days for Topeka and Wichita is 58 days and 55 days, respectively (Reference 12). Since the seasonal frequencies of lightning occurrences directly correlate with the seasonal frequencies of thunderstorm days, lightning is least frequent in fall and winter, with 0-4 thunderstorm days per month for Topeka and Wichita, and most prevalent in late spring, with 9-10 thunderstorm days per month in May and June (Reference 12).

A more pertinent statistic than the number of thunderstorm days per year is the number of lightning strikes per square mile per year (Reference 41). The strikes per area have been determined from the combined results of several studies, and they indicate that the number of flashes to ground per square mile per year is between 0.05 and 0.8 times the number of thunderstorm days per year. Therefore, if the largest number of thunderstorm days (Topeka with 58 days) is used, the expected number of strikes per year in a square mile area surrounding the site is between 3 and 46.

A 15-year survey of Storm Data (Reference 44) for the site area showed frequent lightning incidents and associated damage. Qualitatively, lightning frequency directly correlates with that of hail and tornadoes, with a maximum in the spring.

The frequency of lightning strikes to an area is related to the number of thunderstorm days in that area. In order to characterize the expected frequency of lightning strikes in the area of the Wolf Creek plant, data from Topeka, Kansas regarding the average

number of thunderstorm days over a 31-year period were used. These data were presented in Table 2.3-4 and are summarized below.

SEASON	THUNDERSTORM DAYS
Winter (January through March)	3
Spring (April through June)	26
Summer (July through September)	23
Fall (October through December)	5
ANNUAL TOTAL	57

The following discussion, which estimates the number of lightning strikes to safety-related structures at the site, was developed following the methodology presented in Reference 26.

The "attractive area" of the structures was determined for a lightning strike with an electrical current magnitude of 20,000 amperes, which corresponds to the current magnitude of 50 percent of lighting flashes. The attractive area (A) of a structure is:

$A = Lw + 4H \ (w+L + \pi H)$, where

L = structure length, meters
w = structure width, meters
H = structure height, meters

The grouping of safety-related structures which maximizes the attractive area is composed of six structures: reactor building, control building, auxiliary building, diesel generator building, fuel building, and refueling water storage tank.

For simplicity, this grouping has been assumed to have the following dimensions:

L = 96.4 m
w = 86.5 m
H = 62.5 m

These dimensions yield an attractive area of 0.103 km^2. The number of lightning strikes to earth per thunderstorm day per square kilometer (N_e) is given by:

$N_e = (0.1 + 0.35 \sin z) \times (0.40 + 0.20)$ where
z = the geographical latitude

Using the approximate plant latitude of 38 14', the value of N_e calculated from the above equation is $N_e = 0.190$. Thus, the number of lightning strikes per square kilometer per year equals:

$$N_e \times 57 \frac{\text{thunderstorm days}}{\text{Year}} = 10.83 \frac{\text{strikes}}{\text{km}^2 \text{ year}}$$

Since the safety-related structures of interest have an attractive area of 0.103 km^2, the number of lightning strikes per year to safety-related structures at the site is estimated to be:

$$10.83 \frac{\text{strikes}}{\text{km}^2 \text{ yr}} \times 0.103 \text{ km}^2 = 1.12 \frac{\text{strikes}}{\text{year}}$$

or one lightning strike every 0.89 years (324 days).

From data in Section 2.3.1.2.5 it was seen that the number of strikes to ground per square mile per year is between 0.05 and 0.8 times the number of thunderstorm days per year. This results in between 3 and 46 lightning strikes per square kilometer per year, which includes the number previously calculated of 10.83 lightning strikes per square kilometer per year.

The seasonal estimate of lightning strikes to safety-related structures is presented below:

SEASON	STRIKES PER SEASON
Winter	0.06
Spring	0.51
Summer	0.45
Fall	0.10
ANNUAL	1.12

2.3.1.2.6 Tornadoes

Tornado activity is significant in the site area. Table 2.3-5 shows that tornadoes have been observed in the area around the site during almost every month, with about 70 percent occurring during April, May, and June. Over 30 percent of the total number were reported during May, the month of greatest frequency. January is the month of least activity with no tornadoes reported during the period (Reference 32). About 90 percent of the Kansas tornadoes occurred between noon and midnight, with the greatest activity between 1600 and 1800 CST. Figure 2.3-5 shows the total number of tornadoes by 1-degree longitude-latitude squares for

the 13-year period ending 1967 (Reference 31). It is noted that there are several conflicting published values of tornado occurrences per 1-degree square (References 31, 32 and 39). The differences might be attributed to the years sampled, or to the method of report classifications used by the investigators.

The number of tornadoes per 1-degree longitude-latitude square for the period 1956 to 1971 is summarized in Table 2.3-5. During this period Kansas had a total of 92 tornadoes per 10,000 square miles, the largest in the United States (Reference 32). The most severe storm to occur in the general area, from the standpoint of casualties and damage, was on June 8, 1966, when an early evening tornado passed through Topeka causing 16 fatalities, 406 injuries, and property losses in excess of $100 million. In 1972, there were 45 tornadoes reported in Kansas as a whole, with no deaths reported. Table 2.3-6 summarizes the total amount of damage caused by tornadoes between 1916 and 1950 (Reference 47).

The probability of tornado occurrence must be examined statistically, since the possibility of a tornado striking a point is so low that it is difficult to predict its occurrence. For this reason, an annual frequency of tornadoes in an area (1-degree longitude-latitude square) is determined from climatological data, after which the point probability and return period are computed. According to Reference 39, the probability (P) of a tornado hitting a single point within a 1-degree longitude-latitude square is:

$$P = \frac{(2.8209 \times \bar{t})}{A} \qquad [2.3\text{-}1]$$

where:

A = the area in square miles of a 1-degree longitude-latitude square centered on the point;

$\bar{t}$ = the mean annual frequency of tornadoes in the area.

For the 1-degree longitude-latitude square enclosing the site, and using Thom's data for the years 1953-1962, $\bar{t}$ = 3.2. Thus:

$$P = \frac{(2.8209 \times 3.2)}{3788} = 2.38 \times 10^{-3}$$

and the return period, R, for all tornadoes (recurrence interval) is:

$$R = \frac{1}{P} = \frac{1}{2.38 \times 10^{-3}} = 420 \text{ years} \qquad [2.3\text{-}2]$$

However, using more recent data from 1956-1971, the monthly and annual probabilities and recurrence intervals of a tornado occurrence per any 1-degree longitude-latitude square in Kansas are given in Table 2.3-5. These data (Reference 32) indicate a much longer recurrence interval than given by Thom.

The design basis tornado is the Class I tornado, as specified by Regulatory Guide 1.76. The Characteristics of the Class I tornado are as follows:

Maximum Wind Speed	360 miles/hr.
Maximum Rotational Speed	290 miles/hr.
Maximum Translational Speed	70 miles/hr.
Minimum Translational Speed	5 miles/hr.
Radius of Maximum Rotational Speed	150 feet
Pressure Drop	3.0 lb/in^2
Rate of Pressure Drop	2.0 lb/in^2 sec.

The publication Storm Data, (Reference 44) was consulted to obtain information concerning tornado strikes in the vicinity of the site in the years 1972 through 1980. The area comprising Coffey County and the seven county area surrounding Coffey County were evaluated. The counties investigated are Allen, Anderson, Coffey, Franklin, Greenwood, Lyon, Osage, and Woodson Counties.

The tornadoes recorded in these counties are shown below along with an estimate of the path area of each. No estimate of the maximum wind speed that occurred was available from this source. In order to provide some indications as to the intensity of the tornado, an estimate of property and crop damage is included which has also been obtained from Reference 44.

LOCATION (COUNTY)	DATE	PATH LENGTH (MILES)	PATH WIDTH (YARDS)	ESTIMATED DAMAGE PROPERTY(1)	ESTIMATED DAMAGE CROPS(1)
Greenwood, Wilson	4/19/72	20	100	4	0
Osage	7/2/72 Brief Touchdown			0	0
Lyon	3/13/73	8.5	220	4	0
Lyon	4/13/7	9 to 10	440	3	0
Greenwood	6/4/73	5	300	5	5
Allen	6/4/73	2	200	4	0
Coffey	11/20/73	1	176	5	0
Greenwood, Chase & Butler	5/30/74	28	500	6	4
Lyon, Osage & Shawnee	6/8/74	38	2640	7	4
Allen	3/11/77	0.5	75	5	0
Allen	5/4/77	0.25	50	3	0
Greenwood	5/11/78	7 yds.	3	4	0
Osage	5/23/78	4	30	5	0
Franklin	6/17/78 Brief Touchdown			0	0
Osage	6/17/78	8	150	5	0
Greenwood	9/17/78	2	7	4	0

Note 1 - Storm damages are placed in categories varying, from 0 to 9 as follows:

0) No damage
1) Less than $50
2) $50 to $500
3) $500 to $5,000
4) $5,000 to $50,000
5) $50,000 to $500,000
6) $500,000 to $5 million
7) $5 million to $50 million
8) $50 million to $500 million
9) $500 million to $5 billion

2.3.1.2.7 Hurricanes

The eastern Kansas location of the site is about 1,400 miles west of the Atlantic Ocean and about 800 miles north of the Gulf of Mexico. Because the strength of a hurricane is dissipated rapidly once the storm commences an overland trajectory, this distance minimizes the influence that a hurricane would have upon the site. For a 93-year period, 1871-1963, the tracks of four dissipating hurricanes have been shown to pass through Kansas (Reference 7).

2.3.1.2.8 Strong Winds

Strong winds occur in Kansas as a result of extratropical cyclones, thunderstorms, and tornadoes. Tornadoes are discussed in Section 2.3.1.2.6. Extratropical cyclones usually produce their highest wind speeds in winter or spring because they are energized mainly by temperature contrasts between air masses.

Thunderstorms are convectively driven and therefore produce their strongest winds during the spring and summer months. The maximum 1-minute wind speed for Topeka was 81 miles per hour from the north, while the maximum for Wichita was 68 miles per hour from the northwest. Gusts of lesser speeds are recorded from almost all directions (References 9 and 12).

According to Pautz (Reference 31), there were 877 reports of wind gusts (50 knots and greater) occurring in 453 days in the State of Kansas from 1955 to 1967 (Figure 2.3-6). The diurnal distribution of these wind gusts shows a maximum between 1800 CST and 2400 CST. Pautz also shows this data by 1-degree longitude-latitude squares. About 30 windstorms were reported in the square encompassing the site (Figure 2.3-7). Figure 2.3-8 shows these windstorm reports averaged by 2-degree longitude-latitude squares. About 200 reports occurred in the site vicinity. This is a much higher rate of occurrence than shown in the 1-degree square averages; the disparity between these frequencies is explained in Section 2.3.1.2.3.

The fastest-mile wind speed is defined as the fastest observed 1-minute value when the direction is in tens of degrees (Reference 12). Thom (Reference 39) chose the annual fastest mile wind speed as the best available measure of wind for design purposes. He calculated fastest mile wind speed values and mean recurrence intervals using Frechet probability distributions. Some typical recurrence intervals and their related wind speeds for eastern Kansas are shown in Table 2.3-7. The 100-year return period fastest-mile wind speed in the site region was calculated at 86 mph. In comparison, the fastest-mile wind speeds observed in Topeka and Wichita are presented in Table 2.3-8.

2.3.1.2.9 Air Pollution Potential

Meteorological conditions which are conducive to high air pollution potential are light winds, surface inversions, and stable layers aloft. The site area is characterized by frequent storm passages, cloudiness, high winds, and thermal instability, all of which favor rapid dispersion of atmospheric pollutants and,

therefore, low air pollution potential. The geographical distribution of these periods of relatively good ventilation conditions is indicated by the tracks of the centers of well-defined low pressure systems (Figure 2.3-9). Periods of limited dispersion or stagnation are often associated with slow moving, warm anticyclones with resulting thermal stability and numerous temperature inversions. Hosler (Reference 21) has presented a climatological study on the frequency of temperature inversions in the United States. According to his study, the site is in an area where periods of high air pollution potential may be expected to occur approximately 30-40 percent of the time (Figure 2.3-10).

The mixing height or mixing depth of the atmosphere, defined as that height through which relatively vigorous vertical mixing occurs, plays a significant role in the diffusion potential of a given area. Holzworth (Reference 20) has indicated that maximum mixing heights for eastern Kansas vary from a mean of about 850 meters (2788.9 ft) in the winter to about 1,600 meters (5249.6 ft) in the summer (Figure 2.3-11). Such values indicate that this region has mixing heights which are higher than those over about one-half of the United States (Figure 2.3-12).

Periodically, however, a high pressure system in the lower atmosphere will stagnate over a region and result in a lower mixing height and limited vertical diffusion. The occurrence of limited dispersion episodes, also called stagnation periods, throughout the contiguous United States has been objectively determined by Holzworth (Reference 20). The critical limiting conditions used to define an episode are:

a. All mixing heights 1,500 meters (4921.5 ft) or less;

b. All mixing layers average wind speeds 6.0 meters per second (8.9 mph) or less;

c. Above conditions satisfied continuously for at least two days.

Figure 2.3-13 shows the total number of episode-days, the number of days for which the above conditions are met, in 5 years to be about 62 in the vicinity of the site. There is a qualitative agreement between the objectively derived patterns and the actual forecast-days of high air pollution potential (Figure 2.3-14) for the region (Reference 20).

2.3.1.2.10 Meteorological Data Used for Ultimate Heat Sink Analysis

The meteorological data used as input to the Ultimate Heat Sink (UHS) analysis in Section 9.2.5 were based on a computer processing of 16 years of meteorological data (1949 through 1964) from Chanute Flight Service Station (F.S.S).

The long-term meteorological data collected at Chanute, Kansas are considered to be the most representative data for the WCGS as discussed in Section 2.3.2. However, only 16 years of data were recorded (1949-1964) by the U.S. National Climatic Center at Chanute, Kansas.

These 16 years of data represent regional climatological conditions for analysis for the UHS because included in this 16-year period of record is the worst recorded drought which occurred during 1952 through 1957 and has an estimated recurrence interval of 50 years. This drought also occurred in many states in the midwest including Illinois and Texas. For example, the 1952-1955 drought in Illinois was considered to have a recurrence interval of 83 years by Illinois State Water Survey (Reference 1). Also, in Texas this drought was considered to be the worst on record since 1890 (Reference 2). To date these droughts for Illinois and Texas are considered to be the worst on record. Therefore, the 16 years of Chanute meteorological data for the Ultimate Heat Sink (UHS) Analysis for WCGS includes the most severe regional climatological period on record to date.

The worst 30-day evaporation and temperature periods were selected from this 16-year meteorological data for use in the UHS analysis. These two 30-day periods occurred close to or within the one-in-fifty year drought (maximum 30-day evaporation period occurred from June 24, 1954 to July 23, 1954; maximum temperature period occurred from July 16, 1951 to August 15, 1951). Note that this worst evaporation period for the WCGS UHS analysis occurred within the one-in-fifty year drought and the worst temperature period occurred close to the one-in-fifty year drought. Analysis of Illinois weather data for 28 years (1948 to 1976) for an UHS located in Illinois developed similar trends, i.e., the worst 30-day evaporation and temperature periods also occurred close to or within the one-in-fifty year drought.

By this analogy, the 16 years of Chanute meteorological data used for WCGS UHS analysis are representative of the regional climatological conditions and contain the worst case drought, evaporation, and temperature periods.

As suggested in Revison 2 to Regulatory Guide 1.27, the worst temperature period was obtained by saving the conditions for the 5 consecutive days, 1 day, and 30 consecutive days resulting in the highest average water temperatture, after which these three periods were combined to produce a synthetic 36-day worst weather period.

The temperature periods were determined to have the following actual dates:

Worst 5 days:	June 30, 1949 (6:00 p.m.) to July 5, 1949 (noon)
Worst 1 day:	July 2, 1949 (noon) to July 3, 1949 (noon)
Worst 30 days:	July 16, 1951 (6:00 a.m.) to August 15, 1951 (6:00 a.m.)

Table 2.3-9 shows A) "The Worst Temperature Period: (synthetic 36-day period as explained above, and B) "The Worst Evaporation Period." The latter was obtained by selecting the weather conditions corresponding to the 30 consecutive days (midnight June 24, 1954 to midnight July 23, 1954) for which evaporation loss was maximum.

2.3.1.3 Local Meteorological Condtions for Design and Operating Bases

The following meteorological conditions developed in Seciton 2.3.1 were used for design and/or operation of the plant:

Meteorological Condition	Section In Which Condition Was Developed	Section In Which Condition Was Used
Condtions used as input to ultimate heat sink analysis	2.3.1.2.10	9.2.5
Class I Design Basis Tornado Parameters	2.3.1.2.6	3.3.2
Maximum Probable Winter PMP and 100-year Return Period Snowpack	2.3.1.2.2	2.4.2.3.3
Probable Maximum Winds	2.3.1.2.8	2.4.5.1

2.3.2 LOCAL METEOROLOGY

Data from onsite measurements and from nearby stations of the National Weather Service are used in preparing this report. The only first order National Weather Service stations in the area are at Topeka and Wichita, both having extensive data. Burlington, 4 miles southwest of the site, has some limited data available that have been used when applicable. Because it has a good length of continuous record, is close to the site, and has approximately the same elevation and exposure, the Chanute, Kansas, Flight Service Station (F.S.S.) (Reference 28) provided data which are used to characterize the wind and atmospheric stability of the site area. In comparison, Topeka is 56 miles north of the site and its wind data are influenced by its location in the Missouri River Valley, while Wichita has a similar exposure to the site area but is 96 miles southwest of the site (Figure 2.3-1).

Although these data are considered to be generally representative of meteorological conditions at the site, local variations, especially in the distribution of wind direction and speed, probably exist. These local variations can only be identified by the onsite meteorological monitoring program. Accordingly, the local climatology of wind and atmospheric stability is evaluated in detail using 36 months of data gathered from the onsite meteorological tower during the period June 1, 1973 to May 31, 1975 and March 5, 1979 to March 4, 1980. The data and methods used are explained in Section 2.3.3.9.

2.3.2.1 Normal and Extreme Values and Meteorological Parameters

2.3.2.1.1 Temperature

Table 2.3-10 presents the monthly and annual average and extreme temperatures for Burlington, Wichita, and Topeka. The average monthly temperatures range from 80°F in July and August to 29°F in January; however, Kansas has occasional severe outbreaks of hot spells in the summer and cold periods in the winter. Burlington has recorded both a high of 117°F and a low of -27°F, Topeka a high of 109°F and a low of -20°F, and Wichita a high of 113°F and a low of -12°F.

The annual average number of days with temperatures in excess of 90°F is approximately 60 to 70 for the region, while the average number of freezing days per year is about 120. The annual mean temperatures based on these data are 57.0°F for Burlington, 54.3°F for Topeka, and 56.6°F for Wichita.

Table 2.3-11 gives the hourly average temperature for the WCGS using the 3-year period of on-site data at the 10-meter level.

This table also presents the annual average and extreme temperatures for the site. The annual mean temperature is 54.7°F (12.6°C), which compares favorably to the annual means for Burlington, Topeka, and Wichita. Hourly average, daily average, and extreme temperature data for the site are presented on a monthly basis in Table 2.3-12.

It should be noted that the "mean" values in the referenced tables are the arithmetic averages of all hourly values. The "climatic mean" is determined by adding the maximum and minimum values each day and dividing by 2.

Although Kansas is distant from major bodies of water, significant moist air incursions from the Gulf of Mexico occur during the summer months. This moist air inflow results in marked increases in wet bulb temperatures for the region from June to September. Monthly and annual average dewpoint temperatures for both Topeka and Wichita are presented in Table 2.3-13.

Hourly average dewpoint temperature and annual average and extreme dewpoint temperatures for the 3-year period of onsite data are listed in Table 2.3-11. The mean annual dewpoint temperature is 42.6 F (5.9 C), which compares favorably to the mean annual dewpoint at both Wichita and Topeka (Table 2.3-13). Onsite dewpoint statistics on a monthly basis are given in Table 2.3-12.

2.3.2.1.2 Water Vapor

This portion of Kansas shows a marked diurnal change in relative humidity. As temperatures increase during the day, relative humidities decrease accordingly. Likewise, when temperatures fall during the evening hours, there is an appreciable rise in the relative humidity values. Therefore, the lowest relative humidity values are found during the afternoon hours, while the highest values occur in the early morning just before sunrise. Mean relative humidity values for Topeka and Wichita are shown in Tables 2.3-14 and 2.3-15.

Table 2.3-11 lists the hourly average relative humidity for this 3-year data base from the site. Annual averages and extremes of relative humidity can also be found in this table. Monthly relative humidity statistics are presented in Table 2.3-12 for the 3 year period. The annual averages show that the onsite data period was slightly drier than the long-term period. No data on absolute humidity are available.

2.3.2.1.3 Fog

Heavy fog occurs relatively infrequently in the region around the site. Topeka averages about 14 days per year with heavy fog while Wichita has 17 such days. The months of December, January, and February show the greatest incidence of fog, averaging two to three such days per month (Tables 2.3-14 and 2.3-15). No onsite fog data are available. No data on reduction of visibility because of smog are available.

2.3.2.1.4 Precipitation

Long-term average precipitation is moderate, ranging from 30 to 38 inches annually, and is distributed throughout the year, although 70 percent of the annual total precipitation occurs between April and September (Table 2.3-16). This is a direct result of the increased thunderstorm activity occurring in the region during the summer months. January is generally the driest month of the year, while either May, June, or July is the wettest. The annual average number of days with precipitation ranges from about 85 to 95.

Snowfall, occurring in every season but summer, averages between 15 and 20 inches a year in the region. The greatest average monthly snowfall for Burlington, Kansas, occurs in February (Table 2.3-16). Snowfalls of 17 inches or more in 24 hours have been recorded at Topeka, Kansas (Reference 12).

On-site precipitation data were not taken during the first 2 years of data gathering. However, the data are available for the March 5, 1979 - March 4, 1980 period. Annual precipitation wind roses for the 10- and 60-m levels are presented in tabular form in Tables 2.3-17 and 2.3-18. Monthly precipitation wind roses based on the 1 year of data are presented in Tables 2.3-19 and 2.3-20. Table 2.3-21 presents the number of hours with precipitation and precipitation rate distributions, by month, for the year of data. The total precipitation for the year was 28.16 inches with the maximum of 8.35 inches occurring in June 1979.

Additional data on short-term rainfall intensity can be found in Section 2.3.1.2.1. Additional information on snowfall and weight of snowpack can be found in Section 2.3.1.2.2.

2.3.2.1.5 Wind Speed and Direction

Joint wind speed and direction frequency distributions for Chanute F.S.S. from 1955 to 1964 are shown on a monthly and annual basis in Table 2.3-22. On the average, the prevailing wind at Chanute

is southerly from April through December, while north-northwesterly flow prevails during January and February. March has the highest monthly wind speed, averaging 12.8 knots. July and August have the minimum monthly average wind speed of 9.5 knots.

Calms were present 3.6 percent of the time, while strong winds above 20 knots were observed 3.5 percent of the time. Calms occurred primarily during the summer months with a maximum frequency of 5.1 percent in June. Strong winds occurred primarily in the spring, with a maximum frequency of 9.0 percent in April.

Table 2.3-23 gives the frequency distributions for the persistence of wind direction at Chanute F.S.S. in each season. Southerly and north-northwesterly winds are most persistent, with the former dominating in spring, summer, and fall, and the latter in winter. The maximum persistence during the spring, summer, fall, and winter is 60 hours, 33 hours, 45 hours, and 36 hours, respectively. No calms last longer than 21 hours.

The joint wind-stability characteristics of the site area are defined by Table 2.3-24. The table is based on 10 years of standard National Weather Service (previously the U.S. Weather Bureau) 3-hourly observation at Chanute F.S.S., covering the period January, 1955 to December, 1964. For each observation the stability existing at that time was calculated by the Turner-Pasquill method in program "STAR", supplied by the National Climatic Center, Asheville, North Carolina. In the version of the program used for this study, Pasquill stability class G is not distinguished from class F; rather, the two are treated as a single class which is designated as F. The mean wind speeds for each stability class are as follows:

Stability Class	Mean Wind Speed (knots)
A	1.7
B	4.7
C	9.2
D	13.1
E	8.2
F	3.9

Tables 2.3-25 and 2.3-26 give the wind roses for the lower level (10-m) and upper level (60-m) winds, respectively, for this 3-year period of on-site data. These wind rose are also displayed graphically on Figures 2.3-15 through 2.3-18. Wind roses on a monthly basis are provided in Tables 2.3-27 (10-m) and 2.3-28 (60-m). For the 10-meter level, the mean annual wind speed is 9.2 knots (4.6 m/sec) and the prevailing direction is south. Comparison of onsite data with long-term Chanute F.S.S. indicate that similar wind patterns occur at both sites. The prevailing direction is southerly, except for the winter months when it shifts to a north-northwesterly direction. Wind speeds at Chanute F.S.S. are slightly higher than those onsite; however, at both sites they are strongest during March and April. Joint frequencies of wind speed, direction, and stability for the total period are presented in Tables 2.3-29 (10-m) and 2.3-30 (60-m). These joint frequencies are given on a monthly basis in Tables 2.3-31 (10-m) and 2.3-32 (60-m). The stability frequency (in percent of total time) over the total period is distributed as follows: A=11.29, B=5.13, C=6.10, D=30.99, E=23.92, F=13.42, G=9.15 (Table 2.3-29). The

most frequent occurrence of Stability Class A is during the early summer months. Stability Class G occurs most frequently during the fall.

Diurnal variation of wind speed and direction, average, and extreme winds for the total period are presented in Table 2.3-11, and on a monthly basis in Table 2.3-12. Table 2.3-33 provides the total period lower level wind persistence for each stability class; for all classes combined (Pasquill All) and all stable classes (Pasquill #S#), respectively. Southerly, northerly and north-northwesterly winds are most persistent onsite; the same pattern has also been noted at Chanute F.S.S.

2.3.2.1.6 Cloud Cover and Sunshine

Average monthly and annual daylight cloud cover and sunshine for Topeka and Wichita are given in Tables 2.3-34 and 2.3-35.

2.3.2.1.7 Stability

The seasonal persistence of stability frequency distribution at Chanute Flight Service Station is depicted in Table 2.3-36. For all seasons, only Class D stability conditions have a persistence exceeding 15 hours. In spring, fall, and winter more than 10 percent of Class D stability conditions persist for longer than 102 hours, while the upper limit for summer persistence is 96 hours.

Onsite diurnal variation of stability statistics can be found for the total period in Table 2.3-11 and monthly in Table 2.3-12. Table 2.3-37 presents a stability persistence summary for the 3-year onsite data set. The only stability classes to persist more than 24 hours are classes D and E.

The 85-1Om differential temperature was used as the primary parameter to determine stability at Wolf Creek. If the 85-10m data value was not available, then the 60-10m differential temperature value determined stability. Difficulties were encountered in getting valid data for these parameters for the Phase 2 program (Section 2.3.3.7.2). This caused all valid data to come under intense scrutiny. Before data was allowed into the data base, all calibrations, site logs, and weather maps that were obtained from the U.S. Department of Commerce were checked against the analog strip chart. If the data could not be proved invalid, then the data was allowed into the data base.

For these data, stabilities A, F, and G occurring for greater than a 12-hour consecutive period were identified. These 16 time periods and stabilities are listed in Table 2.3-37a.

All strip chart data and instrument calibration records for the 10 stable condition periods showed consistent and valid data. All 10 periods occurred during the night time hours under clear skies and high pressure conditions. Daytime temperatures varied from 10 to 30 F. Radiational cooling near the surface occurs under these conditions creating stable meteorological conditions. As the sun rises and adds heat to the surface layer, stable conditions weaken.

The first three unstable periods (3/7-8/79, 3/8/79, 3/8-9/79) can be attributed to low pressure systems and frontal movements across the area which were being maintained by a polar jetstream maximum located over the midsection of the U.S. The upper air flow was strong out of the north bringing an influx of polar air.

The polar air continued to flow over the region at upper levels during the last three unstable periods (3/10/79, 3/11/79, 3/12/79). However, low humidity, high pressure and a southerly surface flow helped to keep skies clear and create surface heating for unstable conditions near the surface.

2.3.2.2 Potential Influence of the Plant and Its Facilities on the Environment

Site characteristics and general arrangements of the facilities for the plant and cooling lake are shown in Figure 2.4-1, while the plant layout is shown in Figures 1.2-2 and 2.1-3.

To create the cooling lake, an earth dam was constructed across Wolf Creek at a point about 3.1 miles south of the plant site. In addition, saddle dams were constructed at low points on the western topographic ridge (Figure 2.4-1). The nearest of these dams is approximately 1.2 miles west of the plant site.

The cooling lake has a normal operating elevation of 1087 feet mean sea level and a surface area of 5,090 acres. Station grade is 1099.5 feet and floor grade is 1100.0 feet. A maximum of about 12 feet of soil and near-surface bedrock was cut from the plant site area to establish station grade (Figure 2.1-3).

Buildings and other structures do not have sufficient dimensions to affect the general diffusion climatology of the site beyond a wake region of several hundred meters. Neither the saddle dams nor the main cooling lake dam significantly affected local meteorology at the plant site.

The filled cooling lake modified the diffusion climatology of the site to the extent that its surface temperature differs from the air temperature at the site. This results in a modification of the diffusion properties of the air either before or after it passes the plant. The amount of modification depends on the initial temperature difference between the air and the lake water and the length of time that the air remains over the lake.

The maximum fetch of the lake in relation to the plant site is about 3.1 miles in the south-southwest to south-southeast sector. Thus, for winds less than about 6 miles per hour blowing from or into this sector (and less than about 2 miles per hour in any sector over the lake) modifications in the atmospheric stability of the diffusion properties of the air may be expected.

In addition to introducing modifications in the diffusion climatology, the cooling lake may produce an increase in the atmospheric humidity and hence an increase in fog incidence in the area. This potential increase in fog incidence was investigated by computer simulation.

The computer program FOGALL (certified and documented by Dames & Moore) employed in the analysis of fogging and icing potential of the Wolf Creek Lake evaluates the impact of the lake at specified receptor points. This evaluation contains the following information: 1) the number of fog occurrences in 20 visibility range categories for each receptor and the total occurrences at each receptor for all ranges; 2) the count of fog hours which would occur without the heated lake (baseline conditions); 3) the water vapor density distribution for the receptors; 4) the frequency of occurrence of the temperature change at each receptor due to the lake; 5) the total amount of the number of hours ice would occur at each receptor; and 6) the frequency of ice occurrences without the lake (baseline conditions). In addition, for each occurrence (hour) of fog, the date, vapor pressure, receptor air temperature, water vapor density, visibility range, source air temperature, temperature difference between source and receptor, and receptor number are listed. The receptor points used in the evaluation are presented in Figure 2.3-19.

The FOGALL model was developed as an alternative to POND model in 1980 by Dames & Moore. The objective was to develop a model which was more flexible than POND and to update both the physics and algorithms used. The basic differences between FOGALL and POND are listed below:

1. FOGALL uses a more recent formulation (Reference 34) for the calculation of the heat and moisture fluxes from the heated pond.

2. FOGALL utilizes a formal area source dispersion algorithm, while POND utilizes a more intuitive trajectory approach. The trajectory approach limits POND to 8 discrete wind directions. In FOGALL the wind varies continuously.

3. POND uses ambient 3-hour meteorological observations while FOGALL uses hourly data.

4. FOGALL stimulates the vertical dispersion of vapor and heat from each area source making up the lake by using a Gaussian distribution using Pasquill-Gifford parameters. POND uses a uniform distribution to simulate the vertical dispersion. Both water vapor and heat are uniformly distributed between the water surface and a height calculated from upwind fetch and stability class.

5. POND uses an 18 x 10 fixed cartesian grid as the basis for its calculations. This grid is used to define both area sources and receptor points. In FOGALL each receptor and each area source can be independently positioned. That is, neither receptor or sources are keyed to a cartesian grid. The receptor in FOGALL can also be positioned with a vertical coordinate. This permits receptors in a visibility analysis to be placed at eye level position along critical highways.

6. FOGALL utilizes an optimized subroutine to calculate σy and σz while POND does not.

7. Input water temperature can be a constant or it can be varied hourly, daily or monthly in FOGALL. In POND the input water temperature can not be varied as a function of time.

8. FOGALL produces frequency distribution of fog, icing, water vapor density, and induced temperature changes for baseline as well as plant induced conditions. The frequency distributions generated have more resolution than those generated in POND.

A complete copy of the FOGALL certification/users manual was provided in response to ER(OLS) Questions 450.3 and 450.4.

The procedure used to validate the FOGALL model is described in the certification/users manual provided in response to ER Question 450.3.

The verification of FOGALL was performed by executing two test cases and manually calculating the expected results. One test case utilized source water temperature constant with time and area. The second case varied the source water temperature over the source area each hour. In addition, hand calculations were performed to verify that the results of each subroutine conformed with the respective applied theoretical model or mathematical equation.

The model design is based upon accepted principals of atmospheric physics; computed values were hand verified; and the test cases were designed to detect fog, no fog, ice, and no ice conditions at defined receptors. The validation procedure, therefore, provides a high degree of confidence that the FOGALL results are representative of actual conditions.

In calculating the potential of the cooling lake to cause fogging and icing, FOGALL uses a numerical approximation to a Gaussian area source model, which essentially breaks the water surface up into a number of small incremental source area elements. The water temperature of each source element is a model input (vary spatially and temporarily) as well as hourly input of wind speed, wind direction, atmospheric stability, ambient temperature, and relative humidity.

FOGALL makes an emission, dispersion, and impact calculation each hour. The emission calculations constitute an evaporative mass flux calculation at each increment, and a sensible heat flux calculation via the evaporative mass flux and the Bowen ratio which is evaluated in terms of ambient temperature, relative humidity, and surface water temperature. The dispersion calculation for each element is made using the Gaussian area source model and it produces estimates of water vapor density impact and thermal impact for source strengths of evaporative mass flux and sensible heat fluxes, respectively.

The visual impact calculation takes the total water vapor density impact and total thermal impact at a given receptor and determines whether or not fog is present. The liquid water content of air at the receptor is calculated as the difference between the water vapor density (ambient plus total impact) and water vapor density

at saturation (assumes water vapor starts to condense at a relative humidity of 100 percent). The visibility at the receptor is calculated from the liquid water content using an equation given in the Compendium of Meteorology (Reference 14). Fog exists at the receptor when, according to international definition (Reference 1).

The meteorological data used in these calculations were on-site hourly observations of wind speed (meters per second), wind direction (degrees), 10-meter dew point and ambient temperature (C), and stability class (A-G), for the periods June 1973 to May 1975 and March 1979 to March 1980. The lake surface temperature distribution was calculated from a model which simulated the effects of local meteorological conditions (period January 1949 to December 1965), and plant heated-water discharge, on the surface temperature and evaporation rates of the lake. These calculated surface lake temperatures assumed a one-unit generating plant operating at 100 percent average annual load factor. The data used were in the form of a cumulative profile of surface temperature distribution (seasonal upper 1 percentile) for six locations on the cooling lake [plant discharge, A to D, and plant inlet; see Figure 3.4-13 ER]. The cooling lake was divided up into 36 source squares (750 meters by 750 meters) with each square assigned a constant surface water temperature. The source square temperatures in the upper regions of the lake are not affected by the plant heated discharge; hence, the calculated natural background temperatures where used as given in the ER Figure 3.4-14. Source squares located near the four isotherm locations and plant inlet and discharge [Figure 3.4-13 in ER] were assigned the 1 percentile seasonal temperatures as given in Table 3.4-2 of the ER(OLS). Source squares located between two isotherm locations were assigned one-half the temperature gradient between the two (assuming a linear gradient existed between adjacent source squares). For this investigation, the program was run using 3 individual years of meteorological data, 1 year (by month) of source water temperatures (36 sources) covering an array of 90 receptors located in the immediate vicinity of the lake (Figure 2.3-19).

The evaluation of the lake's impact is made by using an area source model which is derived from the Gaussian point source model. The water body is broken up into a number of incremental area elements. The impact at a particular point (Xp, Yp, Zp) is taken to be the sum of the individual impacts of each area element.

The basic area source diffusion equation for ground level releases is given by:

$$I(x'_p, y'_p, z) = \int_{-infin}^{x'_p} \int_{-infin}^{infin} Y\,(x', y')\; G(x'_p - x', y'_p - y', z)\; dy'\; dx') \qquad [2.3\text{-}3]$$

where $I(x'_p, y'_p, z)$ is the total impact at the point (x'_p, y'_p, z), (x',y') is the flux (thermal or water vapor) at the point (x'y'), and G is the Gaussian kernel given by:

$$G(x,y,z) = \frac{1}{psy\ (x) sz\ (x) u} \exp\left\{-1/2 \frac{y^2}{ys(x)} + \frac{z^2}{s\ z\ (x)}\right\} \qquad [2.3\text{-}4]$$

where u is the ambient wind speed. Note that a factor of 2 isincluded to represent ground reflection.

Equation [2.3-3] is applied to each incremental area element in impact. Assuming that the surface water temperature variation with each element is small (i.e., can be moved outside the integral) and assuming

$$\frac{Dx'}{2(x'_p - x')} << 1$$

Equation [2.3-3] can be written for a single element located at point (x'_s, y'_s) as:

$$I(X'_p, Y'_p, Z) = \frac{Y(x'_s, y'_s)\ x'}{u\ z}\ 1/2p\ \exp\left(-\frac{1}{2}\ \frac{(\ z)^2}{sz}\right)\ (\mathrm{erf}(y_1) - \mathrm{erf}(y_2)) \qquad [2.3\text{-}5]$$

where:

$$y_1 = \frac{y'_p - y'_s + Dy/2}{2sy} \qquad [2.3\text{-}6]$$

$$y_1 = \frac{y'_p - y'_s - Dy/2}{2sy} \qquad [2.3\text{-}7]$$

and sz and sy are evaluated at the downwind distance $x'_p - x'_s$. Equation [2.3-5] is the basis of the diffusion calculation in the FOGALL model.

The flux, Y, is evaluated aerodynamically as the evaporative mass flux, E, for the water vapor impact and as the thermal emission flux, f, when the thermal impact is calculated.

The calculation of E and f is based upon the work of Ryan and Harleman (Reference 34). There are several variables which are determined sequentially in the model in order to calculate E and
f. These are:

1) Ambient dry air density, r ad (using the gas law);

2) Ambient virtual temperature, T_V, according to:

$$T_V = T(1+0.6083 \frac{rv}{rad + rv}) \qquad [2.3\text{-}8]$$

3) Saturation vapor pressure at the water surface, e_{ws} (thermodynamically);

4) Water vapor density at the water surface, r_{wv} (using the gas law);

5) The change in the water vapor density, Dr_V, between the surface and a height of 2 meters;

6) Dry air density at the water surface, T_{wd} (using the gas law);

7) Virtual temperature at the water surface, T_{wv}, using Equation [2.3-8] with the corresponding variables for the water surface (assuming T at the surface equal to water temperature);

8) The change in the virtual potential temperature, D q_V , according to:

$$Dq_V = DT_V + GDz$$

where G is the dry adiabatic lapse rate.

The evaporation mass flux, E, is then calculated as

$$E = \frac{H_C Drv}{Cprad} \qquad [2.3\text{-}9]$$

where:

$$Hc = 1.754 \ (Dq_V)^{1/3} + 2.06554u \qquad [2.3\text{-}10]$$

The water vapor impact is then calculated by substituting E for in Equation [2.3-5].

The thermal impact is calculated by substituting T for in Equation [2.3-5], where

$$fT = \frac{H_C D q_V}{radCp} \qquad [2.3\text{-}11]$$

The results of these analyses showed that the greatest occurrences of fogging and icing occurred directly over the lake and along the immediate shoreline. These occurrences diminished rapidly with increasing distance from the lake. Twenty receptors were selected as being representative of conditions that would be encountered along U.S. Route 75 (Receptors 1, 2, 11, 12, 21, 22, 28, 29, 35, 36, 44, 45, 53, 54, 62, 63, 71, 72, and 82), the nearby towns of Burlington and New Strawn (Receptors 21, 22, and 53), and at the plant site (Receptor 48). The results of the analyses (Tables 2.3-42 through 2.3-44) showed that the frequency of fog occurrences resulting from the cooling lake at the receptors bordering U.S. Route 75 and the towns of Burlington and New Strawn was less than 1.5 percent on an annual basis. Most of these fog occurrences were of short duration (1 or 2 hours) and had visibilities of less than 200 m (1/8 mile). The frequency of icing occurrences for the same receptors was less than 0.25 percent on an annual basis. Fog occurrence frequency increased proceeding from the southern to northern receptors.

This is due to the prevailing southerly wind direction, which provides the mechanism for the advection of heat and moisture to the northern receptors, and the closer proximity to the lake of the northern receptors.

Of the 20 receptors, Receptor 48 showed the highest fog (approximately 5 percent on an annual basis) and icing frequency, as well as the greatest occurrence of visibility ranges less than 100 and 200 meters. This result is a direct consequence of (1) proximity to the plant discharge, which has the highest source temperatures (moisture source) per season [Table 3.4-2 of ER]; and (2) the prevailing southerly winds causing latent and sensible heat advection.

In addition to the annual results, the data of March 5, 1979 to March 4, 1980 (Receptors 21 and 22 at Burlington and 53 at New Strawn) were further studied for number of fog occurrences per month (Table 2.3-45), and the number of monthly fog occurrences per 6 hour interval. The results at these receptors showed the greatest frequency of fog during November (13, 17, and 13 hours

for Receptors 21, 22, and 53, respectively) and March (15, 16, and 14 hours for Receptors 21, 22, and 53, respectively). A secondary maximum occurred during August for Receptors 21 and 22 (16 and 19 hours, respectively) and also during February (10 hours for each of the three receptors). Examination of the number of fog occurrences per 6-hour interval showed the fog occurring during the early and mid-morning and late evening periods. A further check of the meteorological input data for these cases showed very stable atmospheric conditions (stability classes E to G) and low wind speed conditions persisting.

In addition to the above results, the change in water vapor density distribution and the frequency of temperature changes greater than 2 C were determined at each receptor. Again, the greatest impact was found in the immediate vicinity of the lake. The towns of Burlington (Receptors 11, 12, 21, 22) and New Strawn (Receptor 53) and the plant site (Receptor 48) were of particular interest with respect to temperature and water vapor changes. A summary of the frequency of temperature changes greater than 2 C at the above receptors is presented in Table 2.3-42. The greatest number of occurrences is at the plant site because of its close proximity to the lake. At New Strawn, a temperature increase of 2 C or greater can be expected on the order of 1.5 percent of the year because of the cooling lake. The frequency of the temperature increase of 2 C or greater will be even less at Burlington.

The changes in water vapor density distribution, due to the cooling lake, for the above receptors is presented in Tables 2.3-43 through 2.3-45.

The primary effect of the cooling lake was to modify atmospheric stability in the local area of the lake due to different roughness parameters and surface temperatures between land and lake. To evaluate the cooling lake's impact on the WCGS x/Q calculations of the USAR Section 2.3.4 and 2.3.5, eight combinations of ambient atmospheric stability, air-water temperature differences, and type of release were studied. These cases are listed in 2.3-29c.

Case 1

For the case of a stable ambient atmosphere, water temperature warmer than ambient air, and ground level release, the effect of the cooling lake is to heat the two level atmosphere causing increased turbulence. Ground level releases would, therefore, be more dispersed. For this case, the USAR analyses of Sections 2.3.4 and 2.3.5 are conservative.

Case 2

For an elevated release into a stable atmosphere traversing over warmer water, there will be a modification of ground level x/Q only if the lake-induced mixing reaches plume height within the distance that air flow is over the lake. G. S. Raynor (Reference 33) presents a method for estimating the vertical extent of mixing due to the warmer lake surface:

$$H = \frac{u^{*}T}{\bar{u}} \left(\frac{F(T_A - T_W)}{-DT/DZ}\right) \qquad (1)$$

where

H = height of modified layer (m)

u* = friction velocity over the water (m sec^{-1})

$\bar{u}$ = mean wind speed (m sec^{-1})

F = fetch over water (m)

T_A = low-level air temperature in source region (^{o}C)

T_W = water temperature (^{o}C)

DT/ DZ = lapse rate ovet the source region and above the inversion (Cm^{-1})

To estimate the maximum impact of a warmer cooling lake on a stable atmosphere, the inversion height (H) was calculated for:

u* = .21 m/s (appropriate for smooth water surface; D.H. Slade, 1968)

$\bar{u}$ = 2 m/s

F = 5.5 km (wind from south or north)

$T_A - T_W = -50^{o}C$

D T/D Z = .015^{o}C/m (E stability)

Under the extreme assumptions, the mixing height will reach approximately 450 meters, sufficient height to cause plume fumigations. Since the fumigation will occur over water or within a

short distance of the lake, this situation will cause a greater impact (with respect to present analyses) only within a short distance of the lake itself X/Q concentrations farther downwind may be lower due to the lake-induced mixing.

Case 3 and 4

For an elevated or ground release with a stable atmosphere traversing a cooler body of water, the effect of the cooling lake will be to increase the stability of the atmosphere, potentially creating a very shallow intensification of the existing temperature inversion. Since this shallow temperature structure would likely be destroyed by mechanically-induced turbulence over the land surfaces, the lake does not have a significant effect in this case.

Case 5 and 6

For the case of an elevated or surface release into an unstable atmosphere traversing a warmer body of water, the effect of the cooling lake would be to increase the instability of the atmosphere producing greater dispersion of a ground level release. Greater dispersion of an elevated release would occur if the lake-induced turbulence extended to plume height. For these cases, the existing analyses are conservative for a ground release, and are likely somewhat conservative for an elevated release.

Case 7

For a ground level release into an unstable atmosphere traversing cooler water, the effect of the cooling lake will be to create a low-level temperature inversion which would restrict the dispersion of the low-level plume, tending to increase ground-level concentrations, until the inversion was destroyed by a rougher (or warmer) land surface.

Case 8

As with Case 7, a low-level inversion will be created over the lake surface. From Equation 1 with the following variables:

u^* = .21 m/s

$\bar{u}$ = 2 m/s

F = 5.5 Km

$T_A - T_W = 10^{o}C$

$\Delta T/\Delta Z = -.015^{o}C/m$ (C stability)

The mixing depth (H) for this conservative case will not exceed approximately 20 meters. Since an elevated release from the 60-meter vent would not easily penetrate to groundlevel through this inversion layer, X/Q values would generally be lower than the present analyses.

Conclusion

Only for Cases 2 and 7 would an analysis which considers the presence of the cooling lake tend to be more conservative than the existing analysis of Sections 2.3.4 and 2.3.5. For Cases 1, 5, 8, and perhaps 6 the existing analysis should be more conservative.

Cases 2 and 7 will differ from the present analyses only in the immediate vicinity of the cooling lake and then only for wind directions which would produce the largest over-water fetch (i.e., N, S, NW, and SSE). From three years of onsite data at 10- and 60-meter wind levels (Tables 2.3-29 and 2.3-30) stable stability classes (E, F, and G) occur approximately 20 percent of the time and unstable classes (A, B, and C) occur approximately 9 percent of the time.

It is expected that over long averaging periods the effect of Cases 1 and 8 will tend to balance the effect of Cases 2 and 7. The short-term accident analyses presented in Tables 2.3-55 through 2.3-57 show strong stable cases resulting from Case 7. With respect to Case 2, it is expected that the resulting fumigation will not result in a X/Q value which exceeds the X/Q values of a ground-level release in a stable atmosphere.

A preoperational fog monitoring program was used to evaluate the meteorological impacts of the cooling lake. The purpose of the study was to document the frequency of occurrence of natural fog (as opposed to fogs induced by the operation of the cooling lake) along Highway 75 which is located from 0.5 miles to 2.0 miles west of the cooling lake.

Table 2.3-29 shows that the predominant frequency of light wind (less than 3 meters per second) is from the sectors southeast through south. This corresponds with the Dames & Moore Program FOGALL analyses which shows the maximum increase in cooling lake induced fogging frequency along Highway 75 to occur approximately 3 miles south through 2 miles north of New Strawn, Kansas.

WOLF CREEK

The Wolf Creek fog study began during late 1983 and continued through the first refueling. The instrument used during this study was a Fog Visiometer produced by Meteorology Research, Inc. This instrument was equipped with a strip-chart recorder so that 24-hour surveillance of fog conditions was possible. The area selected for study was about 300 feet east of U.S. 75, along and one half mile south of the Wolf Creek access road in Section 34, Range 15 East, Township 20 South in Coffey County. This location was selected because computer modeling indicates this area may have a higher incidence of fog occurrence than other locations along U.S. 75. The instrument was set for a minimum visibility of 255 feet and a maximum visibility of 12,000 feet (2.27 miles).

The Fog Visiometer is a back-scatter type of visibility monitor. The instrument has a light source and sensor in the same housing unit. The source emits a type of ultraviolet light to which the sensor is responsive. However, the sensor will not detect any ambient white light. The theory behind the instrument is that the more light which is scattered (and detected by the sensor) indicates a decrease in visibility. This instrument does not differentiate between decreased visibility caused by fog or by other sources such as dust or insects; but, by comparison of the strip chart with onsite meteorological data, one can make that differentiation. Routine maintenance on this piece of equipment once a week involve performing an electronic zero/span check on the sensor, and cleaning the recorder printing head with solvent. The strip chart provide a record of changes of visibility which facilitated data analysis.

2.3.2.2.1 Topographical Description

The topography of the site area is level to gently undulating. The topography within a 5-mile radius of the site is shown on Figure 2.3-21. Cross sections along 5-mile radial lines are shown on Figure 2.3-22. The greatest maximum and minimum variation in elevation along any radial is 130 feet, along the north-northeast line. The average maximum displacement along all the radial cross section is 90 feet. General topographic features within a 50-mile radius of the plant are shown on Figure 2.3-23; topographic cross sections along 50-mile radial lines are shown on Figure 2.3-24. Maximum elevations occur to the west and northwest where the terrain rises to between 350 and 400 feet above plant grade at distances of 35 to 40 miles from the site. Section 2.3.2.3 discusses modifications to dispersion characteristics which are expected to result from plant facilities, including the cooling lake.

2.3.2.3 Local Meteorological Conditions for Design and Operating Bases

Temperature extremes data, along with other extreme meteorological variables of rainfall, icing, sleet, snow, rain, wind, and dust were used in design of safety-related equipment exposed to ambient environment conditions and are presented in Section 3.11(B).2.5. The temperature extremes considered varied from $-60^{\circ}F$ to $+120^{\circ}F$.

The minimum extreme temperature has been re-evaluated for Wolf Creek. This evaluation indicates that the acceptable minimum extreme temperature for Wolf Creek is $-30^{\circ}F$. The one in one hundred year calculation for the minimum extreme temperature listed below is no longer valid for Wolf Creek and is only listed for documentation of the original design conditions.

One in 100-year recurrence maximum and minimum temperatures for the site were calculated using National Weather Service observations taken at Topeka and Wichita, and temperature data from Chanute Flight Service Station. Since the most severe conditions were found to occur at Topeka, the Topeka data were used to obtain conservative results. The data used were the yearly extreme temperatures recorded at Topeka during the period 1888 through 1940.

To obtain the 1 in 100-year recurrence maximum and minimum temperatures, the maximum and minimum temperatures for each year were listed and ranked relative to all other years. The 1:100-year maximum and minimum temperatures were then determined from an extremal probability distribution (P) using the plotting position formula (Reference 15):

$$P = 1 - \frac{n - 0.44}{N + 0.12} \qquad [2.3\text{-}12]$$

where:

n = the descending rank of temperature;
N = number of years of observations.

The reduced variate, Y, was calculated by:

$$Y = -\ln(-\ln P), \qquad [2.3\text{-}13]$$

which, when related linearly to the maximum and minimum temperatures, yielded the following extremal distributions:

Maximum temperature = 101.8 + 2.94Y ± 9 in °F
Minimum temperature = -6.6 - 5.733Y ± 18 in °F

Therefore, the 1 in 100-year maximum and minimum temperatures are 111.5 ±9°F and -33 +18°F, respectively, where the range represents the 95.5 percent confidence limits.

A freezing index (FI), number of degree-days below 32°F during the freezing season, was obtained using the same methods of statistical analysis described above for extreme temperatures. Analysis of mean monthly temperature data at Topeka for the years 1930-1971 was made to determine the 1 in 100-year recurrence freezing index. The FI was computed to be 850.5 degree-days for that 42-year period. This index is used in Section 2.5 to determine the 1 in 100-year recurrence frost depth.

Rainfall data, in conjunction with other meteorological parameters, were used in several hydrological design considerations. For example, in Section 2.4.2.2, "Flood Design Considerations", rainfall data (Reference 27) were utilized in deriving the probable maximum precipitation (PMP). The dam and spillway of the cooling lake are designed to withstand the effects of the PMP occurring over the entire drainage basin above the damsite. Rainfall data were converted to a 27.4-square-mile basin using methods developed in the U.S. Weather Bureau Technical Publication No. 33 (Reference 45). Rainfall data was used in Section 2.4.11.3.2, "Water Level Determination". Lake drawdown analysis was performed for the 1952-1957 historic drought using rainfall data and evaporation data.

Rainfall data was also used in the USAR Section 2.4.2.3.2. The design basis for the roof drainage system is a rainfall intensity of 7.4 inches per hour with a recurrence interval of 100 years. Rainfall data, in conjunction with other meteorological data such as dry bulb temperature, dew point temperature, wind speed, atmospheric pressure, and short and long wave radiation were used in the design of the UHS.

Wind speed data were used in Section 2.4.5.1, titled "Probable Maximum Winds and Associated Meteorological Parameters".

For computing the wave generation within the cooling lake, a regional historical study of maximum wind speeds was made in order to arrive at an estimated maximum wind speed of 25-minute duration. A 25-minute duration is the minimum time required for wave generation in the cooling lake, Section 2.4.3.6. The fastest observed 1-minute, 1-hour, and 1-month wind speed values were found in published National Weather Service data (Reference 8). A number of other occurrences of extreme winds with time durations accurately recorded are also used in the analysis. The observed wind speed values were plotted and a best-fit curve was drawn through the representative points. The probable maximum wind speed of 90 miles per hour for a 25-minute duration was then estimated from the plotted data points.

Wind speed was used in Section 3.3.1, titled "Designed Wind Velocity". A wind velocity of 100 miles per hour at 30 feet above ground for a 100-year recurrence interval was based on BC-TOP-3.

Wind speed was used to determine the effective velocity pressure values through the vertical velocity distribution and gust factors. The vertical velocity distribution (V_z) used was:

$$V_z = \left(\frac{z}{30}\right)^{1/7} V_{30} \qquad [2.3\text{-}14]$$

where:

V_z = wind speed in miles per hour at level z foot;

V_{30} = the 30-foot level wind speed in miles per hour.

The gust factor employed was 1.1 for total structural response, and 1.25 for parts and portions of the structure.

2.3.3 ONSITE METEOROLOGICAL MEASUREMENT PROGRAMS

2.3.3.1 Preoperational and Operational Programs

A permanent site for meteorological measurements was selected on March 5, 1973 and a 295-foot tower, with instrumentation, was placed into operation on May 24, 1973. The meteorological tower and its location with respect to the plant are shown on Figures 2.3-25 and 2.1-6.

The preoperational and operational monitoring system was designed to provide a reliable system in compliance with the requirements specified in Regulatory Guide 1.23 as to the scope of monitoring activities and overall quality of the monitored data.

2.3.3.1.1 Preoperational Progams

The preoperational program is divided into two phases. Phase 1 consisted of the 2 years of monitoring from June 1, 1973 to May 31, 1975. Phase 2 consisted of 1 year of continuous monitoring from March 5, 1979 to March 4, 1980.

The Phase 1 preoperational monitoring program utilized a sophisticated digital data acquisition system to facilitate data analysis and system performance testing. Based on system performance during Phase 1 monitoring, a final monitoring system was designed for use in Phase 2 and during operational monitoring at the site. The final monitoring system selected for Phase 2 and the operational monitoring provides similar data accuracy and quality using simplified data recording techniques.

The Phase 2 preoperational monitoring system did not use a digital data collection system because technicians inspected and maintained the site on a daily basis, which provided a high degree of instrumental surveillancce of the analog data collection system.

2.3.3.1.2 Operational Program

The operational monitoring program did commence immediately following fuel load (March 1985) and will continue through the lifetime of the plant.

The operational meteorological system makes available within the power plant control room a summary of past weather conditions, including wind direction, wind speed, temperature, and atmospheric dispersion, so that sufficient information is normally available for emergency planning. The plant computer provides the capability to display virtually real time meteorological data in the Control Room and other areas of the plant. The plant computer also provides for long term storage of the data.

2.3.3.2 Types of Measurements Made

2.3.3.2.1 Phase 1 Preoperational Program

The types of meteorological parameters measured and sensor performance data for the Phase 1 program are given in Table 2.3- 46. They are horizontal wind speed, horizontal wind direction, standard deviation of the horizontal wind direction, temperature at the reference level, temperature difference between the three heights and the reference level, dewpoint temperatures, and solar radiation.

2.3.3.2.2 Phase 2 Preoperational Program

The meteorological parameters measured during the Phase 2 preoperational program and associated sensor specification are identified in Table 2.3-47. The parameters monitored are identical to the Phase 1 parameters with the exception that solar radiation was eliminated and precipitation was added for the Phase 2 programs.

2.3.3.2.3 Operational Program

The operational monitoring program records the parameters identified in Table 2.3-48. The simplified monitoring system, which includes measurement of wind speed, wind direction, and temperature difference at the 32-foot and 196-foot levels, and standard deviation of the horizontal wind direction at the 196-foot level, was designed to reduce system failure and associated maintenance requirements, while ensuring that sufficient information is available to document local meteorological conditions during plant operation.

Procedures for use of the data collected from the instrumentation under post-accident conditions (i.e. those conditions covered by the Emergency Plan) are controlled by the pertinent portions of the Appendix B Quality Assurance program.

2.3.3.3 Locations and Elevations of Instruments

The meteorological tower (Latitude 38 14' 43" N., Longitude 95^{o} 41' 06" W) is located in an open field about 0.5 miles northeast of the plant site (Figure 2.1-6). The terrain is flat to undulating, and the tower is located on a flat ridge. There are no variations in topography which exceed 55 feet for at least 1 mile from the tower.

The instruments are mounted on the tower at heights of 32 feet, 116 feet, 196 feet, and 277 feet. The types of instruments at each level are given in Tables 2.3-46, 2.3-47, and 2.3-48 for Phase 1, Phase 2 and operational monitoring systems, respectively. An instrument shed housing the recording equipment is located near the tower. A plot of the tower area is shown on Figure 2.3-25 and some relevant distances are given in Table 2.3-49. The nearest plant structure to the meteorological tower is the conference center located 2,000 feet south-southwest of the tower.

The tower, a series 90 manufactured by the Rohn Company, is 295 feet high and has a base grade elevation of 1,110 feet. It is constructed to conform with Occupational Safety and Health Act (OSHA) regulations and is painted and illuminated according to Federal Aviation Administration (FAA) specifications. The meteorological recording instruments are located in an instrument shed located east of the tower base. A communication shed, which houses fiber optic equipment is located south of the tower base. Air conditioning and heating are provided as necessary for the sheds. Wiring from the tower to the instrument shed is housed in an overhead conduit within the waveguide support rack. The 100-foot by 93-foot area is enclosed by a 7-foot fence which surrounds the instrument shed, fiber optic shed and meteorological tower base. Both the gate in the fence and the instrumentation shed door are locked when the area is not manned.

A rain gauge is located 90 feet to the south of the instrument shed. It is mounted on a metal pole at a height of 6 feet above ground level (Table 2.3-47). The precipitation monitor was operated during Phase 2. The solar radiation monitor, which was also mounted on the pole with the rain gauge, was operated during Phase 1, but not operated during Phase 2.

2.3.3.4 Description of Instruments

2.3.3.4.1 Phase 1 Instruments

Table 2.3-46 gives a description of the instruments and their levels on the tower used during Phase 1. The Climet wind speed transmitter has a threshold of 0.6 mile per hour, a calibrated range up to 90 miles per hour, and performs over a temperature range -50 F to +155 F. Calibration instructions are given by the manufacturer, and rigorous tests are performed to ensure continued accuracy. A test traceable to the standards of the National Bureau of Standards (NBS) was run on a set of cups identical to the Climet 011-1 sensor. The test indicated the following relation:

$$F=31.87V-16.57 \qquad [2.3-15]$$

where:

F = frequency (hertz)

V = wind speed (mph)

The wind speeds measured by the sensors installed at the WCGS were within 0.5 mph of the wind speed as determined using the formula above over the entire range of the instrument. Table 2.3-50 presents a test run of the Climet 011-1 anemometer using the formula above. Wind directions were measured to an accuracy of +3.

During Phase 1 of the program, temperature variations were measured over three different height ranges with respect to a reference temperature at 32 feet. In each case, this measurement was made with a probe accuracy of +0.15 C.

Solar radiation, monitored solely during Phase 1, was measured to an accuracy of +1 percent.

2.3.3.4.2 Phase 2 Instruments

Table 2.3-47 gives a description of the instruments and their levels on the tower used during Phase 2. The system was modified for Phase 2 operation by the installation of platinum-resistance temperature probes which are accurate to within +0.05°C. Recording accuracy is ±0.08°C, and aspiration accuracy is ±0.1°C so that system accuracy was within +0.14°C.

Precipitation was measured by a tipping bucket gauge to an accuracy of ±1 percent.

2.3.3.4.3 Operational Program Instruments

Table 2.3-48 gives a description of the instruments and their levels on the tower used during the Operational Montioring Program. In accordance with Regulatory Guide 1.23 specifications, measurements during operational monitoring will be taken only between 196 feet and 32 feet, with a system accuracy of ±0.15°C.

2.3.3.5 Maintenance and Calibration of Instruments

2.3.3.5.1 Calibration

During the Phase 1 monitoring program each instrument was calibrated in the laboratory prior to installation and a check made to verify that it performed according to manufacturer specifications. A second calibration was made at the site 10 days after the system was installed. For the phase 2 monitoring program, an initial field calibration was performed and subsequent calibrations were performed during mid-March and mid-June of 1979. During the entire operation of the program, calibration is performed on each of the instruments and their recorders at 3- month intervals. During the operational monitoring program, calibration is performed according to the schedule specified in the Technical Specifications and operational phase calibration program. The instruments are checked and cleaned, parts replaced as necessary, and then recalibrated according to the following schedule:

a. The temperature reference and dewpoint transducers were field calibrated against NBS calibrated thermometers and an Assman Psychrometer during Phase 1 and 2. In addition, an ice bath is used to calibrate the reference temperature during Phase 2.

b. Each separate temperature difference was calibrated by comparison with a calibrated thermistor pair during Phase 1; during Phase 2 the system is calibrated using an ice bath.

c. The wind direction indicators are calibrated and the reference direction (west) checked;

d. The pyranometer output and its amplifier card were checked during Phase 1; during Phase 2 the pyranometer was not used.

e. Zero and span tests are made on the recorders.

2.3.3.5.2 Operational Program Calibration

During the operational monitoring program, calibration is performed according to the schedule specified in the Technical Requirements Manual and operational phase calibration program.

Accident related meteorological instrumentation is calibrated periodically to assure the validity of the meteorological data as required by Technical Requirements Manual. Calibration of this instrumentation is subject to the pertinent requirements of the Appendix B Quality program.

2.3.3.5.3 Maintenance

The meteorological tower site was visited on Monday, Wednesday, and Friday of every week during periods of normal operation during Phase 1; during Phase 2 the instruments were checked each work day. During the operational phase, maintenance is performed in accordance with operational phase maintenance procedures. If any instrument or parameter is found to be out of tolerances specified in the checklists, the cognizant engineer is notified and corrective action is taken. This ensures detection of instrument failure before extended periods of data are lost.

An inventory of spare parts is kept on hand to back up critical instruments and equipment if they should fail completely.

2.3.3.5.4 Phase 1 and 2 Data Recovery

Data recovery for Phase 1 is presented in Table 2.3-51.

During Phase 1 the concurrent data recovery for the parameters critical for diffusion analyses (wind direction, wind speed, and temperature difference) was 96.7 percent for winds measureed at 32 feet and 93.2 percent for winds measured at 196 feet.

During the Phase 2 monitoring program the dewpoint sensor was not rendered operational until March 22, 1979. Data recovery for the period March 5, 1979 to March 4, 1980 is provided in Table 2.3- 52. Concurrent data recovery for the parameters critical for diffusion analyses was 85.4 percent for winds measured at 32 feet and 83.6 percent for winds measured at 196 feet.

For the entire 3-year period, concurrent data recovery measured at both wind levels of 32 and 196 feet exceeds 90.0 percent. Concurrent data recovery for wind measured at 32 feet was 92.9 percent and for wind measured at 196 feet is 90.0 percent.

2.3.3.5.5 Operational Program Data Recovery

During the Operational Monitoring Program the concurrent data recovery will meet the requirements as delineated in Regulatory Guide 1.23.

2.3.3.6 Data Recording Systems

2.3.3.6.1 Phase 1 Preoperational Monitoring Program

Analog output from the sensors was transmitted to strip chart recorders via a Climet translator (Model 060-020).

Each level of wind data was recorded on a two-channel Esterline- Angus recorder (Model E1102R). The temperature data were recorded on a six-channel multi-point Esterline-Angus recorder (Model E1124E). The solar radiation data were recorded on a two-channel Esterline-Angus recorder (Model E1102R). These recorders were housed in the instruments shed.

The digital system consisted of a Hewlett-Packard (HP) 3485A scanning digital voltmeter with an HP 9600A computer system for sampling and storing all meteorological parameters once every minute. Using an HP 2100A mini-computer and a Data Acquisition and Control Executive (DACE) operating system together with a supplied program, hourly values for each parameter were computed and stored in memory. These values were printed and punched on paper tape every 24 hours at the site on an ASR33 teletype unit.

2.3.3.6.2 Phase 2 and Operational Monitoring Programs

During Phase 2, analog output signals from the wind speed, wind direction, and precipitation monitors were recorded on Esterline-Angus recorders (Model E1102R) as in Phase 1. Wind sigma values for each monitored level were recorded on Esterline-Angus mini-servo recorders (Model MS601C). Temperature difference across three height ranges were recorded, along with the 32-foot reference temperature, using a Leeds & Northrup multipoint chart recorder (Model 251).

During the Operational Phase data is recorded via the Nuclear Plant Information System (NPIS) which digitally records meteorological data from the the tower. All analog recorders are only used as a backup. Analog output signals from the wind speed and wind direction and Wind sigma values for each monitored level are recorded on chart type recorders. Temperature difference across one height range, along with the 32-foot reference temperature are recorded using a multipoint chart recorder. All recorders are located in the instrument shed.

2.3.3.7 Data Analysis

2.3.3.7.1 Phase 1 Preoperational Data Recording

The analog chart records were removed every 28 days for inspection and analysis. Each chart was removed separately, stamped and identified by job number, date, instrument, and level. The charts were inspected for breaks in record, time errors, and power failures and then stored. The information gained from their inspection was used to update and verify the digital data on which the analysis was made. The analog recording system provided a back-up in case of digital system failure, so that a high percentage data recovery rate could be maintained. As an additional check on the system's reliability, the results from the analog recordings were compared with those obtained from the digital recordings.

For each 28-day period, a total of 48 hours of digital and analog data were selected for comparison: one 24-hour continuous sample, and four 6-hour continuous samples. At least one 6-hour sample was taken from each week of data, and one week of data was sampled for both the 6-hour and the 24-hour period. The 24-hour sample provided a check on the diurnal trend of the meteorological parameters, whereas each 6-hour sample provided a check on the values of the parameters for 6 consecutive hours. The frequency of sampling of the 6-hour period was to examine data representativeness.

The rationale for this comparison procedure was to provide adequate assurance that the digital and analog recording systems indicate the same values for the meteorological parameters. The procedure also permitted the detection of any small systematic differences between the two sets of data which would not be detected by comparing isolated values. Hence, the reliability of the digital master file data used in safety analysis was established.

Each analog record was also scanned in its entirety to detect data inconsistencies and/or malfunctioning of the data acquisition system. Three site visits each week and quarterly calibrations further ensured the accuracy and reliability of the data acquisition system. During quarterly calibrations, the correspondence between analog and digital values was established.

More than 7.1 percent of the total digital master file data were compared against the analog data every 4 weeks, and a minimum of 3.5 percent of the data were compared every week.

This amount of data comparison, with the selected frequency and continuity of samples, was considered to provide a statistically significant sampling, ensuring the reliability of the digital master file data between quarterly calibrations.

Digital data were processed by the minicomputer so that average hourly values of all the prime parameters were calculated onsite from the minute-by-minute scan values. Alarm limits on data validity and the number of single values contributing to each hourly average were watched and flagged by the computer to assist in later assessment of data reliability. At the end of each month, the data on punched paper tape was read into a permanent data file on a time-sharing computer system. Any missing data were then retrieved from the back-up analog recording system.

With the exception of wind direction, hourly averages of the minute-by-minute observations were calculated from the following scalar equation:

$$\bar{B}_j = \frac{r_j}{n} \sum_{i=1}^{n} B_{ji} \qquad [2.3\text{-}16]$$

where:

$\bar{B}_j$ = the average hourly value for the jth variable (in engineering units);

n = the total number of minute observation during the hour, (normally 60), but if n is less than 20 for that hour, data are considered to be missing;

B_{ji} = the ith minute observation on the jth variable (millivolts);

r_j = the conversion factor to change the jth variable from millivolts into physical units.

Whereas most of the averages were scalar in form, the average wind directions were determined by the following averaging techniques:

a. Each minute observation of wind vector (speed and direction) is broken into its components, U and V according to:

$$U_i = S_i \sin (q_i - p) \qquad [2.3\text{-}17]$$

$$V_i = S_i \cos (q_i - p) \qquad [2.3\text{-}18]$$

where:

U_i = the east-west component of wind for the minute;

V_i = the north-south component of wind for the minute;

S_i = the scalar wind speed for the minute;

q_i = the wind direction for the minute.

b. The U_i and V_i components were added separately and the sums were divided by the total number of minute observations for the hour, to establish the average components $\bar{U}$ and $\bar{V}$, i.e.:

$$\bar{U} = \frac{1}{n} \sum_{i=1}^{n} U_i \qquad [2.3\text{-}19]$$

$$\bar{V} = \frac{1}{n} \sum_{i=1}^{n} V_i \qquad [2.3\text{-}20]$$

where:

$\bar{U}$ = the average east-west component of wind for the hour;

$\bar{V}$ = the average north-south component of wind for the hour;

n = the number of valid minute observations for the hour.

c. The average wind direction was found by converting the average components into a vector direction, i.e.:

$\bar{U} > 0$ and $\bar{V} > 0$: $\bar{q} = Tan^{-1}\ U/\bar{V} + 180$ [2.3-21]

$\bar{U} > 0$ and $\bar{V} < 0$: $\bar{q} = Tan^{-1}\ \bar{U}/\bar{V} + 360$ [2.3-22]

$\bar{U} < 0$ and $\bar{V} > 0$: $\bar{q} = Tan-1\ \bar{U}/\bar{V} + 180$ [2.3-23]

$\bar{U} < 0$ and $\bar{V} < 0$: $\bar{q} = Tan^{-1}\ \bar{U}/\bar{V}$ [2.3-24]

where:

$\bar{q}$ = the average vector wind direction during the hour.

(Note that $Tan^{-1}\ \bar{U}/\bar{V}$ is always in the range -90° to +90°)

Regulatory Guide 1.23 suggests that data be averaged over a period of at least 15 minutes once each hour. In the averaging techniques described above, a minimum of 20 digital observations for each hour was therefore chosen to constitute a representative observation set for determining hourly averages. In general these 20 values were consecutive.

To verify the effect of using significantly less than 60 observations per hour, a test comparison was performed by taking a week's digital data (162 hourly observations) and obtaining averages using 60, 40, and 20 minutes of data within each hour. The hourly mean values obtained from the digital data were compared with the values read from the analog record to check the correspondence of the two sets of data. The difference between the averaging using 60- and 20-minute digital values is within the tolerance limits specified in Regulatory Guide 1.23 for more than 90 percent of the comparisons of temperature, dewpoint, delta T (ΔT), and wind speed. The difference between the averages using 60 and 40 observations are insignificant except for the wind variability at 10 meters, for which the difference is within the tolerance limit for 85 percent of the observations. This is not considered crucial in as much as wind variability is not being used to determine atmospheric stability.

The diffusion climatology of the site was defined by three variables. These, together with the primary and secondary (back- up) measurements for each, were as follows:

1. Horizontal wind speed	primary 32- and 196-foot wind speed secondary 116-foot wind speed
2. Horizontal wind direction	primary 32- and 196-foot wind direction secondary 116-foot wind direction
3. Temperature difference (ΔT)	primary ΔT from 32 feet to 196 feet secondary ΔT from 32 feet to 277 feet

The secondary measurement was necessary only during periods of outage of the primary system, and was reduced to the appropriate level as follows:

a. Wind speed at 116 feet was converted to wind speed at 32 feet using the power law:

$$V_{32} = V_{116} \left(\frac{32}{116}\right)^{s} \qquad [2.3\text{-}25]$$

where:

V_{32} = the wind speed at 32 feet;

V_{116} = the wind speed at 116 feet;

S = 0.25 for Pasquill Classes A, B, C, and D and 0.50 for Classes E, F, and G.

b. Wind direction at 116 feet was directly substituted for wind direction at 32 feet;

c. DT between 32 and 277 feet was converted to ΔT between 32 and 196 feet by proportional extrapolation:

$$DT_{196-32} = DT_{277-32}^{\frac{164}{245}} \qquad [2.3\text{-}26]$$

where:

ΔT_{277-32} = Temperature difference between 277 and 32 feet.

ΔT_{196-32} = Temperature difference between 196 and 32 feet.

It was not necessary to substitute the 116-foot level wind direction for the 32-foot level wind direction.

Ninety-five percent joint data recovery of 10-meter (32 feet) wind speed, wind direction, and DT at the permanent tower site has been obtained after including substitutions for the period between June 1, 1973 and May 31, 1974. Ninety-one percent joint data recovery of 60-meter (196 feet) winds and DT has been obtained for the same period.

2.3.3.7.2 Phase 2 Data Recording

The analog chart records were removed during Phase 2 for processing twice per month. The frequency of chart removal was increased over that used for Phase 1 to minimize the loss of valid data due to system failure. Upon removal, each chart was stamped and identified by date, instrument and measurement level. Each chart was inspected for record interruptions, time errors, power failures, and symptomatic instrument malfunctions. Following inspection of the charts, the data was reduced to hourly averages for each parameter and recorded on keypunch forms. Approximately 10 percent of each data record was reduced independently and compared to previously reduced data to ensure the accuracy of the reduction procedure. Following a review of the reduced data, the data was keypunched, verified, and loaded onto the computer system for subsequent analysis.

Since low data recovery during the period 3/5/79 to 3/4/80 of Phase 2 was primarily the result of meteorological instrumentation problems, the Operating Agent and Dames & Moore did not change any procedures for meteorological data collection because of the loss of data in the Phase 2 year. During the time between Phase 2 and the Operational Meteorological Program the tower was checked each work day by an Operating Agent technician. Analog strip charts were taken from the recorders every two weeks. The Operating Agent then reviewed the analog charts before sending them to Dames & Moore. At Dames & Moore the charts are again reviewed and, if problems were found, the Operating Agent is immediately notified. By checking the tower frequently and by reviewing the analog strip charts twice, all problems are readily identified and the problems corrected in a timely manner. KG&E and Dames & Moore did everything practical to prevent data loss in Phase 2. Unfortunately, due to the instrumentation problems which occurred, a large amount of data loss did occur during the period 3/5/79 to 3/4/80. Data collection during the period 3/5/80 to 3/4/81 was more successful with all parameters reporting a data recovery of greater than 95 percent (refer to Table 2.3-29b).

A Dames & Moore certified program was used to facilitate evaluation of onsite meteorological data representativeness. The program, whose capabilities have increased since its origination, flaged inconsistencies in the hourly values of all meteorological parameters measured at the site. The meteorologist initially responsible for reviewing the data determined limiting values that were program inputs for each parameter. Hourly values outside these limits were program outputs which were subsequently rechecked for representativeness (by the meteorologist) in the analog data base. Additional onsite records were rechecked as deemed necessary. Final visual inspections of the digital and analog data bases were performed by at least two meteorologists.

2.3.3.7.2.1 Phase 2 Loss of Data

The problems encountered in the Phase 2 meteorology data collection program at Wolf Creek were caused primarily by meteorological instrumentation. Thus, the low data recovery would have occurred even if a redundant data recording system were used. As Table 2.3-29a shows, most of the lost data for Phase 2 occurred at the 10-meter dewpoint, 85-10 meter delta temperature, and 60-10 meter delta temperature sensors.

Instrumentation at the tower during Phase 2 is given in Table 2.3-47.

The cooled mirror dewpoint system installed at the start of Phase 2 exhibited design and reliability problems to the extent that considerably less than 90 percent valid data were recovered for this instrument. Technicians at the site performed numerous calibrations and maintenance on the system in an attempt to make the system more reliable. On December 18, 1979 the cooled mirror

dewpoint system was replaced with a backup LiCl dewpoint system. The Operating Agent realized at that time even though the LiCl system was not as sensitive as the cooled mirror dewpoint system, the LiCl system needed be installed in order to obtain a data recovery of greater than 50 percent. On April 24, 1981 an EG&G cooled mirror dewpoint system was installed at the tower. This system then collected valid data.

Another problem occurred with the 85-10m and 60-10m differential temperature (new RTD temperature systems installed in Phase 2 to obtain better long-term differential temperature accuracy). Occasionally the upper level sensors would cause the Delta-T pair to give meteorologically impossible differential temperature values such as highly negative and positive values. This problem persisted until the Operating Agent discovered corroded cable connectors and installed new electrical cabling to the upper levels on September 26, 1979.

Both aspiration systems on the 85-meter and 60-meter tower level failed in December 1979 causing the temperature sensors to experience solar heating during daylight hours. The Operating Agent immediately replaced the faulty aspiration system with replacements obtained from a vendor. The replacement aspirators, however, had too low an air flow, and consequently did not produce representative differential temperature measurements. Problems in obtaining acceptable replacement delayed acquisition of valid data from both systems until the end of January 1980.

2.3.3.7.2.2 Phase 2 Auto-Convective Lapse Rates

A sizeable fraction of the auto-convective lapse rates found in the three annual cycles of onsite data occurred during the period March 5, 1979 through March 13, 1979. During this period, the 10-meter sensor used in delta temperature measurement did not experience adequate aspiration. As a result, nonrepresentative extremely unstable delta temperature data were recorded, particularly during daylight hours. A total of 121 hourly average values of both 10-60 meter and 10-85 meter delta temperature data are now considered unrepresentative and have been deleted from the data base.

The remaining, infrequent auto-convective lapse rates in the data base occurred during the months of June through October during the midday hours of 1000 to 1500 hours. These sporadic values occurred primarily in the 10-60 meter delta temperature data set and did not greatly exceed the 10-60 meter autoconvective lapse rate of $-1.7^{o}C$. The largest negative delta temperature was $-1.94^{o}C$ and occurred in 1974. The majority of the exceedances were less than $-1.8^{o}C$. These data are considered valid.

2.3.3.7.2.3 Phase 2 Stability Conditions

Different stability conditions between the 10-60 meter level and those measured between the 10-85 meter level have been rechecked for validity. The previously mentioned program was used to flag occurrences where stability conditions simultaneously measured for these two intervals varied by two or more stability classes. These occurrences have been reexamined.

One such occurrence which was reexamined was Julian day 160, 1979. At 0200 hour on this particular day, the delta temperature was moderately unstable at 10-60 meters and slightly stable at 10-85 meters. Upon examination of the processed hourly data and associated analog strip chart, it was discovered that the subsequent hours of 0300 to 1300 hours were invalidated due to an onsite equipment problem. During the period of March through September 1979, moisture seepage into the aspirator cables connected to the 10-meter junction box caused abnormal delta temperature values to be recorded during periods of precipitation events. On September 26, 1979, new cables were installed and the problem was rectified.

During initial data review in 1979, this data problem was identified and hours 0300 through 1300 of delta temperature data were invalidated. At that time, the hour in question was inadvertently not invalidated. This hour has now been invalidated.

Based on the reexamination of concurrently measured 10-60 meter and 10-85 meter delta temperature data, the occurrence of stability measurements differing more than two stability classes is usually associated with unstable 10-60 meter delta temperature measurements. Differences in stability classes determined from delta temperature measurements made between 10-60 meters and 10-85 meters can, in part, be attributed to the fact that the numerical range of stability classes B and C for both measurement intervals are narrow and less than the +0.15^{o}C/50 meter delta temperature measurement accuracy.

It should also be noted that both sets of representative delta temperature data predominantly exhibit the same tendencies in stability change over time. For example, as measurements for the 10-60 meter interval become increasingly unstable or stable, so do corresponding measurements for the 10-85 meter interval. However, when changes in stability are expressed in terms of classes, rather than numerical averages, similar trends evident in the hourly averaged data sets are obscured.

Meteorological conditions of stability A, F, or G occurring with 10-meter wind speeds above 3 meters per second (m/sec) were also reevaluated for representativeness and found to be correct. Representative Class A values occurred during daylight hours and were associated with wind speeds generally ranging from calm to 10m/sec, with a few cases ranging from 10 to 16m/sec. Classes F and G usually occurred during early morning hours and were associated with wind speeds less than 4 m/sec.

The simultaneous occurrence of the above stability/wind speed combinations is considered representative of onsite meteorological conditions. The meteorological tower is located on a flat, lightly vegetated plateau. Surrounding terrain is generally flat to gently rolling, as shown in Figures 2.1-6, 2.3-21, and 2.3-22. Thus, terrain features should not contribute greatly to mechanical turbulence and, therefore, increased vertical mixing of air in the vicinity of the meteorological tower. There are also no structures or clusters of trees in the immediate vicinity of the tower that could greatly disrupt air flow past the tower and cause increased vertical mixing. The above factors permit heating and cooling of the lower atmosphere in regions surrounding the meteorological tower to proceed with less influence of mechanical turbulence than would be expected in regions having more complex terrain features. Thus, extremes of measured instability and stability may more often be associated with higher wind speeds at this meteorological monitoring station.

2.3.3.7.2.4 Operational Program Data Recovery

The Operational Monitoring Program records the parameters identified in Table 2.3-48. A description of data available of data availability during plant operation is provided in Section 2.3.3.1 above. The Operational Program (including operating procedures) meets the recommendations of Regulatory Guide 1.23 and NUREG-0654.

2.3.3.7.3 Data Analysis and Summaries

2.3.3.7.3.1 Preoperational Program

During the Preoperational Meteorological Program the hourly values of meteorological parameters were processed through a number of certified and documented computer programs (METEOR 3 (for a and b below); ACNTXXX and ANDIFF (for c and d below)), which yield the following:

a. Joint frequency distribution of wind speed and wind direction by each of 7 Pasquill Stability Classes;

b. Frequency distribution of temperature and dewpoint temperature;

c. Frequency distribution of the relative concentration;

d. Annual average values of relative concentration with direction and distance.

2.3.3.7.3.2 Operational Program

The Operational Meteorlogical Program records and parameters identified in Table 2.3-48. A description of data availability during plant operation is provided in Section 2.3.3.1 above. The Operational Program meets the requirements of Regulatory Guide 1.23

2.3.3.8 Regional Climatological Data

Regional climatological data concerning wind direction and wind speed were based on measurements taken at Chanute Flight Service Station, Kansas, over the period 1955-1964. Regional data concerning temperature, atmospheric water vapor, and precipitation were based on measurements taken by the National Weather Service over the period 1941-1978 at Topeka and Wichita, Kansas. The elevations of the regional measurements are provided in Table 2.3-53.

2.3.4 Short-Term (Accident) Diffusion Estimates

The objective of this section is to provide conservative estimates of atmospheric diffusion at both the site boundary and at the outer limits of the low population zone (LPZ) for appropriate time periods up to 30 days and to provide the short-term atmospheric dispersion factors (X/Qs) for the postulated accident analyses presented in Chapter 15. The diffusion evaluations for the short-term accident are based on the assumption of a ground-level release (i.e., no reduction in ground concentrations due to elevation of the plume). The plant parameters used in the calculations are presented in Table 2.3-54. Meteorological data used are described in the joint frequency distributions of wind speed, wind direction, and of the WCSA atmospheric stability presented in Section 2.3.2.

Table 2.3-59d lists the limiting X/Qs for the Wolf Creek site. The detailed procedures used in the calculations are given in Section 2.3.4.2.

2.3.4.1 Diffusion Model for 0-2 Hours

The analytical procedure for evaluating the 0-2 hour accident period is based on a revision of the model described in Regulatory Guide 1.3. The changes reflect variations in atmospheric diffusion factors that occur as a function of wind direction and variable site boundary distance. Allowances are made for meandering plumes during light winds and stable atmospheric conditions. The new approach is described in Regulatory Guide 1.145.

The model is distance and direction dependent. Variability of wind direction frequency was considered in determining the relative concentration (X/Q) values. The hourly X/Q values were determined as described below.

During neutral (D) or stable (E, F, or G) atmospheric stability conditions when the windspeed at the 10-meter level is less than 6 meters per second, horizontal plume meander can be considered. X/Q values were determined through selective use of the following set of equations for ground-level relative concentrations at the plume centerline:

$$X/Q = \frac{1}{\bar{u}_{10}\ (p s_y s_z + A/2)} \qquad [2.3\text{-}27]$$

$$X/Q = \frac{1}{\bar{u}_{10}\ (3 p s_y s_z)} \qquad [2.3\text{-}28]$$

$$X/Q = \frac{1}{\bar{u}_{10} p \sum_{y} s_z} \qquad [2.3\text{-}29]$$

where:

X/Q = relative concentration, in sec/m3,

= 3.14159,

$\bar{u}_{10}$ = windspeed at 10 meters above plant grade,* in m/sec,

s_y = lateral plume spread, in m, at a given distance and stability based on logarithmic curves in Reg. Guide 1.145,

*The 10-meter level is representative of the depth through which the plume is mixed with building wake effects.

z = vertical plume spread, in m, at a given distance and stability based on logarithmic fit of NRC curves in Reg. Guide 1.145,

Sy = lateral plume spread with meander and building wake effects, in m, a function of atmospheric stability, windspeed $\bar{u}_{10}$, and distance. For distances of 800 meters of less, $y = Ms_y$. For distances greater than 800 meters,

$$S\ y = (M - 1)\ s_y 800m + s_y \qquad [2.3\text{-}30]$$

A = the smallest vertical-plane cross-sectional area of the reactor building, in m2

X/Q values were calculated using equations 2.3-27, 2.3-28, and 2.3-29. The values from equations 2.3-27 and 2.3-28 were compared and the higher value selected. This value was compared with the value from Equation 2.3-29 and the lower value of these two was selected as the appropriate X/Q value.

During all other meteorological conditions (unstable (A, B, or C) atmospheric stability and/or 10-meter level wind-speeds of 6 meters per second or more), plume meander was not considered. The appropriate X/Q value was the higher value calculated from Equation 2.3-27 or 2.3-28.

Plume meander was accounted for by modifying the lateral diffusion coefficient s_y in accordance with equation 2.3-30. The meander function (M) is calculated as explained below:

1. For Pasquill Stabilities A-C at all wind speeds or all stabilities when wind speed >6 mps, M = 1;

2. For wind speed <2 mps, M is independent of wind speed and varies in the following manner:

   Stability D, M = 2;
   Stability E, M = 3;
   Stability F, M = 4;
   Stability G, M = 6;

3. For wind speeds greater than 2 mps but less than 6 mps, M is determined from Figure 3 of Regulatory Guide 1.145.

An hourly observation is considered to be calm if the wind speed is less than the starting speed (threshold) of the wind instruments. For calm conditions a wind speed is assigned equal to the vane or anemometer starting speed, whichever is higher. A wind direction is assigned in proportion to the directional distribution of the lowest non-calm wind speed group for each atmospheric stability class.

2.3.4.1.1 Exclusion Area Boundary

The sector X/Q values at the exclusion boundary are determined for each sector. These are defined as the X/Q values that are exceeded 0.5 percent of the total time. To extract this value, the hourly /Q values are sorted according to sector and magnitude. A cumulative probability distribution or X/Q values can easily be constructed.

$$P(X/Q) = \frac{\text{rank of } X/Q}{X/Q \text{ population size}} \qquad [2.3\text{-}31]$$

P(X/Q) is the probability of being exceeded. For example, the 1Oth largest value of a 100-value population has a probability of being exceeded 10/100 or 10 percent. The highest of the 16 sector X/Q values is defined as the maximum sector X/Q value.

2.3.4.1.2 Outer LPZ Boundary

Sector X/Q values are determined for the outer LPZ for 8 and 16 hours and 3 and 26 days. The average /Q values for the various time periods are approximated for each sector by a logarithmic interpolation between the 2-hourly sector[1] X/Q values (same general methods as in Section 2.3.4.1.1) and the annual average X/Q (see Section 2.3.5) at the same point. The highest of the 16 sector X/Q values are identified for each time period.

2.3.4.1.3 Five and Fifty Percent Overall Site X/Q Value

The X/Q values that are exceeded no more than 5 and 50 percent of the total time around the exclusion area boundary and the outer LPZ boundary are determined in a manner similar to the 0.5 percent sector X/Q values. All of the hourly X/Q values were sorted according to magnitude (independent of the direction) and the 5 and 50 percent values chosen from the list. For the same time periods used in Section 2.3.4.1.2, the 5 and 50 percent X/Q values

[1]The X/Q's are based on 1-hour averaged data, but are assumed to apply for 2 hours.

are determined by logarithmic interpolation between the maximum annual average X/Q values at the LPZ distance and the LPZ 2-hour 5 and 50 percent X/Q value.

2.3.4.2 Results of Short-Term Diffusion Estimates

Two-hour X/Q values were computed at the exclusion zone boundary (1200 m) and X/Q values for 2-, 8-, 16-, 72-, and 624-hour postulated accident periods were computed at the LPZ (4023 m). The computations were based on onsite meteorological data for three one-year data sets; June 1, 1973 through May 31, 1975, and March 5, 1979 through March 4, 1980. An analysis was also performed for the 3 years of data combined.

Results of the analysis for each data set and the combined three-year period are presented in Tables 2.3-55 through 58. Each table presents the greatest 0.5 percent 0-2 hour X/Q values for each of the 16 sectors at the exclusion zone boundary (1200 m) and the greatest 0.5 percent 2-, 8-, 16-, 72-, and 624-hour X/Q values for each of the 16 sectors at the LPZ (4023 m). The highest sector value for each accident period is asterisked to clarify the maximum sector X/Q value at the exclusion zone boundary and the LPZ for each accident period. Also presented in each table are the greatest 0-2 hour 5 and 50 percent X/Q values at the exclusion zone boundary and the greatest 5 and 50 percent X/Q values for each accident period at the LPZ.

The highest 0.5 percent 2-hour X/Q values at the exclusion zone boundary was 1.5×10^{-4} for all 3 individual years and for the 3 years combined. The highest values occurred in the northwest through north sectors. The maximum sector X/Q at the LPZ from this data set was 5.0×10^{-5} sec/m3 in the northwest sector for the data period March 5, 1979 through March 4, 1980. The highest 5 and 50 percent 2-hour X/Q values resulted from the analysis of the March 5, 1979 through March 4, 1980 data set. The greatest 5 and 50 percent X/Q values were 4.5×10^{-5} sec/m3 and 5.0×10^{-6} sec/m3 for the LPZ and 1.5×10^{-4} sec/m3 and 2.8×10^{-5} sec/m3 for the exclusion zone boundary, respectively.

2.3.4.3 Control Room Intake

The basic model employed for the distribution of relative concentrations (X/Qs) within a building wake at WCGS control room intakes following an accident is given by Reference 17 to be:

$$X/Q = \frac{K_C}{AV} \qquad (1)$$

Where A = reference cross-sectional building area, m^2

V = reference wind speed, m/sec

K_C = nondimensional concentration coefficient

K_C is a function of nondimensional space coordinates x/L, y/L, and z/L, building configuration, wind direction, and source configuration. The K_C field for a given building configuration, source configuration, and wind direction is considered to be invariant. Accordingly, K_C values determined by wind tunnel tests with a model structure are expected to be the same as those that would be obtained with a geometrically similar building in the full-scale atmosphere in the same wind direction, with a similar leak. The contiguous building arrangement is shown in Figure 2.3-20. The K_C data used in the analysis for low level release are presented in Figure 2.3-25 and were derived from two sets of tests. One used rectangular prisms (Ref. 18), the other used a model of the EBR-II complex (Ref. 17). Both tests were described and portions of the data presented in Reference 35. The Kc data for the unit vent release from the top of the containment were extracted from Figure 10 of Reference 17 and are presented in Table 2.3-78. The value of A used in conjunction with K_C in Figure 2.3-2 and Table 2.3-78 is the WCGS equivalent of the EBR-II area, $A = 1.12\ D^2 = 2280\ m^2$ with the diameter of the reactor D = 45.1m.

The value of V used in conjunction with Figure 2.3-25 is the mean velocity of the approach flow at an elevation corresponding to the anemometer elevation of the EBR-II model tests. Reference 3 reports this elevation to be 62 feet or 0.77D above the top of the dome. The WCGS equivalent height becomes 63.4 + 0.77 x 45.1 = 98.1m above ground. The V values were obtained by extrapolating wind speeds at anemometer elevations equivalent to 98.1 meters by the power law.

$$V = u_1\ (98.1/z_1)^n \quad (2)$$

Where

u_1 = mean speed at elevation z_1, m/sec

z_1 = anemometer elevation at a given site, m

n = atmospheric stability exponent

Values of n were arbitrarily assumed for the various stability classes as follows:

Pasquill Stability Class	A	B	C	D	E	F	G
n	0.20	0.25	0.29	0.33	0.40	0.50	0.60

A cumulative frequency distribution was constructed for the X/Q values calculated by equations 1 and 2 above, using 3 years combined onsite meteorological data. The corresponding highest 5 percent, 10 percent, 20 percent, and 40 percent X/Q values are given in Table 2.3-79.

2.3.5 LONG-TERM DIFFUSION ESTIMATES

The objective of Section 2.3.5 is to provide realistic estimates of annual average release atmospheric transport and diffusion characteristics to a distance of 80 km (50 miles) from the plant for annual average release limit calculations and man-rem estimates. The terrain within 50 km (31 miles) of the site is essentially flat becoming gently rolling to 80 km (50 miles). No important ranges of hills or mountains are within the region. No substantial water bodies are present, which are large enough to affect ambient dispersion parameters.

The analyses were based on on-site meteorological data over the periods June 1, 1973 through May 31, 1975 and March 5, 1979 to March 4, 1980.

2.3.5.1 Calculations

Both the PUFF and straight-line Gaussian dispersion models, described in Regulatory Guide 1.111, were used for determination of annual average diffusion estimates.

2.3.5.1.1 PUFF Model

The Equation for the PUFF model, as specified by Regulatory Guide 1.111 is:

$$X/Q = 2[(2p)^{3/2}\sigma_H \sigma_Z]^{-1} \exp\left(-\frac{1}{2}\left(\frac{r^2}{\sigma_H^2}+\frac{h_e^2}{\sigma_z^2}\right)\right) \qquad [2.3\text{-}32]$$

where:

$r^2 = (x - \bar{u}t)^2 + y^2$; and

$\sigma_H = \sigma_y = \sigma_x$

where:

h_e = Effective release height;

Q = Effluent emission over the time interval;

t = Travel time;

$\bar{u}$ = Mean windspeed at the height of the effective release point;

x = Distance from center of PUFF along the direction of flow;

y = Distance from center of PUFF in the crossflow direction;

s_x = Plume spread along the direction of flow;

s_y = Lateral plume spread;

s_z = Vertical plume spread; and

X = Atmospheric concentration of effluent in a PUFF at ground level and at a distance x from the PUFF center.

Concentration averages for long time intervals are calculated by summing the concentrations of individual elements for the grid of points over which they pass.

The number of elements and the plume spread parameters (s_z, s_z, and s_z) are selected such that the resulting concentration estimate is representative of the concentration from a continuous point source release. Elements are followed in the computational scheme until they are beyond the region of interest or until their peak concentration falls below a specified value.

The data base used for both the ground- and mixed-mode PUFF calculation consisted of 1 year of data: June 1, 1973 through May 31, 1974. The three 1-year sets of data were used to predict annual average relative concentrations using a straight-line Gaussian dispersion model. Of the 3 years, the June 1, 1973 to May 31, 1974 period was selected for use in the PUFF model because it produced the most conservative annual average relative concentrations with the greatest data recovery. In both PUFF calculations, 10-meter level wind data were used. Analysis of climatological statistics has shown that the 1-year period selected is representative of the entire 3-year data base. This conclusion is based upon consideration of the following factors:

a. The percentage of occurrence of each stability and mean wind speed for each class; and

b. The frequency distribution of wind speed and wind direction characteristics (the distribution of wind in each compass sector and associated mean wind speed).

The PUFF calculation requires that the data base not contain any invalid or missing data. Furthermore, the data base must besequential and not have time gaps (the data base should not be collapsed to eliminate missing data). To meet these requirements, all missing or invalid data were approximated. The replacement of missing or invalidated data was accomplished by the following:

a. Estimation of missing parameters from data taken at another tower level (direct substitution for wind direction, proportional estimation for vertical temperature difference, and use of the power law for wind speeds).

b. Linear temporal interpolation (missing data period generally short and/or limited variation of parameters) as indicated by interfacing valid data points.

c. Substitution of similar data periods as indicated by time of day, variation in and magnitude of valid parameters, and by continuity with interfacing valid data points.

A total of 4.2 percent of the data in the selected period was replaced by these means.

The generation of terrain/recirculation correction factors (TCF) required that the data base used in the calculation be identical to that used for the calculation of relative concentration values (X/Q), using the straight-line Gaussian model. Calm wind directions in the selected data period were replaced using the distribution of the lowest wind speed class.

2.3.5.1.1.1 Model Input

The calculations using the PUFF model were performed for ground-level releases at the following set of distances: 0.25, 0.75, 1.50, 2.5, 3.5, 5.0, 10.0, 20.0, 35.0, and 50.0 miles.

The terrain/recirculation correction factors for special points and standard distances not represented by the above distances were determined by a log-log interpolation of approximate concentrations. These approximations were validated by selectively comparing them to actual calculations.

Mixing heights for Topeka, Kansas (Reference 20) were used for the ground-level calculations. In these calculations, the mixing height was interpolated between the morning (7 a.m.) and afternoon (4 p.m.) mixing heights. The morning and afternoon mixing heights on a monthly basis were interpolated between seasonal values

2.3.5.1.1.2 Terrain/Recirculation Correction Factors

The terrain/recirculation correction factors (TCF) for the ground-level and mixed-mode release cases were determined as the ratio between the PUFF-advection X/Q estimates and the straight-line X/Q estimates in the following form:

$$TCF\ (r,q) = \frac{\frac{X}{Q}(r,q)_p}{\frac{X}{Q}(r,q)_s} \qquad [2.3\text{-}33]$$

where:

TCF (r,q) = Terrain/recirculation correction factor at distance, r, in sector, q;

X/Q (r,q) P = Annual average relative concentration at a point (r,q) using a PUFF-advection modeling scheme (sec/m^3); and

X/Q (r,q) S = Annual average relative concentration at a point (r,q) using a straight-line modeling scheme (sec/m^3).

Terrain/recirculation correction factors at the 22 standard distances, based on the data period June 1, 1973 through May 31, 1974, for ground-level releases are provided in Table 2.3-59. TCFs for the restricted area, the low population zone (LPZ) boundary, and the organic receptor distances are presented in Table 2.3-61 for ground-level releases.

PUFF calculations were performed at the 10 distances given in Section 2.3.5.1.1.1 to obtain the required diffusion estimates. Diffusion estimates at the restricted area, LPZ boundary, organic receptor (humans, animals, vegetation) distances, and those standard distances not listed in Section 2.3.5.1.1.1 were estimated by logarithmic interpolation based on the diffusion estimates at the 22 standard distances. The logarithmic interpolation procedure is defined by the following equation:

$$X = s_1 \left(\frac{d}{d_1}\right)^B \qquad [2.3\text{-}34]$$

where:

$B = \ln (X_2/X_1) \quad \ln (d_2/d_1)$;

X = Concentration (sec/m^3) at a special point located a distance, d, away from the source; and

X_1/X_2 = Concentrations (sec/m^3) at standard distances d_1 and d_2, respectively.

The distances d_1 and d_2 are selected such that they agree with the following relationship:

$$d_1 < d < d_2 \qquad [2.3\text{-}35]$$

The diffusion estimates based on the above interpolation procedure were compared with estimates obtained by direct calculation using the actual distances to the restricted area, LPZ boundary, and organic receptors. The two sets of calculations were in agreement.

2.3.5.1.2 Straight-Line Gaussian Dispersion Model

The use of the straight-line Gaussian dispersion model in calculating X/Q, X/Q depleted, and relative desposition was determined by the Wolf Creek site parameters and the meteorological data as specified in NRC Regulatory Guide 1.111. Depletion factors and relative deposition rates are computed from curves in Regulatory Guide 1.111. For long-term transport, the plume is assumed to meander over a 22.5-degree sector.

2.3.5.1.2.1 Elevated Release Model

The unit vent at the Wolf Creek Station is located on top of the containment building. The vent is a square duct with a solid metal roof. The roof keeps rain water out of the vent structure. Released gases are ejected horizontally, through screens in the sides of the structure, just below the roof.

Since the ejected gases have no initial vertical component and since the unit vent is less than twice as high as other structures at the plant, no elevated or mixed mode releases are possible. All releases from the plant are considered as ground releases.

2.3.5.1.2.2 Ground-Level Release Model

Using the ground-level release model, the hourly relative concentration values are calculated at the sector defined by the wind direction using the equation:

$$X/Q = \frac{2.032}{s_z u D} \qquad [2.3\text{-}40]$$

where:

X/Q = Relative ground-level concentration (sec/m^3);

s_z = Vertical standard deviation of the plume (meters);

u = Average wind speed (m/sec); and

D = Distance from the source (meters).

However, with the wake turbulent effect considered, the equation is revised to the following:

$$X/Q = \frac{2.032}{\left(s_z^2 + \frac{cV^2}{p}\right) uD} \qquad [2.3\text{-}41]$$

where:

c = Building shape factor; and

V = Vertical height of the highest adjacent building (meters).

The wake factor ($\frac{cV^2}{p}$) is limited, close to the source, to a factor of twice åzý. So if

$$3\ s_z < \sqrt{s_z^2 + \frac{cV^2}{p}}$$

the resulting equation is:

$$X/Q = \frac{2.032}{3 s_z \bar{u}\ D} \qquad [2.3\text{-}42]$$

(X/Q is calculated to be the larger of Equations 2.3-41 and 2.3-42).

The total integrated relative concentration at each sector and distance is then divided by the total number of hours in the data base.

2.3.5.1.3 Methods of Depletion, Deposition, and Decay Calculation

Depleted X/Q values were computed by applying the depletion factors provided in the curves of Figure 2 of Regulatory Guide 1.111 to the calculated X/Q values. Ground depositions per unit area were calculated using the equation:

$$D/Q = RDep / [2 \sin (11.25)\ x] \qquad [2.3\text{-}43]$$

where:

D/Q = Ground deposition per unit area (1/m2);

RDep = Relative ground deposition rate (1/m); and

x = Calculation distance (meters).

Radioactive decay, based on half lives of 2.26 and 8.0 days, was applied to the X/Q and the X/Q depleted concentrations.

2.3.5.1.4 Results

The PUFF advection modeling scheme (described in Section 2.3.5.1.1) and the straight-line model (Section 2.3.5.1.2) were used with the same data base to calculate annual average relative concentrations (X/Q). The results from both models were then used to calculate terrain/recirculation correction factors (TCF) (see Section 2.3.5.1.1.2). The TCF are calculated for ground level releases. Diffusion estimates, modified by the TCF, were then made using the straight-line model with four meteorological data

sets: (1) June 1, 1973 through May 31, 1974; (2) June 1, 1974 through May 31, 1975; (3) March 5, 1979 through March 4, 1980; and (4) the 3 years combined. In addition to X/Q, the straight-line model calculates X/Q depleted, relative deposition (D/Q), decayed relative concentration, and decayed and depleted relative concentration (based on half lives of 2.26 and 8.0 days).

PUFF tracks the advection and dispersion of up to 500 Gaussian puffs across the study area. New puffs are emitted continuously at 20-minute intervals throughout the year. Puffs are discarded when they leave the study area, or when they have become so attenuated that they no longer have a significant impact at any receptor location. The criterion for discarding an attenuated puff is comparison of the puff center X/Q to a user-specified cutoff X/Q value. In the original analysis, this cutoff was inadvertently set to an inappropriately high value. The result was that puffs were discarded too quickly, before they could reach the more distant receptor locations.

The PUFF model analysis has been repeated for ground-level release using a more appropriate X/Q cutoff value. Revised TCFs are presented in Table 2.3-60a for the 10 receptor ring distances used in the Puff analysis. As this table indicates, the strong systematic under-prediction of PUFF model results in relation to straight-line model results for large source-receptor distances is no longer present.

The mild overall decrease in TCF values at large downwind distances may be attributed to plume meander, accounted for in PUFF but not in the hourly, plume elements in PUFF actually cover a greater distance before arriving at a given receptor than is assumed in the straight-line model. They are, therefore, more attenuated on arrival at the receptor than the straight-line model algorithm would indicate.

Revised TCFs were computed for the ground-level case. The revised TCFs were logarithmically interpolated to provide TCFs for all downwind distances of interest. This complete set of TCFs was applied to all straight-line model results presented in the USAR.

Use of a single meteorological station as the data source for the PUFF analysis is justified by the absence of severe terrain within the region of interest and by the fact that only long-term average relative concentrations are evaluated. Absence of severe terrain implies that deviations from straight-line flow that do occur are not strongly systematic. Effects of random plume meander and

mesoscale recirculation on annual average X/Q values are adequately represented via PUFF simulations with single-station onsite meteorological input.

Annual average concentrations at the standard distances for ground-level releases for the period June 1, 1973 through May 31, 1974 are provided in Table 2.3-62. Ground-level releases are provided in Table 2.3-64 for the same data period at the exclusion area zone (1200 meters); the LPZ (4023 meters); the nearest organic receptor distances; and the plant boundary. For each sector and distance, seven concentrations are provided:

a. Relative concentration (X/Q) (sec/m^3);

b. Depleted relative concentration (X/Q) (sec/m^3);

c. Relative deposition (D/Q) (1/m^2);

d. Decayed relative concentration, half life 2.26 days (X/Q) (sec/m^3);

e. Decayed relative concentration, half life 8 days (X/Q) (sec/m^3);

f. Decayed and depleted relative concentration, half life 2.26 days (X/Q) (sec/m^3); and

g. Decayed and depleted relative concentration, half life 8 days (X/Q) (sec/m^3).

Concentrations based on the remaining 2 years of data and on all 3 years combined are provided as follows:

DATA BASE	RELEASE MODE	DISTANCES	TABLE NUMBER
06/01/74-05/31/75	ground	standard	2.3-66
06/01/74-05/31/75	ground	organic receptors	2.3-67
03/05/79-03/04/80	ground	standard	2.3-70
03/05/79-03/04/80	ground	organic receptors	2.3-71
06/01/73-05/31/75 and 03/05/79-03/04/80 combined	ground	standard	2.3-74
06/01/73-05/31/75 and 03/05/79-03/04/80 combined	ground	organic receptors	2.3-75

2.3.6 REFERENCES

1. American Meteorological Society, 1959, Glossary of Meteorology.

2. American Meteorological Society, 1970, Extremes of Snowfall-United States and Canada: Weatherwise, American Meteorological Soc., No. 23, P. 286 - 294.

3. American National Standard Institute (ANSI), 1972, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures: ANSI, A58.1.

4. Bennett, Iven, 1959, Glaze - Its Meteorology and Climatology, Geographical Distribution and Economic Effects: U. S. Army, Headquarters, Quartermaster Research and Engineering Command, Tech. Rept. EP-105, 217 p.

5. Bodle, D., 1971, Electrical Protection Guide for Land-Based Radio Facilities, Joslyn Electronic Systems, Santa Barbara, Calif. JES-159-3-3M 1/74.

6. Climet Instrument Co., 1970, Instruction Manual, Model 011-1 Wind Speed Transmitter: Climet Instrument Co., Redland, California.

7. Cry, G. W., 1965, Tropical Cyclones of the North Atlantic Ocean: U.S. Weather Bureau, U.S. Dept. of Commerce, Tech. Paper 55, 148 p.

8. Environmental Data Service, 1968, Climatic Atlas of the United States: Environmental Sciences Services Administration, U.S. Dept. of Commerce, p. 58.

9. ________, 1969, Climatological Data, National Summary - ESSA, 1950 - 1968: Environmental Sciences Services Administration, U.S. Dept. of Commerce.

10. ________, 1972, Local Climatological Data, Annual Summary with Comparative Data, Topeka, Kansas: National Oceanic and Atmospheric Administration, U.S. Dept. of Commerce.

11. ________, 1972, Local Climatological Data, Annual Summary with Comparative Data, Wichita, Kansas: National Oceanic and Atmospheric Administration, U.S. Dept. of Commerce.

12. ________, 1978, Local Climatological Data, Annual Summary with Comparative Data, Topeka, Kansas: National Oceanic and Atmospheric Administration, U.S. Dept. of Commerce.

13. ________,1978, Local Climatological Data, Annual Summary with Comparative Data, Wichita, Kansas: National Oceanic and Atmospheric Administration, U.S. Dept. of Commerce.

14. George, Joseph J., Fog, Compendium of Meteorology, Thomas F. Malone, ed., American Meteorological Society, Boston, Massachusetts, 1951, pp. 1179 - 1189.

15. Gringorten, 1963, Fitting Meteorological Extremes by Various Distributions, Quarterly Journal of the Royal Meteorological Society.

16. Gumbel, E., 1954, Statistical Theory of Extreme Value and Some Practical Applications: National Bureau of Standards, Applied Mathematic Series No. 33.

17. Halitsky, J., Golden, J., Halpern, P., 1963: "Wind Tunnel Tests of Gas Diffusion From a Leak in the Shell of a Nuclear Power Reactor and from a Nearby Stack," N.Y. University Department of Met. & Ocean, GSL Rep. 63-2 under USWB Contract Cwb-10321

18. Halitsky, J. 1963: "Gas Diffusion Near Buildings," ASHRAE Trans. 69: pp. 464-484

19. Hess, Seymour, 1959, Introduction to Theoretical Meteorology: Holt, Rinehart and Winston, New York, p. 155-160.

20. Holzworth, G.C., 1972, Mixing Heights, Wind Speeds, and Po- tentional for Urban Air Pollution Throughout the Contiguous United States: U.S. Environmental Protection Agency, No. AP-101, 118 p.

21. Hosler, C.R., 1961, Low-Level Inversion Frequency in the Contiguous United States: Monthly Weather Review, U.S. Weather Bureau, U.S. Dept. of Commerce, No. 89, p. 319- 339.

22. Hudson, H. E. Jr., and W. J. Roberts, 1955, 1952-1955 Illinois Drought with Special Reference to Impounding Reservoir Design - Bulletin No. 43, State Water Survey Division, State of Illinois.

23. Klein, W.H., 1957, Principal Tracks and Mean Frequencies of Cyclones and Anticyclones in the Northern Hemisphere: U.S. Weather Bureau, U.S. Dept. of Commerce, Research Paper 40.

24. Littleton Research and Engineering Corporation, 1970, An Engineering - Economic Study of Cooling Pond Performance: Littleton Research and Engineering Corporation, Massachusetts, for Environmental Protection Agency, 1613DFX05/70 (May).

25. Lowry, R. L., Jr., 1959, A Study of Droughts in Texas, Bulletin 5914, Texas Board of Water Engineers.

26. Marshall, J.L., 1973, Lightning Protection.

27. National Climatic Center, 1948-1959, Hourly Surface Observations (TDF14 and CD488): National Climatic Center, Computer Tape No. 1240 for Station No. 143984.

28. ________, 1955-1964, Hourly Surface Observations (TDF14): National Climatic Center, Computer Tape No. 1241 and 1242 for Station No. 13981.

29. National Center for Atmospheric Research, 1971, Cover Photograph: Bulletin of the American Meteorological Society, V. 52, No. 2.

30. Neuberger, Hans, 1965, Introduction of Physical Meteorology: The Pennsylvania State University, University Park, Pennsylvania, p. 98-108.

31. Pautz, M.E., 1969, Severe Local Storm Occurrences, 1955-1967: Office of Meteorological Operations, Environmental Sciences Service Administration, U.S. Dept. of Commerce, ESSA Tech. Memo WBTM FCST 12.

32. Poultney, N.E., 1973, The Tornado Season of 1972, Weatherwise, American Meteorological Soc., No. 26, p. 22-27.

33. Rayner, G.S., P. Michael, R.M. Brown, and S. Sethu Raman, 1974, Preprint of Symposium on Atmospheric Diffusion and Air Pollution, Sept. 9-13, 1974, Santa Barbara, California, Sponsored by American Meteorological Society.

34. Ryan, P.J. and Harleman, D.R.F., 1973, Analytical and Experimental Study of Transient Cooling Pond Behavior, Report No. 161, Dept. of Civil Engineering, Massachusetts Institute of Technology.

35. Slade, David H., ed., 1968, Meteorology and Atomic Energy: U.S. Atomic Energy Commission, Div. of Tech. Information, p. 102-103.

36. Slade, D.H. (ed.), 1968, Meteorology and Atomic Energy - 1968, TID-24190, National Technical Information Service, Springfield, VA.

37. Sloss, Peter W., 1967, An Empirical Examination of Cumulus Entrainment: Journ. of Applied Meteorology, V. 6, p. 878-881.

38. Tattleman, P. and Gringorten, I., 1973, Estimated Glaze Ice and Wind Loads at the Earth's Surface for the Contiguous United States, Air Force Cambridge Research Laboratories, Bedford, Mass., October.

39. Thom, H.C.S., 1963, Tornado Probability: Monthly Weather Review, U.S. Weather Bureau, U.S. Dept. of Commerce, No. 91, p. 730-736.

40. ________, 1968, New Distribution of Extreme Winds in the United States: Proceedings of the American Society of Civil Engineers, p. 1787-1801.

41. Uman, M., 1971, Understanding Lightning: Beck Technical Publications, Carnegie, Pennsylvania.

42. U. S. Dept. of Commerce, 1949-1973, Climatological Data - Kansas, Vol. 63, No. l through Vol. 87, No. 12.

43. ________, 1974-1979, Local Climatological Data for Wichita and Topeka, Kansas.

44. ________, 1959-1973, Storm Data: National Climatic Center, National Oceanic and Atmospheric Administration, Environmental Data Service, V. 1, No. l through V. 15, No. 12.

45. U.S. Weather Bureau, 1956, Seasonal Variations of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24, and 48 Hours, U.S. Government Printing Office, Washington, D.C., Hydrometeorological Report No. 33.

46. _______, 1959, Climates of the States - Kansas' U.S. Weather Bureau, U.S. Dept. of Commerce, p. 60.

47. _______, 1960, Tornado Occurrences in the United States' U.S. Dept. of Commerce, Washington, D.C., Technical Paper No. 20.

48. ________, 1963, Maximum Recorded United States Point Rainfall for 5 Minutes to 24 Hours for 196 First Orfer Stations: U.S. Weather Bureau, U.S. Dept. of Commerce, Technical Paper No. 2.

49. ________, 1965, Climatic Summary of the United States, Supplement for 1951 through 1960: U.S. Weather Bureau, U.S. Dept. of Commerce, p. 86-112.

TABLE 2.3-1

MAXIMUM SHORT PERIOD RAINFALL
FOR TOPEKA AND WICHITA, KANSAS

	TOPEKA		WICHITA	
Time Interval	Rainfall (inches)	Date	Rainfall (inches)	Date
5 Minutes	0.67[a]	9/14/30	0.66[c]	9/06/11
10 Minutes	1.19[a]	8/13/49	1.10[c]	6/14/31
15 Minutes	1.52[a]	8/13/49	1.52[c]	6/14/31
30 Minutes	2.92[a]	8/13/49	2.31[c]	7/31/50
60 Minutes	4.16[a]	8/13/49	3.28[c]	7/31/50
2 Hours	4.77[a]	8/13/49	3.54[c]	9/06/11
3 Hours	4.79[a]	8/13/49	4.93[c]	9/07/11
6 Hours	4.85[a]	8/13/49	6.68[c]	9/06/11
12 Hours	7.71[a]	9/06/09	7.89[c]	9/06/11
24 Hours	8.08[b]	9/06/09	7.99[b]	9/06/11

a Data Period 1900-1961.
b Data Period 1889-1961.
c Data Period 1903-1961.

Sources:

U.S. Weather Bureau, 1963, Maximum recorded United States point rainfall for 5 minutes to 24 hours for 296 first order stations: U.S. Weather Bureau, Department of Commerce, Technical Paper No. 2.

U.S. Department of Commerce, 1978, Local Climatological Data, Topeka, Wichita, Kansas: National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, N.C.

TABLE 2.3-2

YEARLY MAXIMUM SNOW DEPTH AT WICHITA AND TOPEKA, KANSAS*

YEAR	WICHITA	TOPEKA
1979	8	12
1978	6	10
1977	2	7
1976	1	4
1975	9	8
1974	6	10
1973	6	6
1972	3	3
1971	13	12
1970	13	5
1969	7	4
1968	3	4
1967	4	4
1966	4	7
1965	2	5
1964	5	4
1963	4	3
1962	17	9
1961	7	5
1960	10	19
1959	7	7
1958	5	8
1957	2	3
1956	4	6
1955	3	8
1954	1	1
1953	2	9
1952	7	6
1951	4	3
1950	1	1
1949	4	3

* inches

Sources:

U.S. Department of Commerce, 1949 - 1979, Climatological data - Kansas: U.S. Weather Bureau, vol. 63, no. 1 through vol. 87, no. 12.

TABLE 2.3-3

TOTAL NUMBER OF DAYS WITH
FREEZING PRECIPITATION IN WICHITA, KANSAS*

Month	Number
November	6
December	34
January	9
February	23
March	11
Total	83

* Data Period 1939-1948.

Source:

Bennett, Iven, 1959, Glaze--its meteorology and climatology, geographical distribution and economic effects: U.S. Army, Headquarters Quartermaster Research and Engineering Command, Natick, Massachusetts, Technical Report EP-105, 217 pp.

TABLE 2.3-4

AVERAGE MONTHLY AND ANNUAL NUMBER OF DAYS WITH THUNDERSTORMS AT TOPEKA AND WICHITA, KANSAS

Month	Number of Days at Topeka[a]	Number of Days at Wichita[b]
January	*	*
February	1	1
March	2	2
April	6	6
May	10	9
June	10	10
July	9	8
August	8	7
September	6	6
October	4	3
November	1	1
December	*	*
Annual	58	55

a Data Period 1947-1978.

b Data Period 1954-1978.

Source:

U.S. Weather Bureau, 1959, Climates of the States--Kansas: U.S. Weather Bureau, Department of Commerce, pp. 60-14.

Environmental Data Service, 1978, Local Climatological data, annual summary with comparative data, Topeka, Kansas: National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Wichita, Kansas: National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

TABLE 2.3-5

NUMBER, PROBABILITY, AND
RECURRENCE INTERVAL OF TORNADO OCCURRENCES
PER ONE DEGREE LONGITUDE-LATITUDE SQUARE IN KANSAS*

Month	Number ($x10^{-1}$)	Probability ($x10^{-4}$)	Recurrence Interval (years)
January	0	0	∞
February	.14	.10	95,238
March	.51	.39	25,839
April	2.55	1.96	5,109
May	7.54	5.78	1,729
June	5.47	4.20	2,383
July	2.05	1.57	6,373
August	.81	.62	16,207
September	.69	.53	18,939
October	.76	.58	17,211
November	.64	.49	20,284
December	.09	.07	142,857
Annual	21.21	16.26	615

* Data Period 1956-1971.

Source:

Poultney, N. E., 1973, The Tornado Season of 1972: Weatherwise, American Meteorological Society, no. 26, pp. 22-27.

TABLE 2.3-6

TORNADO SUMMARY FOR KANSAS*

TOTALS

Number	Days	Deaths	Damage
618	374	157	$21,256,515

ANNUAL AVERAGE

Number	Days	Deaths	Damage
17.66	10.69	4.49	$ 607,329

---

* Data Period 1916-1950.

Source:

U.S. Weather Bureau, 1960, Tornado occurrences in the United States: U.S. Department of Commerce, Washington, D.C., Technical Paper no. 20.

TABLE 2.3-7

FASTEST MILE OF WIND
FOR EASTERN KANSAS USING
FISHER-TIPPET TYPE I (FRECHET) DISTRIBUTION

Recurrence Interval (years)	Extreme Mile Wind Speed (mph)	Maximum Gust (mph)
2	53	69
10	57	87
25	71	92
50	78	101
100	86	112

Source:

Thom, H.C.S., 1968, New distributions of extreme winds in the United States. Proceedings of the American Society of Civil Engineers: American Society of Civil Engineers, New York, pp. 1787-1801.

FASTEST MILE OF WIND FOR TOPEKA AND WICHITA, KANSAS

	TOPEKA[a]			WICHITA[b]		
Month	Fastest Mile Wind Speed (mph)	Direction	Year	Fastest Mile Wind Speed (mph)	Direction	Year
January	52	S	1962	57	N	1965
February	47	NW	1967	54	N	1965
March	66	SW	1950	60	N	1965
April	63	SE	1957	63	W	1964
May	72	N	1963	58	S	1962
June	72	SW	1966	68	NW	1978
July	81	N	1958	66	NW	1956
August	57	N	1959	47	NW	1964
September	57	N	1952	56	N	1956
October	63	NE	1954	52	S	1961
November	56	SW	1963	51	N	1964
December	61	NW	1963	54	NW	1963
Year	81	N	July 1958	68	NW	June 1978

[a] Data Period 1949-1978.

[b] Data Period 1953-1978.

[c] The fastest mile wind speed before 1953 was 100 miles/hr from the north in July 1948, recorded by an anemometer located 61 feet above ground at the Wichita Municipal Airport.

TABLE 2.3-8 (continued) (Sheet 2 of 2)

Sources:

Environmental Data Service 1978, Local climatological data, annual summary with comparative data, Topeka, Kansas: National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, Maryland.

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Wichita, Kansas: National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, Maryland.

WORST TEMPERATURE PERIOD AND WORST EVAPORATION PERIOD

This table has been divided into two parts:

A. WORST TEMPERATURE PERIOD (36 sheets)
B. WORST EVAPORATION PERIOD (30 sheets)

The key to the columns is as follows:

A Ceiling (feet)
B Wind Direction
C Wind Speed (knots)
D Dry Bulb (^{O}F)
E Wet Bulb (^{O}F)
F Dew Point (^{O}F)
G Relative Humidity (%)
H Barometric Pressure (" HG)
I Cloud Cover (0-10)
J Atmospheric Phenomena
K Rainfall (1/100 inch)
L Short Wave Radiation (btu/hr/ft^2)
M Long Wave Radiation (btu/hr/ft^2)
N Vapor Pressure of Air ("HG)

The synthetic date appears on the short line following the column heads; for example 1. 8. 1. means August 8, Year 1.

A. WORSE TEMPERATURE PERIOD [a,b]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1.	1440.	13981.	1.	8.	1.									
0.	20000.	9.	10.	89.	78.	74.	61.	29.	0.	0.	0.	0.	133.	1.
1.	20000.	9.	9.	85.	77.	74.	69.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	9.	7.	82.	76.	74.	76.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	9.	7.	79.	75.	73.	81.	29.	0.	0.	0.	0.	123.	1.
4.	20000.	9.	5.	78.	75.	74.	87.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	8.	5.	77.	75.	74.	90.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	8.	5.	77.	74.	73.	87.	29.	0.	0.	0.	0.	121.	1.
7.	20000.	7.	7.	75.	73.	72.	90.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	10.	6.	75.	73.	72.	90.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	9.	5.	74.	72.	72.	93.	29.	0.	0.	0.	0.	118.	1.
10.	20000.	8.	6.	73.	71.	71.	93.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	8.	5.	72.	71.	70.	93.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	7.	3.	74.	73.	72.	93.	29.	0.	0.	0.	117.	118.	1.
13.	20000.	9.	5.	79.	75.	73.	81.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	10.	6.	85.	75.	72.	65.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	12.	5.	88.	76.	71.	57.	29.	0.	0.	0.	258.	130.	1.
16.	20000.	10.	8.	91.	76.	70.	50.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	11.	7.	93.	75.	68.	45.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	9.	9.	93.	75.	68.	45.	29.	0.	0.	0.	281.	133.	1.
19.	20000.	9.	9.	94.	75.	67.	41.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	9.	9.	95.	76.	68.	41.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	10.	9.	95.	77.	70.	44.	29.	0.	0.	0.	161.	136.	1.
22.	20000.	9.	8.	94.	77.	70.	46.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	9.	4.	95.	78.	72.	48.	29.	0.	0.	0.	0.	0.	0.

[a] For key to table, see sheet 1

[b] The worst temperature period was obtained by saving the conditions for the 5 consecutive days, 1 day, and 30 consecutive days resulting in highest average water temperature, after which these three periods were combined to produce a synthetic 36-day worst weather period. The temperature periods were determined to have the following actual dates:

WORST 5 DAYS: June 30, 1949 (6 p.m.)-July 5, 1949 (6 p.m.)
WORST 1 DAY: July 2, 1949 (noon) - July 3, 1949 (noon)

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
2.	1440.	13981.	1.	8.	2.									
0.	20000.	10.	4.	94.	79.	74.	52.	29.	0.	0.	0.	0.	137.	1.
1.	20000.	10.	3.	91.	78.	73.	56.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	7.	3.	86.	77.	74.	67.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	4.	2.	82.	77.	75.	79.	29.	0.	0.	0.	0.	127.	1.
4.	20000.	6.	3.	80.	76.	75.	84.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	7.	3.	79.	75.	73.	81.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	1.	3.	76.	74.	73.	90.	29.	0.	0.	0.	0.	120.	1.
7.	20000.	7.	3.	75.	73.	72.	90.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	0.	0.	75.	73.	72.	90.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	8.	4.	76.	73.	72.	87.	29.	0.	0.	0.	0.	119.	1.
10.	20000.	0.	0.	74.	72.	71.	90.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	0.	0.	73.	72.	71.	93.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	3.	3.	76.	73.	72.	87.	29.	0.	0.	0.	117.	119.	1.
13.	20000.	7.	3.	82.	76.	74.	76.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	9.	7.	86.	77.	74.	67.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	5.	3.	90.	79.	74.	60.	29.	0.	0.	0.	255.	134.	1.
16.	3600.	9.	1.	90.	78.	74.	60.	29.	7.	0.	0.	0.	0.	0.
17.	5000.	0.	0.	93.	77.	71.	49.	29.	7.	0.	0.	0.	0.	0.
18.	5000.	5.	3.	94.	76.	70.	46.	29.	7.	0.	0.	191.	143.	1.
19.	5000.	5.	4.	95.	76.	68.	41.	29.	7.	0.	0.	0.	0.	0.
20.	5000.	7.	3.	96.	77.	70.	42.	29.	6.	0.	0.	0.	0.	0.
21.	20000.	15.	2.	97.	79.	72.	45.	29.	4.	0.	0.	144.	144.	1.
22.	20000.	7.	4.	98.	78.	70.	41.	29.	4.	0.	0.	0.	0.	0.
23.	20000.	9.	3.	96.	77.	70.	42.	29.	2.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
3.	1440.	13981.	1.	8.	3.									
0.	20000.	8.	4.	95.	77.	70.	44.	29.	2.	0.	0.	0.	138.	1.
1.	20000.	7.	3.	91.	78.	74.	57.	29.	2.	0.	0.	0.	0.	0.
2.	20000.	5.	3.	86.	77.	74.	67.	29.	1.	0.	0.	0.	0.	0.
3.	20000.	5.	3.	85.	76.	73.	67.	29.	0.	0.	0.	0.	128.	1.
4.	20000.	5.	4.	83.	75.	72.	69.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	7.	5.	81.	76.	74.	79.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	7.	6.	80.	75.	74.	82.	29.	0.	0.	0.	0.	124.	1.
7.	20000.	7.	6.	78.	75.	73.	84.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	7.	5.	78.	74.	72.	81.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	6.	7.	77.	73.	72.	84.	29.	0.	0.	0.	0.	120.	1.
10.	20000.	7.	4.	76.	73.	72.	87.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	7.	6.	74.	72.	71.	90.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	7.	4.	76.	73.	72.	87.	29.	0.	0.	0.	117.	119.	1.
13.	20000.	8.	5.	80.	75.	73.	79.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	9.	8.	84.	75.	72.	67.	29.	3.	0.	0.	0.	0.	0.
15.	20000.	10.	7.	86.	76.	72.	63.	29.	4.	0.	0.	232.	133.	1.
16.	20000.	9.	4.	89.	76.	71.	55.	29.	3.	0.	0.	0.	0.	0.
17.	20000.	8.	9.	90.	75.	69.	50.	29.	5.	0.	0.	0.	0.	0.
18.	4000.	8.	4.	93.	78.	72.	51.	29.	6.	0.	0.	213.	142.	1.
19.	5000.	7.	10.	93.	76.	70.	47.	29.	6.	0.	0.	0.	0.	0.
20.	5000.	5.	6.	92.	76.	71.	51.	29.	7.	0.	0.	0.	0.	0.
21.	5000.	6.	9.	93.	76.	69.	46.	29.	6.	0.	0.	125.	141.	1.
22.	20000.	4.	6.	92.	75.	68.	45.	29.	3.	0.	0.	0.	0.	0.
23.	20000.	6.	9.	92.	75.	68.	45.	29.	2.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
4.	1440.	13981.	1.	8.	4.									
0.	20000.	7.	5.	90.	75.	69.	50.	29.	2.	0.	0.	0.	133.	1.
1.	20000.	7.	4.	85.	76.	72.	65.	29.	1.	0.	0.	0.	0.	0.
2.	20000.	6.	4.	82.	74.	71.	69.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	6.	5.	80.	73.	70.	71.	29.	0.	0.	0.	0.	122.	1.
4.	20000.	7.	4.	78.	73.	71.	79.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	7.	3.	76.	72.	70.	81.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	8.	3.	76.	72.	70.	81.	29.	0.	0.	0.	0.	118.	1.
7.	20000.	0.	0.	74.	71.	70.	87.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	7.	4.	74.	71.	70.	87.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	7.	5.	73.	71.	70.	90.	29.	0.	0.	0.	0.	116.	1.
10.	20000.	7.	3.	72.	70.	69.	90.	29.	1.	0.	0.	0.	0.	0.
11.	20000.	2.	3.	72.	70.	69.	90.	29.	3.	0.	0.	0.	0.	0.
12.	20000.	7.	3.	74.	72.	71.	90.	29.	5.	0.	0.	98.	122.	1.
13.	20000.	7.	4.	79.	74.	72.	79.	29.	4.	0.	0.	0.	0.	0.
14.	20000.	8.	3.	81.	74.	71.	71.	29.	2.	0.	0.	0.	0.	0.
15.	20000.	7.	3.	83.	74.	71.	67.	29.	5.	0.	0.	218.	131.	1.
16.	15000.	8.	4.	85.	75.	71.	63.	29.	8.	0.	0.	0.	0.	0.
17.	14000.	8.	3.	85.	75.	72.	65.	29.	9.	0.	0.	0.	0.	0.
18.	14000.	7.	6.	90.	76.	70.	52.	29.	8.	0.	9.	164.	140.	1.
19.	20000.	2.	4.	86.	76.	72.	63.	29.	7.	0.	1.	0.	0.	0.
20.	4500.	8.	3.	90.	76.	71.	54.	29.	8.	0.	0.	0.	0.	0.
21.	4500.	3.	7.	87.	76.	71.	59.	29.	8.	0.	6.	94.	138.	1.
22.	4500.	14.	9.	76.	74.	73.	90.	29.	10.	0.	1.	0.	0.	0.
23.	5000.	15.	8.	76.	74.	73.	90.	29.	9.	0.	3.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
5.	1440.	13981.	1.	8.	5.									
0.	12000.	4.	5.	78.	75.	74.	87.	29.	10.	0.	0.	0.	132.	1.
1.	12000.	3.	3.	77.	74.	73.	87.	29.	8.	0.	0.	0.	0.	0.
2.	10000.	3.	4.	74.	73.	72.	93.	29.	7.	0.	0.	0.	0.	0.
3.	20000.	8.	3.	74.	72.	72.	93.	29.	2.	0.	0.	0.	120.	1.
4.	20000.	9.	3.	72.	71.	71.	97.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	9.	4.	72.	72.	71.	97.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	8.	3.	72.	71.	70.	93.	29.	0.	0.	0.	0.	115.	1.
7.	20000.	8.	3.	72.	71.	70.	93.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	7.	5.	71.	70.	70.	97.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	8.	5.	71.	70.	70.	97.	29.	0.	0.	0.	0.	114.	1.
10.	20000.	9.	6.	71.	70.	70.	97.	29.	3.	0.	0.	0.	0.	0.
11.	20000.	9.	5.	71.	70.	70.	97.	29.	4.	0.	0.	0.	0.	0.
12.	15000.	9.	4.	72.	71.	71.	97.	29.	7.	0.	0.	81.	122.	1.
13.	18000.	9.	5.	73.	72.	72.	97.	29.	6.	0.	0.	0.	0.	0.
14.	18000.	10.	4.	78.	74.	73.	84.	29.	6.	0.	0.	0.	0.	0.
15.	20000.	11.	9.	83.	76.	73.	71.	29.	4.	0.	1.	231.	131.	1.
16.	15000.	10.	9.	86.	76.	72.	63.	29.	7.	0.	0.	0.	0.	0.
17.	3500.	10.	9.	87.	75.	71.	59.	29.	8.	0.	4.	0.	0.	0.
18.	3500.	10.	9.	86.	75.	71.	61.	29.	9.	0.	0.	132.	138.	1.
19.	4000.	15.	11.	78.	73.	71.	79.	29.	9.	0.	4.	0.	0.	0.
20.	20000.	13.	2.	75.	73.	72.	90.	29.	9.	0.	0.	0.	0.	0.
21.	20000.	5.	2.	82.	76.	74.	76.	29.	8.	0.	1.	93.	134.	1.
22.	20000.	4.	4.	83.	76.	74.	74.	29.	8.	0.	0.	0.	0.	0.
23.	16000.	5.	4.	81.	76.	74.	79.	29.	10.	0.	0.	0.	0.	0.

WOLF CREEK

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
6.	1440.	13981.	1.	8.	6.									
0.	5000.	5.	3.	94.	76.	70.	46.	29.	7.	0.	0.	191.	143.	1.
1.	5000.	5.	4.	95.	76.	68.	41.	29.	7.	0.	0.	0.	0.	0.
2.	5000.	7.	3.	96.	77.	70.	42.	29.	6.	0.	0.	0.	0.	0.
3.	20000.	15.	2.	97.	79.	72.	45.	29.	4.	0.	0.	144.	144.	1.
4.	20000.	7.	4.	98.	78.	70.	41.	29.	4.	0.	0.	0.	0.	0.
5.	20000.	9.	3.	96.	77.	70.	42.	29.	2.	0.	0.	0.	0.	0.
6.	20000.	8.	4.	95.	77.	70.	44.	29.	2.	0.	0.	0.	138.	1.
7.	20000.	7.	3.	91.	78.	74.	57.	29.	2.	0.	0.	0.	0.	0.
8.	20000.	5.	3.	86.	77.	74.	67.	29.	1.	0.	0.	0.	0.	0.
9.	20000.	5.	3.	85.	76.	73.	67.	29.	0.	0.	0.	0.	128.	1.
10.	20000.	5.	4.	83.	75.	72.	69.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	7.	5.	81.	76.	74.	79.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	7.	6.	80.	75.	74.	82.	29.	0.	0.	0.	0.	124.	1.
13.	20000.	7.	6.	78.	75.	73.	84.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	7.	5.	78.	74.	72.	81.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	6.	7.	77.	73.	72.	84.	29.	0.	0.	0.	0.	120.	1.
16.	20000.	7.	4.	76.	73.	72.	87.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	7.	6.	74.	72.	71.	90.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	7.	4.	76.	73.	72.	87.	29.	0.	0.	0.	117.	119.	1.
19.	20000.	8.	5.	80.	75.	73.	79.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	9.	8.	84.	75.	72.	67.	29.	3.	0.	0.	0.	0.	0.
21.	20000.	10.	7.	86.	76.	72.	63.	29.	4.	0.	0.	232.	133.	1.
22.	20000.	9.	4.	89.	76.	71.	55.	29.	3.	0.	0.	0.	0.	0.
23.	20000.	8.	9.	90.	75.	69.	50.	29.	5.	0.	0.	0.	0.	0.

WOLF CREEK

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
7.	1440.	13981.	1.	8.	7.									
0.	20000.	9.	9.	73.	72.	71.	93.	29.	4.	0.	0.	100.	120.	1.
1.	20000.	9.	9.	77.	73.	72.	84.	29.	3.	0.	0.	0.	0.	0.
2.	20000.	10.	15.	81.	75.	72.	74.	29.	1.	0.	0.	0.	0.	0.
3.	20000.	10.	13.	83.	75.	72.	69.	29.	1.	0.	0.	252.	127.	1.
4.	20000.	10.	10.	86.	76.	72.	63.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	10.	13.	88.	78.	74.	63.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	10.	14.	90.	79.	75.	61.	29.	0.	0.	0.	271.	134.	1.
7.	20000.	10.	16.	91.	78.	73.	56.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	10.	16.	92.	79.	74.	56.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	11.	16.	93.	79.	74.	54.	29.	0.	0.	0.	155.	137.	1.
10.	20000.	10.	14.	93.	79.	74.	54.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	11.	8.	92.	79.	75.	57.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	10.	10.	90.	79.	76.	63.	29.	0.	0.	0.	0.	135.	1.
13.	20000.	10.	5.	86.	79.	77.	75.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	8.	6.	83.	79.	77.	82.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	8.	5.	81.	77.	76.	85.	29.	0.	0.	0.	0.	127.	1.
16.	20000.	9.	7.	79.	77.	76.	90.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	7.	4.	79.	77.	76.	90.	29.	10.	0.	163.	0.	0.	0.
18.	500.	6.	3.	70.	70.	70.	100.	29.	10.	0.	17.	0.	123.	1.
19.	10000.	8.	7.	71.	71.	71.	100.	29.	10.	0.	0.	0.	0.	0.
20.	10000.	11.	9.	70.	70.	69.	97.	29.	10.	0.	0.	0.	0.	0.
21.	20000.	10.	4.	71.	69.	68.	90.	29.	8.	0.	0.	0.	121.	1.
22.	20000.	15.	7.	69.	68.	68.	97.	29.	3.	0.	0.	0.	0.	0.
23.	20000.	16.	3.	69.	68.	68.	97.	29.	5.	0.	0.	0.	0.	0.

WOLF CREEK

A. WORST TEMPERATURE PERIOD [(a,b)]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
8.	1440.	13981.	1.	8.	8.									
0.	20000.	6.	7.	71.	70.	69.	93.	29.	10.	0.	0.	40.	124.	1.
1.	20000.	7.	8.	76.	72.	71.	84.	29.	10.	0.	0.	0.	0.	0.
2.	20000.	8.	8.	81.	73.	70.	69.	29.	10.	0.	0.	0.	0.	0.
3.	20000.	8.	6.	83.	74.	70.	65.	29.	7.	0.	0.	175.	132.	1.
4.	20000.	11.	7.	85.	75.	71.	63.	29.	7.	0.	0.	0.	0.	0.
5.	20000.	10.	7.	88.	77.	73.	61.	29.	10.	0.	0.	0.	0.	0.
6.	20000.	11.	6.	89.	77.	73.	59.	29.	10.	0.	0.	95.	143.	1.
7.	20000.	11.	4.	89.	78.	74.	61.	29.	9.	0.	0.	0.	0.	0.
8.	20000.	9.	4.	91.	78.	73.	56.	29.	6.	0.	0.	0.	0.	0.
9.	20000.	13.	4.	93.	78.	73.	52.	29.	3.	0.	0.	147.	139.	1.
10.	20000.	0.	0.	94.	79.	73.	51.	29.	10.	0.	0.	0.	0.	0.
11.	20000.	13.	1.	92.	79.	75.	57.	29.	10.	0.	0.	0.	0.	0.
12.	20000.	11.	3.	91.	81.	78.	66.	29.	10.	0.	0.	0.	147.	1.
13.	20000.	8.	3.	87.	80.	78.	75.	29.	10.	0.	0.	0.	0.	0.
14.	20000.	8.	3.	83.	79.	78.	85.	29.	9.	0.	0.	0.	0.	0.
15.	20000.	8.	3.	81.	78.	77.	87.	29.	7.	0.	0.	0.	134.	1.
16.	20000.	8.	3.	80.	77.	76.	87.	29.	9.	0.	0.	0.	0.	0.
17.	20000.	9.	5.	79.	76.	75.	87.	29.	9.	0.	0.	0.	0.	0.
18.	20000.	9.	3.	78.	75.	74.	87.	29.	8.	0.	0.	0.	130.	1.
19.	25000.	9.	2.	78.	74.	73.	84.	29.	8.	0.	0.	0.	0.	0.
20.	20000.	0.	0.	77.	74.	73.	87.	29.	7.	0.	0.	0.	0.	0.
21.	20000.	10.	3.	76.	73.	72.	87.	29.	7.	0.	0.	0.	126.	1.
22.	25000.	10.	7.	77.	75.	74.	90.	29.	10.	0.	0.	0.	0.	0.
23.	15000.	10.	6.	76.	74.	73.	90.	29.	10.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD [(a,b)]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
9.	1440.	13981.	1.	8.	9.									
0.	20000.	14.	5.	77.	75.	74.	90.	29.	10.	0.	0.	39.	131.	1.
1.	20000.	2.	2.	80.	76.	75.	84.	29.	10.	0.	0.	0.	0.	0.
2.	1000.	2.	9.	80.	76.	74.	82.	29.	10.	0.	0.	0.	0.	0.
3.	20000.	2.	10.	81.	75.	72.	74.	29.	3.	0.	0.	240.	127.	1.
4.	20000.	4.	9.	82.	76.	74.	76.	29.	5.	0.	0.	0.	0.	0.
5.	12000.	4.	5.	83.	77.	75.	76.	29.	10.	0.	0.	0.	0.	0.
6.	8000.	2.	5.	84.	77.	75.	74.	29.	10.	0.	0.	94.	139.	1.
7.	12000.	2.	9.	86.	77.	74.	67.	29.	10.	0.	0.	0.	0.	0.
8.	15000.	2.	9.	85.	75.	71.	63.	29.	8.	0.	0.	0.	0.	0.
9.	20000.	3.	12.	85.	73.	67.	55.	29.	8.	0.	0.	94.	134.	1.
10.	12000.	2.	9.	81.	72.	68.	65.	29.	9.	0.	0.	0.	0.	0.
11.	12000.	2.	5.	80.	72.	68.	67.	29.	10.	0.	0.	0.	0.	0.
12.	12000.	3.	3.	79.	72.	69.	71.	29.	10.	0.	0.	0.	132.	1.
13.	12000.	3.	3.	78.	72.	69.	74.	29.	10.	0.	0.	0.	0.	0.
14.	20000.	2.	3.	75.	72.	70.	84.	29.	6.	0.	0.	0.	0.	0.
15.	12000.	2.	3.	75.	72.	71.	87.	29.	7.	0.	0.	0.	125.	1.
16.	10000.	4.	3.	76.	72.	71.	84.	29.	7.	0.	0.	0.	0.	0.
17.	9000.	4.	3.	76.	72.	70.	81.	29.	6.	0.	0.	0.	0.	0.
18.	20000.	6.	2.	74.	72.	71.	90.	29.	0.	0.	0.	0.	117.	1.
19.	20000.	3.	2.	72.	70.	70.	93.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	3.	2.	71.	70.	70.	97.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	11.	1.	70.	70.	69.	97.	29.	0.	0.	0.	0.	113.	1.
22.	20000.	0.	0.	69.	69.	68.	97.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	1.	2.	68.	67.	67.	97.	29.	0.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
10.	1440.	13981.	1.	8.	10.									
0.	20000.	16.	3.	71.	70.	69.	93.	29.	0.	0.	0.	111.	113.	1.
1.	20000.	16.	2.	76.	72.	71.	84.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	0.	0.	81.	74.	71.	71.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	0.	0.	85.	74.	69.	59.	29.	0.	0.	0.	255.	126.	1.
4.	20000.	2.	3.	85.	74.	69.	59.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	4.	1.	88.	75.	70.	55.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	7.	4.	89.	75.	69.	52.	29.	0.	0.	0.	276.	130.	1.
7.	20000.	8.	4.	89.	75.	69.	52.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	6.	6.	90.	76.	70.	52.	29.	2.	0.	0.	0.	0.	0.
9.	20000.	10.	3.	90.	75.	69.	50.	29.	2.	0.	0.	154.	133.	1.
10.	20000.	8.	5.	93.	76.	69.	46.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	9.	3.	92.	76.	70.	49.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	7.	4.	90.	76.	71.	54.	29.	0.	0.	0.	0.	132.	1.
13.	20000.	8.	5.	86.	77.	73.	65.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	8.	3.	82.	75.	72.	71.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	8.	6.	79.	74.	72.	79.	29.	0.	0.	0.	0.	122.	1.
16.	20000.	9.	5.	76.	72.	71.	84.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	9.	6.	75.	72.	70.	84.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	9.	6.	74.	71.	70.	87.	29.	1.	0.	0.	0.	117.	1.
19.	20000.	9.	5.	74.	71.	69.	84.	29.	2.	0.	0.	0.	0.	0.
20.	20000.	8.	4.	74.	70.	69.	84.	29.	1.	0.	0.	0.	0.	0.
21.	20000.	8.	4.	72.	70.	69.	90.	29.	1.	0.	0.	0.	115.	1.
22.	20000.	8.	6.	71.	70.	69.	93.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	9.	5.	70.	69.	68.	93.	29.	0.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
11.	1440.	13981.	1.	8.	11.									
0.	20000.	9.	5.	73.	71.	69.	87.	29.	0.	0.	0.	111.	115.	1.
1.	20000.	9.	6.	78.	74.	72.	81.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	10.	13.	83.	76.	73.	71.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	10.	9.	86.	77.	74.	67.	29.	0.	0.	0.	250.	130.	1.
4.	20000.	9.	12.	89.	79.	75.	63.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	9.	12.	90.	79.	75.	61.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	8.	10.	92.	80.	76.	60.	29.	0.	0.	0.	269.	137.	1.
7.	20000.	8.	14.	93.	79.	74.	54.	29.	1.	0.	0.	0.	0.	0.
8.	20000.	8.	13.	92.	79.	75.	57.	29.	3.	0.	0.	0.	0.	0.
9.	20000.	10.	12.	93.	80.	75.	56.	29.	2.	0.	0.	150.	140.	1.
10.	20000.	9.	14.	92.	79.	74.	56.	29.	2.	0.	0.	0.	0.	0.
11.	20000.	9.	12.	91.	78.	73.	56.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	9.	12.	89.	78.	74.	61.	29.	0.	0.	0.	0.	133.	1.
13.	20000.	9.	9.	85.	77.	74.	69.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	8.	11.	82.	76.	74.	76.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	9.	15.	81.	75.	73.	76.	29.	0.	0.	0.	0.	124.	1.
16.	20000.	9.	11.	80.	75.	73.	79.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	8.	10.	80.	75.	73.	79.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	9.	11.	79.	74.	72.	79.	29.	0.	0.	0.	0.	122.	1.
19.	20000.	9.	9.	78.	74.	72.	81.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	9.	13.	78.	74.	72.	81.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	9.	12.	77.	73.	72.	84.	29.	0.	0.	0.	0.	120.	1.
22.	20000.	9.	9.	76.	73.	72.	87.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	9.	10.	76.	73.	72.	87.	29.	3.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD [(a,b)]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
12.	1440.	13981.	1.	8.	12.									
0.	20000.	9.	11.	77.	73.	72.	84.	29.	5.	0.	0.	91.	126.	1.
1.	20000.	9.	17.	80.	75.	73.	79.	29.	1.	0.	0.	0.	0.	0.
2.	20000.	9.	19.	82.	76.	73.	74.	29.	1.	0.	0.	0.	0.	0.
3.	20000.	9.	20.	85.	77.	74.	69.	29.	3.	0.	0.	237.	132.	1.
4.	20000.	10.	21.	88.	78.	74.	63.	29.	7.	0.	0.	0.	0.	0.
5.	20000.	10.	18.	90.	78.	74.	60.	29.	10.	0.	0.	0.	0.	0.
6.	20000.	9.	23.	92.	79.	75.	57.	29.	8.	0.	0.	159.	145.	1.
7.	20000.	10.	24.	93.	79.	74.	54.	29.	7.	0.	0.	0.	0.	0.
8.	20000.	9.	17.	95.	80.	75.	53.	29.	2.	0.	0.	0.	0.	0.
9.	20000.	10.	23.	95.	80.	75.	53.	29.	1.	0.	0.	151.	140.	1.
10.	20000.	9.	17.	95.	81.	76.	54.	29.	1.	0.	0.	0.	0.	0.
11.	20000.	9.	17.	93.	79.	74.	54.	29.	6.	0.	0.	0.	0.	0.
12.	20000.	9.	11.	91.	79.	74.	57.	29.	10.	0.	0.	0.	145.	1.
13.	20000.	8.	9.	87.	78.	75.	68.	29.	10.	0.	0.	0.	0.	0.
14.	20000.	8.	13.	86.	77.	74.	67.	29.	7.	0.	0.	0.	0.	0.
15.	20000.	9.	14.	84.	78.	75.	74.	29.	7.	0.	0.	0.	136.	1.
16.	20000.	9.	15.	84.	76.	73.	69.	29.	6.	0.	0.	0.	0.	0.
17.	20000.	9.	13.	83.	75.	72.	69.	29.	3.	0.	0.	0.	0.	0.
18.	20000.	9.	10.	82.	75.	72.	71.	29.	2.	0.	0.	0.	127.	1.
19.	20000.	10.	11.	80.	74.	71.	74.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	9.	12.	81.	73.	70.	69.	29.	0.	0.	0.	0.	0.	0.
21.	15000.	10.	6.	79.	73.	70.	74.	29.	6.	0.	0.	0.	127.	1.
22.	20000.	15.	3.	77.	73.	71.	81.	29.	4.	0.	0.	0.	0.	0.
23.	20000.	13.	1.	76.	72.	70.	81.	29.	1.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
13.	1440.	13981.	1.	8.	13.									
0.	20000.	16.	2.	76.	71.	69.	79.	29.	8.	0.	0.	65.	126.	1.
1.	20000.	2.	5.	76.	71.	69.	79.	29.	10.	0.	0.	0.	0.	0.
2.	20000.	4.	3.	79.	72.	69.	71.	29.	10.	0.	0.	0.	0.	0.
3.	20000.	8.	2.	82.	74.	71.	69.	29.	10.	0.	0.	88.	135.	1.
4.	20000.	9.	9.	86.	76.	72.	63.	29.	10.	0.	0.	0.	0.	0.
5.	20000.	10.	3.	90.	79.	74.	60.	29.	10.	0.	0.	0.	0.	0.
6.	20000.	10.	5.	91.	78.	73.	56.	29.	8.	0.	0.	160.	143.	1.
7.	20000.	12.	2.	93.	78.	72.	51.	29.	6.	0.	0.	0.	0.	0.
8.	20000.	16.	3.	94.	80.	75.	54.	29.	4.	0.	0.	0.	0.	0.
9.	20000.	15.	2.	95.	81.	76.	54.	29.	4.	0.	0.	137.	145.	1.
10.	4000.	2.	5.	91.	80.	76.	61.	29.	6.	0.	0.	0.	0.	0.
11.	20000.	1.	7.	89.	79.	76.	65.	29.	4.	0.	0.	0.	0.	0.
12.	20000.	2.	6.	87.	79.	76.	70.	29.	2.	0.	0.	0.	134.	1.
13.	18000.	2.	4.	84.	77.	75.	74.	29.	9.	0.	0.	0.	0.	0.
14.	18000.	3.	5.	82.	77.	75.	79.	29.	9.	0.	0.	0.	0.	0.
15.	18000.	3.	3.	82.	77.	75.	79.	29.	9.	0.	0.	0.	136.	1.
16.	20000.	1.	4.	79.	76.	75.	87.	29.	4.	0.	0.	0.	0.	0.
17.	20000.	4.	3.	77.	72.	70.	79.	29.	7.	0.	0.	0.	0.	0.
18.	20000.	4.	6.	76.	73.	72.	87.	29.	10.	0.	0.	0.	130.	1.
19.	5500.	4.	5.	76.	74.	73.	90.	29.	10.	0.	0.	0.	0.	0.
20.	5500.	2.	7.	76.	74.	73.	90.	29.	10.	0.	36.	0.	0.	0.
21.	4600.	1.	9.	68.	68.	68.	100.	29.	10.	0.	34.	0.	121.	1.
22.	5500.	2.	3.	69.	69.	68.	97.	29.	10.	0.	1.	0.	0.	0.
23.	5500.	1.	6.	69.	68.	68.	97.	29.	10.	0.	0.	0.	0.	0.

WOLF CREEK

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
14.	1440.	13981.	1.	8.	14.									
0.	15000.	1.	2.	69.	69.	69.	100.	29.	10.	0.	0.	39.	122.	1.
1.	15000.	5.	2.	72.	70.	69.	90.	29.	10.	0.	0.	0.	0.	0.
2.	15000.	6.	2.	74.	70.	69.	84.	29.	10.	0.	0.	0.	0.	0.
3.	15000.	16.	4.	76.	72.	71.	84.	29.	10.	0.	0.	88.	129.	1.
4.	15000.	2.	9.	77.	73.	71.	81.	29.	10.	0.	0.	0.	0.	0.
5.	12000.	2.	9.	80.	73.	71.	74.	29.	10.	0.	0.	0.	0.	0.
6.	12000.	2.	9.	60.	74.	71.	74.	29.	10.	0.	0.	95.	133.	1.
7.	15000.	2.	9.	82.	74.	71.	69.	29.	10.	0.	0.	0.	0.	0.
8.	30000.	2.	7.	82.	74.	71.	69.	29.	10.	0.	0.	0.	0.	0.
9.	20000.	2.	12.	82.	74.	71.	69.	29.	8.	0.	0.	91.	133.	1.
10.	20000.	3.	7.	82.	73.	69.	65.	29.	8.	0.	0.	0.	0.	0.
11.	20000.	3.	3.	82.	72.	68.	63.	29.	9.	0.	0.	0.	0.	0.
12.	20000.	2.	3.	80.	72.	69.	69.	29.	9.	0.	0.	0.	131.	1.
13.	20000.	2.	2.	78.	73.	71.	79.	29.	10.	0.	0.	0.	0.	0.
14.	20000.	3.	3.	76.	72.	70.	81.	29.	10.	0.	0.	0.	0.	0.
15.	20000.	4.	3.	76.	72.	70.	81.	29.	10.	0.	0.	0.	129.	1.
16.	20000.	2.	3.	74.	71.	70.	87.	29.	10.	0.	0.	0.	0.	0.
17.	20000.	2.	4.	72.	70.	69.	90.	29.	6.	0.	0.	0.	0.	0.
18.	20000.	3.	3.	71.	69.	68.	90.	29.	10.	0.	0.	0.	124.	1.
19.	20000.	16.	3.	70.	69.	68.	93.	29.	2.	0.	0.	0.	0.	0.
20.	20000.	2.	2.	69.	68.	68.	97.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	2.	3.	68.	67.	67.	97.	29.	0.	0.	0.	0.	110.	1.
22.	20000.	3.	3.	68.	67.	67.	97.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	2.	3.	67.	67.	66.	97.	29.	0.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
15.	1440.	13981.	1.	8.	15.									
0.	20000.	3.	3.	68.	67.	67.	97.	29.	0.	0.	0.	109.	110.	1.
1.	20000.	2.	3.	71.	69.	68.	90.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	2.	7.	75.	71.	69.	81.	29.	0.	0.	0.	0.	0.	0.
3.	2500.	2.	4.	76.	71.	68.	76.	29.	6.	0.	0.	196.	124.	1.
4.	2500.	4.	4.	77.	70.	67.	71.	29.	7.	0.	0.	0.	0.	0.
5.	3000.	16.	3.	80.	71.	66.	62.	29.	9.	0.	0.	0.	0.	0.
6.	3000.	2.	4.	81.	71.	66.	60.	29.	8.	0.	0.	163.	130.	1.
7.	3000.	4.	3.	82.	72.	68.	63.	29.	8.	0.	0.	0.	0.	0.
8.	3000.	4.	3.	83.	73.	69.	63.	29.	8.	0.	0.	0.	0.	0.
9.	4000.	2.	8.	86.	71.	64.	48.	29.	7.	0.	0.	109.	133.	1.
10.	4000.	1.	4.	84.	72.	67.	56.	29.	6.	0.	0.	0.	0.	0.
11.	20000.	2.	3.	83.	72.	68.	61.	29.	4.	0.	0.	0.	0.	0.
12.	20000.	4.	3.	82.	71.	66.	58.	29.	7.	0.	0.	0.	129.	1.
13.	20000.	3.	2.	79.	72.	69.	71.	29.	7.	0.	0.	0.	0.	0.
14.	20000.	3.	2.	77.	71.	69.	76.	29.	6.	0.	0.	0.	0.	0.
15.	20000.	5.	2.	75.	71.	69.	81.	29.	4.	0.	0.	0.	121.	1.
16.	20000.	6.	3.	74.	70.	69.	84.	29.	1.	0.	0.	0.	0.	0.
17.	20000.	0.	0.	72.	70.	69.	90.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	3.	2.	71.	69.	69.	93.	29.	0.	0.	0.	0.	113.	1.
19.	20000.	0.	0.	69.	68.	68.	97.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	2.	2.	68.	68.	68.	100.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	2.	1.	67.	67.	67.	100.	29.	0.	0.	0.	0.	109.	1.
22.	20000.	2.	2.	66.	66.	66.	100.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	2.	1.	66.	65.	65.	97.	29.	0.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
16.	1440.	13981.	1.	8.	16.									
0.	20000.	1.	2.	69.	68.	67.	93.	29.	0.	0.	0.	109.	111.	1.
1.	20000.	1.	1.	74.	71.	70.	87.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	2.	3.	77.	72.	70.	79.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	4.	3.	78.	70.	67.	69.	29.	2.	0.	0.	250.	121.	1.
4.	20000.	9.	3.	82.	72.	68.	63.	29.	3.	0.	0.	0.	0.	0.
5.	20000.	10.	3.	85.	72.	66.	53.	29.	2.	0.	0.	0.	0.	0.
6.	20000.	13.	1.	85.	71.	64.	50.	29.	1.	0.	0.	276.	124.	1.
7.	20000.	10.	3.	89.	71.	63.	42.	29.	1.	0.	0.	0.	0.	0.
8.	20000.	12.	2.	88.	70.	62.	42.	29.	3.	0.	0.	0.	0.	0.
9.	20000.	4.	3.	88.	70.	61.	40.	29.	3.	0.	0.	150.	128.	1.
10.	20000.	3.	2.	87.	71.	62.	42.	29.	2.	0.	0.	0.	0.	0.
11.	20000.	15.	2.	89.	73.	65.	45.	29.	2.	0.	0.	0.	0.	0.
12.	20000.	15.	2.	86.	73.	68.	55.	29.	6.	0.	0.	0.	133.	1.
13.	20000.	0.	0.	83.	72.	67.	58.	29.	6.	0.	0.	0.	0.	0.
14.	20000.	0.	0.	80.	71.	67.	65.	29.	3.	0.	0.	0.	0.	0.
15.	20000.	15.	2.	77.	71.	69.	76.	29.	1.	0.	0.	0.	120.	1.
16.	20000.	15.	2.	75.	71.	69.	81.	29.	1.	0.	0.	0.	0.	0.
17.	20000.	0.	0.	73.	71.	69.	87.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	2.	2.	75.	70.	67.	76.	29.	8.	0.	0.	0.	124.	1.
19.	20000.	2.	1.	73.	70.	69.	87.	29.	2.	0.	0.	0.	0.	0.
20.	20000.	2.	1.	72.	69.	68.	87.	29.	1.	0.	0.	0.	0.	0.
21.	20000.	6.	1.	72.	70.	69.	90.	29.	3.	0.	0.	0.	117.	1.
22.	20000.	3.	2.	71.	69.	68.	90.	29.	4.	0.	0.	0.	0.	0.
23.	10000.	7.	3.	72.	69.	68.	87.	29.	9.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD [(a,b)]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
17.	1440.	13981.	1.	8.	17.									
0.	10000.	5.	3.	72.	70.	69.	90.	29.	10.	0.	0.	38.	125.	1.
1.	5000.	9.	9.	79.	73.	71.	76.	29.	10.	0.	0.	0.	0.	0.
2.	10000.	8.	2.	75.	73.	72.	90.	29.	9.	0.	0.	0.	0.	0.
3.	25000.	10.	3.	80.	75.	73.	79.	29.	7.	0.	0.	170.	131.	1.
4.	20000.	9.	6.	86.	78.	75.	69.	29.	5.	0.	0.	0.	0.	0.
5.	20000.	7.	4.	89.	78.	73.	59.	29.	4.	0.	0.	0.	0.	0.
6.	4000.	9.	9.	91.	78.	73.	56.	29.	6.	0.	0.	208.	141.	1.
7.	4000.	6.	7.	80.	70.	65.	60.	29.	10.	0.	0.	0.	0.	0.
8.	10000.	4.	4.	79.	71.	67.	67.	29.	10.	0.	0.	0.	0.	0.
9.	15000.	10.	13.	81.	74.	71.	71.	29.	10.	0.	0.	54.	134.	1.
10.	15000.	10.	9.	78.	71.	68.	71.	29.	8.	0.	0.	0.	0.	0.
11.	15000.	9.	10.	79.	72.	69.	71.	29.	8.	0.	0.	0.	0.	0.
12.	15000.	9.	7.	78.	72.	69.	74.	29.	7.	0.	0.	0.	127.	1.
13.	20000.	8.	4.	74.	71.	70.	87.	29.	8.	0.	0.	0.	0.	0.
14.	20000.	7.	2.	73.	70.	69.	87.	29.	7.	0.	0.	0.	0.	0.
15.	20000.	8.	5.	72.	70.	69.	90.	29.	4.	0.	0.	0.	119.	1.
16.	20000.	13.	2.	70.	70.	69.	97.	29.	1.	0.	0.	0.	0.	0.
17.	20000.	7.	4.	70.	69.	68.	93.	29.	1.	0.	0.	0.	0.	0.
18.	20000.	7.	3.	69.	69.	68.	97.	29.	0.	0.	0.	0.	111.	1.
19.	20000.	7.	3.	69.	68.	68.	97.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	7.	2.	68.	67.	67.	97.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	0.	0.	67.	66.	66.	97.	29.	0.	0.	0.	0.	109.	1.
22.	20000.	2.	2.	66.	66.	66.	100.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	9.	2.	66.	65.	65.	97.	29.	1.	0.	0.	0.	0.	0.

WOLF CREEK

A. WORST TEMPERATURE PERIOD [a,b]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
18.	1440.	13981.	1.	8.	18.									
0.	20000.	0.	0.	67.	66.	66.	97.	29.	1.	0.	0.	107.	110.	1.
1.	20000.	0.	0.	73.	69.	67.	81.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	8.	4.	78.	71.	68.	71.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	10.	3.	80.	72.	68.	67.	29.	7.	0.	0.	173.	129.	1.
4.	20000.	10.	3.	84.	74.	70.	63.	29.	10.	0.	0.	0.	0.	0.
5.	20000.	16.	3.	84.	74.	70.	63.	29.	10.	0.	0.	0.	0.	0.
6.	20000.	10.	3.	89.	76.	71.	55.	29.	10.	0.	0.	94.	142.	1.
7.	20000.	4.	2.	90.	74.	67.	47.	29.	10.	0.	0.	0.	0.	0.
8.	20000.	15.	2.	90.	75.	69.	50.	29.	10.	0.	0.	0.	0.	0.
9.	20000.	12.	3.	92.	76.	70.	49.	29.	10.	0.	0.	54.	145.	1.
10.	20000.	16.	3.	92.	76.	70.	49.	29.	8.	0.	0.	0.	0.	0.
11.	20000.	15.	2.	92.	76.	70.	49.	29.	5.	0.	0.	0.	0.	0.
12.	20000.	0.	0.	91.	76.	70.	50.	29.	5.	0.	0.	0.	138.	1.
13.	20000.	0.	0.	87.	77.	73.	63.	29.	7.	0.	0.	0.	0.	0.
14.	20000.	0.	0.	83.	76.	73.	71.	29.	8.	0.	0.	0.	0.	0.
15.	20000.	0.	0.	82.	75.	72.	71.	29.	8.	0.	0.	0.	133.	1.
16.	20000.	8.	4.	79.	76.	74.	84.	29.	5.	0.	0.	0.	0.	0.
17.	20000.	11.	3.	78.	73.	71.	79.	29.	5.	0.	0.	0.	0.	0.
18.	20000.	11.	3.	78.	73.	71.	79.	29.	5.	0.	0.	0.	126.	1.
19.	20000.	14.	3.	76.	73.	71.	84.	29.	7.	0.	0.	0.	0.	0.
20.	20000.	15.	2.	75.	72.	71.	87.	29.	5.	0.	0.	0.	0.	0.
21.	20000.	13.	2.	74.	72.	71.	90.	29.	3.	0.	0.	0.	120.	1.
22.	20000.	15.	2.	73.	71.	70.	90.	29.	2.	0.	0.	0.	0.	0.
23.	20000.	16.	3.	72.	71.	71.	97.	29.	2.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
19.	1440.	13981.	1.	8.	19.									
0.	20000.	2.	3.	73.	72.	71.	93.	29.	8.	0.	0.	62.	124.	1.
1.	20000.	1.	5.	77.	74.	73.	87.	29.	5.	0.	0.	0.	0.	0.
2.	20000.	4.	5.	81.	76.	74.	79.	29.	3.	0.	0.	0.	0.	0.
3.	20000.	3.	5.	83.	76.	74.	74.	29.	1.	0.	0.	245.	128.	1.
4.	20000.	2.	6.	86.	75.	71.	61.	29.	3.	0.	0.	0.	0.	0.
5.	20000.	4.	3.	88.	75.	70.	55.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	2.	4.	89.	74.	68.	50.	29.	7.	0.	0.	188.	137.	1.
7.	20000.	3.	9.	90.	73.	66.	45.	29.	9.	0.	0.	0.	0.	0.
8.	20000.	2.	7.	89.	74.	68.	50.	29.	9.	0.	0.	0.	0.	0.
9.	20000.	2.	9.	88.	75.	70.	55.	29.	9.	0.	0.	73.	140.	1.
10.	20000.	2.	6.	90.	75.	68.	49.	29.	8.	0.	0.	0.	0.	0.
11.	20000.	2.	4.	88.	75.	69.	53.	29.	10.	0.	0.	0.	0.	0.
12.	20000.	2.	4.	85.	74.	69.	59.	29.	10.	0.	0.	0.	138.	1.
13.	20000.	3.	2.	83.	74.	71.	67.	29.	8.	0.	0.	0.	0.	0.
14.	20000.	2.	4.	79.	73.	70.	74.	29.	8.	0.	0.	0.	0.	0.
15.	20000.	2.	2.	78.	73.	71.	79.	29.	7.	0.	0.	0.	128.	1.
16.	20000.	3.	4.	77.	73.	72.	84.	29.	4.	0.	0.	0.	0.	0.
17.	20000.	3.	5.	77.	74.	73.	87.	29.	3.	0.	0.	0.	0.	0.
18.	20000.	3.	5.	76.	74.	73.	90.	29.	3.	0.	0.	0.	123.	1.
19.	20000.	4.	6.	76.	74.	73.	90.	29.	2.	0.	0.	0.	0.	0.
20.	20000.	3.	5.	74.	73.	73.	97.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	4.	3.	74.	73.	72.	93.	29.	0.	0.	0.	0.	118.	1.
22.	20000.	3.	3.	72.	72.	72.	100.	29.	0.	0.	0.	0.	0.	0.
23.	300.	4.	5.	73.	72.	72.	97.	29.	10.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
20.	1440.	13981.	1.	8.	20.									
0.	300.	4.	3.	73.	73.	72.	97.	29.	10.	0.	0.	37.	127.	1.
1.	200.	4.	8.	73.	73.	73.	100.	29.	10.	0.	0.	0.	0.	0.
2.	500.	4.	5.	76.	73.	72.	87.	29.	10.	0.	0.	0.	0.	0.
3.	1200.	4.	5.	76.	74.	73.	90.	29.	10.	0.	0.	86.	130.	1.
4.	1100.	4.	4.	78.	75.	74.	87.	29.	10.	0.	0.	0.	0.	0.
5.	1700.	4.	3.	81.	76.	74.	79.	29.	10.	0.	0.	0.	0.	0.
6.	2000.	4.	6.	85.	77.	74.	69.	29.	8.	0.	0.	157.	137.	1.
7.	3000.	3.	3.	86.	76.	72.	63.	29.	6.	0.	0.	0.	0.	0.
8.	20000.	6.	5.	88.	76.	71.	57.	29.	5.	0.	0.	0.	0.	0.
9.	20000.	6.	2.	88.	77.	72.	59.	29.	1.	0.	0.	149.	131.	1.
10.	20000.	3.	3.	89.	77.	72.	57.	29.	1.	0.	0.	0.	0.	0.
11.	20000.	3.	3.	88.	76.	72.	59.	29.	1.	0.	0.	0.	0.	0.
12.	20000.	3.	2.	87.	76.	72.	61.	29.	1.	0.	0.	0.	130.	1.
13.	20000.	3.	2.	84.	76.	73.	69.	29.	3.	0.	0.	0.	0.	0.
14.	20000.	3.	3.	81.	76.	74.	79.	29.	8.	0.	0.	0.	0.	0.
15.	20000.	4.	3.	80.	75.	74.	82.	29.	4.	0.	0.	0.	129.	1.
16.	20000.	3.	3.	79.	75.	74.	84.	29.	1.	0.	0.	0.	0.	0.
17.	20000.	5.	4.	77.	75.	74.	90.	29.	1.	0.	0.	0.	0.	0.
18.	20000.	6.	5.	77.	75.	74.	90.	29.	0.	0.	0.	0.	121.	1.
19.	20000.	6.	3.	76.	74.	74.	94.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	6.	3.	75.	74.	73.	93.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	6.	3.	74.	73.	73.	97.	29.	0.	0.	0.	0.	118.	1.
22.	20000.	6.	4.	74.	73.	73.	97.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	7.	2.	73.	72.	72.	97.	29.	0.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD [a,b]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
21.	1440.	13981.	1.	8.	21.									
0.	20000.	8.	4.	74.	73.	72.	93.	29.	0.	0.	0.	103.	118.	1.
1.	20000.	9.	4.	78.	74.	73.	84.	29.	1.	0.	0.	0.	0.	0.
2.	20000.	10.	8.	83.	76.	73.	71.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	9.	9.	86.	76.	73.	65.	29.	8.	0.	0.	145.	138.	1.
4.	20000.	10.	10.	89.	77.	73.	59.	29.	8.	0.	0.	0.	0.	0.
5.	20000.	10.	7.	90.	77.	72.	56.	29.	5.	0.	0.	0.	0.	0.
6.	20000.	10.	7.	93.	77.	71.	49.	29.	5.	0.	0.	228.	141.	1.
7.	20000.	10.	8.	94.	76.	69.	44.	29.	2.	0.	0.	0.	0.	0.
8.	20000.	12.	3.	95.	77.	69.	42.	29.	2.	0.	0.	0.	0.	0.
9.	20000.	12.	6.	97.	75.	67.	37.	29.	2.	0.	0.	150.	138.	1.
10.	20000.	15.	2.	95.	77.	71.	46.	29.	2.	0.	0.	0.	0.	0.
11.	20000.	16.	5.	92.	78.	72.	52.	29.	3.	0.	0.	0.	0.	0.
12.	20000.	10.	2.	91.	78.	73.	56.	29.	4.	0.	0.	0.	139.	1.
13.	20000.	10.	3.	87.	78.	74.	65.	29.	7.	0.	0.	0.	0.	0.
14.	20000.	10.	5.	85.	78.	75.	72.	29.	7.	0.	0.	0.	0.	0.
15.	20000.	12.	3.	84.	76.	73.	69.	29.	6.	0.	0.	0.	134.	1.
16.	20000.	10.	3.	81.	75.	73.	76.	29.	2.	0.	0.	0.	0.	0.
17.	20000.	9.	4.	80.	75.	73.	79.	29.	2.	0.	0.	0.	0.	0.
18.	20000.	11.	3.	79.	75.	73.	81.	29.	1.	0.	0.	0.	123.	1.
19.	20000.	13.	3.	79.	74.	72.	79.	29.	1.	0.	0.	0.	0.	0.
20.	5000.	12.	3.	79.	74.	73.	81.	29.	7.	0.	0.	0.	0.	0.
21.	5000.	14.	3.	79.	75.	73.	81.	29.	7.	0.	4.	0.	130.	1.
22.	5000.	13.	3.	78.	75.	74.	87.	29.	10.	0.	1.	0.	0.	0.
23.	20000.	13.	1.	76.	75.	74.	94.	29.	10.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
22.	1440.	13981.	1.	8.	22.									
0.	5000.	14.	2.	77.	75.	74.	90.	29.	10.	0.	0.	36.	131.	1.
1.	7500.	15.	3.	79.	74.	72.	79.	29.	10.	0.	0.	0.	0.	0.
2.	7500.	15.	5.	80.	73.	70.	71.	29.	10.	0.	0.	0.	0.	0.
3.	7500.	2.	2.	79.	75.	74.	84.	29.	10.	0.	0.	85.	133.	1.
4.	7500.	2.	3.	81.	74.	72.	74.	29.	10.	0.	0.	0.	0.	0.
5.	20000.	6.	2.	88.	76.	71.	57.	29.	7.	0.	0.	0.	0.	0.
6.	20000.	10.	2.	90.	74.	67.	47.	29.	8.	0.	0.	160.	139.	1.
7.	25000.	16.	1.	89.	75.	69.	52.	29.	8.	0.	0.	0.	0.	0.
8.	20000.	16.	2.	91.	74.	67.	45.	29.	4.	0.	0.	0.	0.	0.
9.	20000.	16.	8.	92.	75.	67.	44.	29.	2.	0.	0.	149.	134.	1.
10.	20000.	1.	6.	89.	73.	67.	48.	29.	2.	0.	0.	0.	0.	0.
11.	20000.	1.	5.	88.	73.	66.	48.	29.	3.	0.	0.	0.	0.	0.
12.	20000.	2.	6.	86.	72.	66.	51.	29.	3.	0.	0.	0.	129.	1.
13.	20000.	2.	5.	81.	71.	67.	63.	29.	6.	0.	0.	0.	0.	0.
14.	20000.	3.	4.	78.	70.	66.	66.	29.	6.	0.	0.	0.	0.	0.
15.	20000.	4.	3.	76.	67.	62.	62.	29.	3.	0.	0.	0.	118.	1.
16.	20000.	3.	4.	74.	68.	66.	76.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	3.	3.	72.	68.	66.	81.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	2.	2.	70.	67.	66.	87.	29.	0.	0.	0.	0.	111.	1.
19.	20000.	3.	2.	69.	66.	65.	87.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	0.	0.	68.	66.	65.	90.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	4.	2.	67.	65.	64.	90.	29.	0.	0.	0.	0.	108.	1.
22.	20000.	4.	2.	66.	64.	64.	93.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	4.	3.	66.	65.	64.	93.	29.	0.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
23.	1440.	13981.	1.	8.	23.									
0.	20000.	0.	0.	68.	66.	64.	87.	29.	0.	0.	0.	105.	109.	1.
1.	20000.	2.	3.	73.	69.	67.	81.	29.	1.	0.	0.	0.	0.	0.
2.	20000.	4.	3.	79.	71.	67.	67.	29.	7.	0.	0.	0.	0.	0.
3.	20000.	5.	1.	83.	71.	65.	55.	29.	8.	0.	0.	148.	131.	1.
4.	20000.	0.	0.	85.	71.	64.	50.	29.	9.	0.	0.	0.	0.	0.
5.	20000.	0.	0.	86.	70.	62.	45.	29.	9.	0.	0.	0.	0.	0.
6.	20000.	0.	0.	86.	71.	63.	46.	29.	8.	0.	0.	162.	133.	1.
7.	20000.	4.	3.	87.	71.	63.	45.	29.	8.	0.	0.	0.	0.	0.
8.	20000.	15.	3.	90.	72.	64.	42.	29.	9.	0.	0.	0.	0.	0.
9.	20000.	8.	3.	89.	72.	64.	43.	29.	9.	0.	0.	73.	138.	1.
10.	20000.	5.	3.	87.	71.	64.	46.	29.	8.	0.	0.	0.	0.	0.
11.	20000.	5.	3.	85.	71.	64.	50.	29.	8.	0.	0.	0.	0.	0.
12.	20000.	3.	3.	84.	73.	68.	58.	29.	7.	0.	0.	0.	132.	1.
13.	20000.	5.	3.	82.	72.	68.	63.	29.	7.	0.	0.	0.	0.	0.
14.	20000.	5.	3.	79.	70.	66.	64.	29.	3.	0.	0.	0.	0.	0.
15.	20000.	5.	3.	77.	70.	67.	71.	29.	2.	0.	0.	0.	120.	1.
16.	20000.	7.	2.	74.	69.	67.	79.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	7.	3.	74.	69.	67.	79.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	7.	4.	71.	68.	66.	84.	29.	0.	0.	0.	0.	112.	1.
19.	20000.	7.	2.	70.	68.	66.	87.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	7.	3.	68.	65.	64.	87.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	0.	0.	66.	65.	64.	93.	29.	0.	0.	0.	0.	107.	1.
22.	20000.	0.	0.	66.	65.	64.	93.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	0.	0.	66.	65.	65.	97.	29.	2.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
24.	1440.	13981.	1.	8.	24.									
0.	20000.	7.	2.	69.	66.	64.	84.	29.	7.	0.	0.	72.	117.	1.
1.	15000.	8.	3.	72.	69.	68.	87.	29.	8.	0.	0.	0.	0.	0.
2.	20000.	9.	5.	77.	73.	71.	81.	29.	2.	0.	0.	0.	0.	0.
3.	20000.	9.	8.	85.	75.	71.	63.	29.	7.	0.	0.	169.	135.	1.
4.	20000.	9.	6.	88.	77.	72.	59.	29.	8.	0.	0.	0.	0.	0.
5.	20000.	9.	3.	91.	77.	72.	54.	29.	6.	0.	0.	0.	0.	0.
6.	20000.	9.	10.	94.	79.	74.	52.	29.	4.	0.	0.	240.	142.	1.
7.	20000.	9.	7.	95.	77.	70.	44.	29.	3.	0.	0.	0.	0.	0.
8.	20000.	10.	6.	97.	76.	68.	39.	29.	4.	0.	0.	0.	0.	0.
9.	20000.	9.	5.	96.	76.	67.	39.	29.	4.	0.	0.	136.	140.	1.
10.	20000.	9.	6.	96.	78.	71.	45.	29.	4.	0.	0.	0.	0.	0.
11.	20000.	9.	7.	94.	78.	71.	47.	29.	4.	0.	0.	0.	0.	0.
12.	20000.	9.	7.	90.	78.	73.	57.	29.	3.	0.	0.	0.	136.	1.
13.	20000.	9.	5.	87.	76.	72.	61.	29.	3.	0.	0.	0.	0.	0.
14.	20000.	9.	3.	85.	76.	73.	67.	29.	2.	0.	0.	0.	0.	0.
15.	20000.	9.	5.	82.	76.	73.	74.	29.	2.	0.	0.	0.	128.	1.
16.	20000.	9.	5.	81.	75.	73.	76.	29.	3.	0.	0.	0.	0.	0.
17.	20000.	9.	5.	80.	74.	72.	76.	29.	2.	0.	0.	0.	0.	0.
18.	20000.	9.	4.	78.	73.	71.	79.	29.	2.	0.	0.	0.	123.	1.
19.	20000.	9.	7.	78.	73.	71.	79.	29.	2.	0.	0.	0.	0.	0.
20.	20000.	9.	7.	78.	73.	72.	81.	29.	1.	0.	0.	0.	0.	0.
21.	20000.	9.	5.	77.	73.	72.	84.	29.	3.	0.	0.	0.	123.	1.
22.	20000.	9.	2.	76.	73.	72.	87.	29.	2.	0.	0.	0.	0.	0.
23.	20000.	10.	2.	74.	72.	71.	90.	29.	5.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
25.	1440.	13981.	1.	8.	25.									
0.	25000.	2.	8.	75.	73.	72.	90.	29.	8.	0.	0.	60.	126.	1.
1.	20000.	3.	7.	79.	75.	73.	81.	29.	8.	0.	0.	0.	0.	0.
2.	20000.	5.	6.	84.	76.	73.	69.	29.	8.	0.	0.	0.	0.	0.
3.	20000.	4.	9.	84.	77.	74.	72.	29.	8.	0.	0.	143.	136.	1.
4.	20000.	4.	13.	84.	76.	73.	69.	29.	8.	0.	0.	0.	0.	0.
5.	20000.	3.	13.	84.	74.	71.	65.	29.	10.	0.	0.	0.	0.	0.
6.	20000.	4.	12.	88.	76.	72.	59.	29.	9.	0.	0.	127.	140.	1.
7.	20000.	2.	9.	89.	77.	73.	59.	29.	5.	0.	0.	0.	0.	0.
8.	20000.	4.	10.	90.	77.	73.	57.	29.	3.	0.	0.	0.	0.	0.
9.	15000.	3.	9.	90.	78.	74.	60.	29.	8.	0.	0.	86.	142.	1.
10.	12000.	3.	7.	89.	78.	74.	61.	29.	8.	0.	0.	0.	0.	0.
11.	8000.	3.	11.	84.	77.	74.	72.	29.	8.	0.	0.	0.	0.	0.
12.	20000.	2.	13.	82.	75.	73.	74.	29.	4.	0.	0.	0.	130.	1.
13.	20000.	2.	9.	80.	73.	70.	71.	29.	4.	0.	0.	0.	0.	0.
14.	20000.	3.	6.	77.	72.	69.	76.	29.	2.	0.	0.	0.	0.	0.
15.	20000.	3.	8.	77.	70.	67.	71.	29.	2.	0.	0.	0.	120.	1.
16.	20000.	3.	9.	76.	68.	64.	66.	29.	2.	0.	0.	0.	0.	0.
17.	20000.	4.	7.	75.	67.	63.	66.	29.	2.	0.	0.	0.	0.	0.
18.	20000.	3.	9.	74.	66.	62.	66.	29.	2.	0.	0.	0.	115.	1.
19.	20000.	3.	4.	73.	65.	61.	66.	29.	2.	0.	0.	0.	0.	0.
20.	20000.	3.	3.	72.	65.	61.	68.	29.	2.	0.	0.	0.	0.	0.
21.	20000.	3.	4.	72.	65.	61.	68.	29.	4.	0.	0.	0.	115.	1.
22.	25000.	3.	3.	72.	64.	60.	66.	29.	8.	0.	0.	0.	0.	0.
23.	5000.	3.	4.	72.	64.	60.	66.	29.	10.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
26.	1440.	13981.	1.	8.	26.									
0.	12000.	3.	5.	72.	55.	61.	68.	29.	8.	0.	0.	62.	120.	1.
1.	12000.	5.	6.	74.	65.	61.	64.	29.	7.	0.	0.	0.	0.	0.
2.	25000.	4.	7.	77.	67.	61.	57.	29.	7.	0.	0.	0.	0.	0.
3.	20000.	5.	9.	80.	69.	63.	56.	29.	4.	0.	0.	228.	123.	1.
4.	20000.	4.	9.	83.	70.	64.	53.	29.	3.	0.	0.	0.	0.	0.
5.	20000.	4.	11.	84.	71.	64.	51.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	6.	5.	86.	71.	65.	50.	29.	0.	0.	0.	273.	125.	1.
7.	20000.	5.	9.	87.	70.	63.	45.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	4.	6.	89.	71.	63.	42.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	4.	9.	89.	72.	64.	43.	29.	3.	0.	0.	143.	131.	1.
10.	20000.	5.	6.	88.	73.	66.	48.	29.	7.	0.	0.	0.	0.	0.
11.	20000.	6.	5.	87.	73.	67.	52.	29.	7.	0.	0.	0.	0.	0.
12.	20000.	4.	4.	86.	72.	66.	51.	29.	3.	0.	0.	0.	129.	1.
13.	20000.	5.	6.	82.	71.	67.	60.	29.	3.	0.	0.	0.	0.	0.
14.	20000.	5.	5.	80.	71.	67.	65.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	4.	8.	78.	70.	66.	66.	29.	0.	0.	0.	0.	118.	1.
16.	20000.	5.	4.	75.	68.	65.	71.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	5.	6.	74.	67.	64.	71.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	5.	7.	73.	67.	64.	73.	29.	0.	0.	0.	0.	113.	1.
19.	20000.	5.	6.	72.	68.	66.	81.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	5.	5.	71.	68.	67.	87.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	6.	6.	71.	68.	67.	87.	29.	0.	0.	0.	0.	112.	1.
22.	20000.	6.	9.	71.	68.	67.	87.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	7.	6.	70.	68.	68.	93.	29.	0.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD [a,b]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
27.	1440.	13981.	1.	8.	27.									
0.	20000.	8.	9.	71.	69.	68.	90.	29.	0.	0.	0.	101.	113.	1.
1.	20000.	8.	12.	76.	72.	70.	81.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	9.	14.	79.	73.	71.	76.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	9.	11.	83.	75.	72.	69.	29.	0.	0.	0.	244.	126.	1.
4.	20000.	9.	12.	86.	77.	74.	67.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	9.	9.	89.	78.	74.	61.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	9.	12.	90.	79.	75.	61.	29.	0.	0.	0.	263.	134.	1.
7.	20000.	10.	15.	93.	80.	76.	58.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	9.	13.	94.	80.	75.	54.	29.	0.	0.	0.	0.	0.	0.

*TM*046426* QUE PASA? -JKL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
9.	20000.	9.	14.	95.	81.	76.	54.	29.	0.	0.	0.	143.	140.	1.
10.	20000.	10.	14.	95.	81.	76.	54.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	8.	15.	93.	81.	76.	58.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	9.	7.	91.	80.	76.	61.	29.	0.	0.	0.	0.	136.	1.
13.	20000.	8.	11.	87.	79.	76.	70.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	8.	10.	86.	77.	74.	67.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	9.	12.	84.	77.	75.	74.	29.	0.	0.	0.	0.	127.	1.
16.	20000.	9.	13.	83.	77.	75.	76.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	9.	13.	82.	76.	74.	76.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	9.	12.	82.	76.	73.	74.	29.	0.	0.	0.	0.	125.	1.
19.	20000.	9.	10.	80.	75.	73.	79.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	9.	9.	80.	75.	73.	79.	29.	2.	0.	0.	0.	0.	0.
21.	20000.	9.	13.	80.	75.	73.	79.	29.	1.	0.	0.	0.	125.	1.
22.	20000.	10.	15.	79.	75.	73.	81.	29.	4.	0.	0.	0.	0.	0.
23.	10000.	9.	9.	79.	75.	73.	81.	29.	6.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD [a,b]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
28.	1440.	13981.	1.	8.	28.									
0.	20000.	10.	10.	79.	75.	74.	84.	29.	3.	0.	0.	92.	126.	1.
1.	20000.	9.	13.	80.	75.	73.	79.	29.	2.	0.	0.	0.	0.	0.
2.	20000.	10.	15.	83.	76.	74.	74.	29.	4.	0.	0.	0.	0.	0.
3.	20000.	10.	17.	88.	77.	73.	61.	29.	1.	0.	0.	241.	132.	1.
4.	20000.	12.	11.	92.	78.	73.	54.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	12.	13.	95.	79.	73.	49.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	12.	6.	98.	80.	73.	45.	29.	0.	0.	0.	264.	141.	1.
7.	20000.	13.	8.	101.	80.	73.	41.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	15.	4.	101.	79.	72.	40.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	13.	3.	103.	81.	73.	39.	29.	0.	0.	0.	144.	146.	1.
10.	20000.	16.	3.	101.	80.	73.	41.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	2.	2.	101.	80.	72.	40.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	2.	3.	98.	80.	74.	46.	29.	0.	0.	0.	0.	141.	1.
13.	20000.	5.	3.	94.	80.	75.	54.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	3.	5.	88.	79.	76.	68.	29.	2.	0.	0.	0.	0.	0.
15.	20000.	3.	6.	87.	79.	76.	70.	29.	2.	0.	0.	0.	134.	1.
16.	20000.	4.	5.	87.	78.	75.	68.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	4.	3.	86.	78.	75.	69.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	5.	3.	86.	78.	75.	69.	29.	0.	0.	0.	0.	130.	1.
19.	20000.	5.	3.	84.	78.	76.	77.	29.	0.	0.	14.	0.	0.	0.
20.	20000.	2.	3.	84.	79.	77.	79.	29.	1.	0.	0.	0.	0.	0.
21.	15000.	16.	17.	82.	78.	77.	85.	29.	8.	0.	36.	0.	136.	1.
22.	15000.	2.	10.	75.	71.	69.	81.	29.	10.	0.	0.	0.	0.	0.
23.	10000.	2.	3.	74.	70.	69.	84.	29.	10.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
29.	1440.	13981.	1.	8.	29.									
0.	8000.	5.	2.	74.	71.	70.	87.	29.	10.	0.	0.	35.	127.	1.
1.	9000.	7.	8.	75.	71.	69.	81.	29.	10.	0.	0.	0.	0.	0.
2.	7500.	6.	13.	75.	71.	69.	81.	29.	10.	0.	0.	0.	0.	0.
3.	8000.	8.	9.	77.	70.	67.	71.	29.	10.	0.	0.	86.	129.	1.
4.	10000.	6.	10.	84.	74.	70.	63.	29.	9.	0.	0.	0.	0.	0.
5.	12000.	6.	9.	87.	74.	69.	55.	29.	8.	0.	0.	0.	0.	0.
6.	12000.	8.	12.	90.	77.	72.	56.	29.	6.	0.	0.	204.	139.	1.
7.	10000.	9.	10.	92.	77.	71.	51.	29.	10.	0.	0.	0.	0.	0.
8.	10000.	9.	10.	91.	77.	72.	54.	29.	8.	0.	0.	0.	0.	0.
9.	30000.	10.	7.	93.	77.	71.	49.	29.	7.	0.	0.	100.	143.	1.
10.	20000.	9.	5.	95.	77.	71.	46.	29.	8.	0.	0.	0.	0.	0.
11.	20000.	9.	4.	96.	78.	71.	45.	29.	7.	0.	0.	0.	0.	0.
12.	20000.	7.	3.	93.	80.	75.	56.	29.	4.	0.	0.	0.	142.	1.
13.	20000.	5.	3.	89.	77.	73.	59.	29.	2.	0.	0.	0.	0.	0.
14.	20000.	5.	3.	84.	77.	75.	74.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	5.	4.	84.	77.	74.	72.	29.	0.	0.	0.	0.	128.	1.
16.	20000.	7.	4.	82.	77.	75.	79.	29.	7.	0.	0.	0.	0.	0.
17.	10000.	8.	4.	82.	77.	75.	79.	29.	10.	0.	0.	0.	0.	0.
18.	15000.	1.	3.	82.	76.	74.	76.	29.	10.	0.	0.	0.	136.	1.
19.	12000.	12.	3.	79.	72.	69.	71.	29.	10.	0.	2.	0.	0.	0.
20.	12000.	14.	4.	78.	72.	69.	74.	29.	10.	0.	7.	0.	0.	0.
21.	12000.	16.	10.	75.	72.	71.	87.	29.	10.	0.	6.	0.	128.	1.
22.	12000.	10.	9.	75.	70.	68.	79.	29.	10.	0.	1.	0.	0.	0.
23.	12000.	16.	2.	73.	72.	71.	93.	29.	10.	0.	4.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
30.	1440.	13981.	1.	8.	30.									
0.	12000.	14.	7.	73.	70.	69.	87.	29.	10.	0.	5.	35.	126.	1.
1.	8000.	8.	10.	72.	70.	69.	90.	29.	10.	0.	0.	0.	0.	0.
2.	8000.	1.	3.	73.	70.	69.	87.	29.	10.	0.	0.	0.	0.	0.
3.	16000.	1.	10.	77.	73.	71.	81.	29.	10.	0.	0.	85.	130.	1.
4.	20000.	14.	8.	82.	75.	71.	67.	29.	7.	0.	0.	0.	0.	0.
5.	20000.	12.	6.	86.	75.	70.	59.	29.	3.	0.	0.	0.	0.	0.
6.	20000.	13.	3.	88.	76.	71.	57.	29.	2.	0.	0.	261.	132.	1.
7.	20000.	13.	4.	91.	78.	73.	56.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	14.	6.	91.	76.	70.	50.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	13.	3.	94.	77.	70.	46.	29.	0.	0.	0.	145.	135.	1.
10.	20000.	12.	2.	93.	77.	71.	49.	29.	1.	0.	0.	0.	0.	0.
11.	20000.	3.	1.	91.	76.	70.	50.	29.	1.	0.	0.	0.	0.	0.
12.	20000.	7.	2.	93.	78.	72.	51.	29.	0.	0.	0.	0.	135.	1.
13.	20000.	5.	3.	85.	77.	74.	69.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	7.	4.	81.	77.	75.	82.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	5.	3.	80.	76.	74.	82.	29.	0.	0.	0.	0.	124.	1.
16.	20000.	5.	3.	79.	76.	75.	87.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	5.	3.	79.	76.	75.	87.	29.	1.	0.	0.	0.	0.	0.
18.	4500.	2.	6.	78.	76.	75.	90.	29.	6.	0.	0.	0.	129.	1.
19.	3000.	15.	16.	79.	75.	74.	84.	29.	10.	0.	99.	0.	0.	0.
20.	1200.	15.	12.	68.	68.	68.	100.	29.	10.	0.	28.	0.	0.	0.
21.	7000.	2.	4.	67.	67.	67.	100.	29.	10.	0.	13.	0.	120.	1.
22.	1700.	2.	4.	66.	66.	66.	100.	29.	10.	0.	15.	0.	0.	0.
23.	6000.	9.	3.	68.	67.	67.	97.	29.	10.	0.	4.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
31.	1440.	13981.	1.	8.	31.									
0.	6000.	9.	4.	68.	67.	67.	97.	29.	10.	0.	3.	35.	121.	1.
1.	4500.	6.	8.	68.	67.	67.	97.	29.	10.	0.	10.	0.	0.	0.
2.	3000.	7.	7.	68.	68.	67.	97.	29.	10.	0.	0.	0.	0.	0.
3.	7000.	3.	3.	73.	70.	68.	84.	29.	8.	0.	0.	144.	123.	1.
4.	1200.	8.	5.	75.	70.	68.	79.	29.	10.	0.	0.	0.	0.	0.
5.	1100.	11.	6.	77.	71.	68.	74.	29.	9.	0.	0.	0.	0.	0.
6.	1500.	13.	9.	80.	72.	69.	69.	29.	6.	0.	0.	205.	128.	1.
7.	7000.	16.	6.	80.	72.	69.	69.	29.	10.	0.	0.	0.	0.	0.
8.	1500.	14.	10.	83.	72.	68.	61.	29.	8.	0.	0.	0.	0.	0.
9.	20000.	15.	7.	83.	72.	67.	58.	29.	8.	0.	0.	86.	132.	1.
10.	20000.	1.	9.	82.	72.	68.	63.	29.	1.	0.	0.	0.	0.	0.
11.	20000.	2.	3.	81.	73.	69.	67.	29.	3.	0.	0.	0.	0.	0.
12.	20000.	2.	3.	81.	73.	70.	69.	29.	6.	0.	0.	0.	129.	1.
13.	20000.	2.	2.	77.	72.	70.	79.	29.	5.	0.	0.	0.	0.	0.
14.	20000.	4.	3.	74.	71.	69.	84.	29.	2.	0.	0.	0.	0.	0.
15.	20000.	4.	2.	73.	71.	70.	90.	29.	1.	0.	0.	0.	117.	1.
16.	20000.	5.	3.	72.	71.	70.	93.	29.	7.	0.	0.	0.	0.	0.
17.	20000.	4.	2.	72.	71.	70.	93.	29.	2.	0.	0.	0.	0.	0.
18.	20000.	4.	4.	71.	70.	70.	97.	29.	1.	0.	0.	0.	115.	1.
19.	20000.	6.	3.	71.	70.	70.	97.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	2.	3.	70.	69.	69.	97.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	2.	3.	70.	69.	69.	97.	29.	2.	0.	0.	0.	115.	1.
22.	20000.	2.	2.	70.	69.	69.	97.	29.	2.	0.	0.	0.	0.	0.
23.	200.	2.	3.	69.	69.	69.	100.	29.	10.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
32.	1440.	13981.	1.	9.	1.									
0.	200.	3.	2.	69.	69.	69.	100.	29.	10.	0.	0.	35.	122.	1.
1.	600.	2.	3.	70.	70.	70.	100.	29.	10.	0.	0.	0.	0.	0.
2.	200.	7.	2.	72.	71.	70.	93.	29.	10.	0.	0.	0.	0.	0.
3.	500.	6.	1.	74.	72.	70.	87.	29.	10.	0.	0.	85.	127.	1.
4.	20000.	3.	2.	79.	74.	72.	79.	29.	5.	0.	0.	0.	0.	0.
5.	20000.	16.	3.	82.	74.	70.	67.	29.	4.	0.	0.	0.	0.	0.
6.	20000.	16.	3.	86.	75.	71.	61.	29.	4.	0.	0.	239.	133.	1.
7.	20000.	2.	6.	85.	75.	70.	61.	29.	5.	0.	0.	0.	0.	0.
8.	20000.	4.	6.	85.	74.	70.	61.	29.	8.	0.	0.	0.	0.	0.
9.	15000.	4.	6.	84.	74.	70.	63.	29.	10.	0.	0.	51.	137.	1.
10.	3800.	8.	1.	83.	74.	70.	65.	29.	10.	0.	0.	0.	0.	0.
11.	3500.	9.	4.	81.	74.	71.	71.	29.	10.	0.	0.	0.	0.	0.
12.	4000.	10.	10.	72.	69.	67.	84.	29.	10.	0.	0.	0.	124.	1.
13.	4000.	7.	3.	70.	68.	67.	90.	29.	10.	0.	0.	0.	0.	0.
14.	15000.	14.	1.	71.	68.	67.	87.	29.	10.	0.	0.	0.	0.	0.
15.	15000.	16.	2.	70.	69.	68.	93.	29.	10.	0.	0.	0.	123.	1.
16.	15000.	14.	5.	70.	68.	67.	90.	29.	10.	0.	0.	0.	0.	0.
17.	15000.	16.	3.	70.	65.	63.	78.	29.	10.	0.	0.	0.	0.	0.
18.	15000.	16.	6.	70.	66.	63.	78.	29.	10.	0.	0.	0.	121.	1.
19.	15000.	4.	2.	69.	66.	64.	84.	29.	10.	0.	0.	0.	0.	0.
20.	15000.	7.	2.	69.	66.	64.	84.	29.	7.	0.	0.	0.	0.	0.
21.	15000.	16.	2.	68.	66.	65.	90.	29.	8.	0.	0.	0.	117.	1.
22.	15000.	10.	2.	67.	66.	65.	93.	29.	7.	0.	0.	0.	0.	0.
23.	12000.	15.	2.	67.	65.	64.	90.	29.	7.	0.	0.	0.	0.	0.

TABLE 2.3-9 (continued)

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
33.	1440.	13981.	1.	9.	2.									
0.	5000.	13.	3.	67.	65.	64.	90.	29.	8.	0.	0.	58.	116.	1.
1.	5000.	15.	3.	68.	66.	65.	90.	29.	8.	0.	0.	0.	0.	0.
2.	5000.	1.	3.	70.	68.	66.	87.	29.	10.	0.	0.	0.	0.	0.
3.	15000.	1.	4.	75.	70.	68.	79.	29.	8.	0.	34.	143.	125.	1.
4.	20000.	2.	7.	77.	71.	69.	76.	29.	7.	0.	5.	0.	0.	0.
5.	20000.	16.	3.	81.	73.	70.	69.	29.	8.	0.	0.	0.	0.	0.
6.	15000.	2.	6.	82.	73.	69.	65.	29.	8.	0.	0.	156.	132.	1.
7.	15000.	3.	3.	84.	73.	69.	61.	29.	7.	0.	0.	0.	0.	0.
8.	15000.	3.	2.	86.	74.	69.	57.	29.	7.	0.	0.	0.	0.	0.
9.	15000.	1.	2.	85.	73.	68.	57.	29.	6.	0.	0.	111.	132.	1.
10.	20000.	4.	1.	85.	72.	67.	55.	29.	3.	0.	0.	0.	0.	0.
11.	20000.	2.	3.	85.	73.	68.	57.	29.	2.	0.	0.	0.	0.	0.
12.	20000.	6.	6.	82.	72.	68.	63.	29.	4.	0.	0.	0.	127.	1.
13.	20000.	4.	6.	73.	66.	63.	70.	29.	3.	0.	0.	0.	0.	0.
14.	20000.	0.	0.	72.	66.	64.	76.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	0.	0.	71.	67.	66.	84.	29.	0.	0.	0.	0.	112.	1.
16.	20000.	5.	2.	70.	66.	64.	81.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	2.	2.	68.	66.	64.	87.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	2.	2.	67.	66.	65.	93.	29.	0.	0.	0.	0.	108.	1.
19.	20000.	7.	2.	67.	66.	65.	93.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	0.	0.	66.	65.	65.	97.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	1.	2.	65.	65.	65.	100.	29.	0.	0.	0.	0.	107.	1.
22.	20000.	16.	2.	65.	64.	64.	97.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	1.	2.	64.	64.	64.	100.	29.	0.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD [a,b]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
34.	1440.	13981.	1.	9.	3.									
0.	20000.	3.	2.	65.	65.	64.	97.	29.	0.	0.	0.	97.	106.	1.
1.	20000.	5.	5.	70.	67.	66.	87.	29.	0.	0.	0.	0.	0.	0.
2.	20000.	7.	3.	73.	68.	66.	78.	29.	0.	0.	0.	0.	0.	0.
3.	20000.	7.	3.	79.	70.	67.	67.	29.	0.	0.	0.	244.	120.	1.
4.	20000.	8.	4.	80.	70.	66.	62.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	7.	2.	83.	70.	64.	53.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	8.	4.	86.	73.	67.	53.	29.	0.	0.	0.	266.	126.	1.
7.	20000.	8.	6.	87.	72.	66.	50.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	8.	9.	88.	73.	67.	50.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	7.	8.	88.	74.	68.	52.	29.	2.	0.	0.	139.	131.	1.
10.	20000.	8.	5.	89.	73.	66.	47.	29.	6.	0.	0.	0.	0.	0.
11.	20000.	9.	6.	87.	73.	67.	52.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	8.	4.	86.	74.	69.	57.	29.	0.	0.	0.	0.	127.	1.
13.	20000.	9.	5.	79.	73.	70.	74.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	7.	4.	76.	71.	69.	79.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	8.	3.	75.	70.	67.	76.	29.	0.	0.	0.	0.	116.	1.
16.	20000.	8.	3.	74.	69.	67.	79.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	8.	8.	73.	69.	67.	81.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	7.	6.	72.	70.	69.	90.	29.	0.	0.	0.	0.	114.	1.
19.	20000.	8.	5.	71.	69.	68.	90.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	7.	3.	71.	69.	68.	90.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	8.	6.	70.	69.	68.	93.	29.	0.	0.	0.	0.	112.	1.
22.	6000.	16.	22.	68.	65.	63.	83.	29.	8.	0.	0.	0.	0.	0.
23.	3500.	2.	12.	65.	64.	63.	93.	29.	10.	0.	2.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
35.	1440.	13981.	1.	9.	4.									
0.	4000.	10.	3.	66.	64.	63.	89.	29.	10.	0.	3.	34.	118.	1.
1.	4000.	9.	18.	67.	64.	63.	87.	29.	10.	0.	2.	0.	0.	0.
2.	20000.	0.	0.	72.	68.	66.	81.	29.	9.	0.	0.	0.	0.	0.
3.	20000.	10.	10.	80.	70.	66.	62.	29.	2.	0.	0.	240.	122.	1.
4.	20000.	12.	12.	81.	71.	66.	60.	29.	0.	0.	0.	0.	0.	0.
5.	20000.	10.	10.	83.	71.	65.	55.	29.	0.	0.	0.	0.	0.	0.
6.	20000.	10.	9.	85.	73.	68.	57.	29.	0.	0.	0.	264.	125.	1.
7.	20000.	10.	9.	88.	75.	69.	53.	29.	0.	0.	0.	0.	0.	0.
8.	20000.	10.	5.	90.	76.	70.	52.	29.	0.	0.	0.	0.	0.	0.
9.	20000.	10.	6.	91.	76.	70.	50.	29.	0.	0.	0.	140.	132.	1.
10.	20000.	10.	4.	90.	76.	71.	54.	29.	0.	0.	0.	0.	0.	0.
11.	20000.	7.	5.	89.	77.	72.	57.	29.	0.	0.	0.	0.	0.	0.
12.	20000.	8.	5.	87.	77.	73.	63.	29.	0.	0.	0.	0.	130.	1.
13.	20000.	6.	3.	82.	76.	74.	76.	29.	0.	0.	0.	0.	0.	0.
14.	20000.	7.	3.	79.	76.	74.	84.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	8.	4.	78.	75.	73.	84.	29.	0.	0.	0.	0.	122.	1.
16.	20000.	7.	3.	77.	74.	73.	87.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	7.	4.	75.	73.	72.	90.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	8.	4.	75.	73.	72.	90.	29.	0.	0.	0.	0.	119.	1.
19.	20000.	8.	6.	74.	73.	72.	93.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	8.	7.	73.	72.	71.	93.	29.	0.	0.	0.	0.	0.	0.
21.	20000.	8.	8.	73.	72.	71.	93.	29.	0.	0.	0.	0.	116.	1.
22.	20000.	8.	7.	73.	71.	71.	93.	29.	0.	0.	0.	0.	0.	0.
23.	20000.	7.	4.	72.	71.	70.	93.	29.	2.	0.	0.	0.	0.	0.

A. WORST TEMPERATURE PERIOD (a,b)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
36.	1440.	13981.	1.	9.	5.									
0.	20000.	8.	4.	72.	71.	70.	93.	29.	7.	0.	0.	64.	122.	1.
1.	20000.	10.	3.	76.	73.	72.	87.	29.	7.	0.	0.	0.	0.	0.
2.	20000.	10.	9.	81.	75.	72.	74.	29.	9.	0.	0.	0.	0.	0.
3.	9000.	16.	17.	81.	76.	74.	79.	29.	10.	0.	0.	82.	135.	1.
4.	20000.	1.	9.	80.	76.	74.	82.	29.	3.	0.	0.	0.	0.	0.
5.	20000.	3.	4.	85.	77.	74.	69.	29.	5.	0.	0.	0.	0.	0.
6.	20000.	5.	9.	87.	76.	72.	61.	29.	5.	0.	0.	220.	135.	1.
7.	20000.	5.	3.	89.	78.	74.	61.	29.	5.	0.	0.	0.	0.	0.
8.	20000.	5.	9.	88.	80.	77.	70.	29.	4.	0.	0.	0.	0.	0.
9.	20000.	5.	10.	88.	80.	77.	70.	29.	4.	0.	0.	122.	138.	1.
10.	20000.	4.	9.	88.	81.	78.	72.	29.	3.	0.	0.	0.	0.	0.
11.	20000.	6.	10.	88.	81.	78.	72.	29.	3.	0.	0.	0.	0.	0.
12.	18000.	7.	4.	87.	80.	78.	75.	29.	6.	0.	0.	0.	140.	1.
13.	20000.	8.	4.	85.	78.	75.	72.	29.	4.	0.	0.	0.	0.	0.
14.	20000.	8.	9.	82.	77.	75.	79.	29.	0.	0.	0.	0.	0.	0.
15.	20000.	8.	12.	81.	76.	75.	82.	29.	0.	0.	0.	0.	126.	1.
16.	20000.	9.	16.	81.	77.	75.	82.	29.	0.	0.	0.	0.	0.	0.
17.	20000.	9.	13.	81.	76.	74.	79.	29.	0.	0.	0.	0.	0.	0.
18.	20000.	9.	10.	81.	76.	74.	79.	29.	0.	0.	0.	0.	125.	1.
19.	20000.	9.	12.	81.	74.	71.	71.	29.	0.	0.	0.	0.	0.	0.
20.	20000.	9.	10.	79.	73.	71.	76.	29.	2.	0.	0.	0.	0.	0.
21.	20000.	10.	13.	78.	72.	70.	76.	29.	3.	0.	0.	0.	123.	1.
22.	9000.	13.	8.	77.	73.	71.	81.	29.	8.	0.	0.	0.	0.	0.
23.	15000.	9.	10.	75.	72.	71.	87.	29.	9.	0.	0.	0.	0.	0.

B. WORST EVAPORATION PERIOD [a,c,d]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1.	1440.	13981.	1.	8.	1.									
0.	20000.	6.	7.	71.	63.	58.	63.	28.96	0.	000000000000	0.	.00	108.71	.49
1.	20000.	7.	9.	72.	64.	59.	63.	28.94	0.	000000000000	0.	.00	.00	.00
2.	20000.	8.	7.	72.	64.	60.	66.	28.94	0.	000000000000	0.	.00	.00	.00
3.	20000.	8.	9.	71.	65.	62.	73.	28.94	0.	000000000000	0.	.00	110.28	.56
4.	20000.	7.	7.	70.	65.	62.	75.	28.95	0.	000000000000	0.	.00	.00	.00
5.	20000.	7.	7.	70.	65.	63.	78.	28.96	0.	000000000000	0.	.00	.00	.00
6.	20000.	7.	7.	73.	68.	66.	78.	28.98	2.	000000000000	0.	118.83	115.73	.64
7.	20000.	9.	10.	79.	72.	69.	71.	28.98	1.	000000000000	0.	.00	.00	.00
8.	20000.	10.	9.	85.	74.	70.	61.	28.98	3.	000000000000	0.	.00	.00	.00
9.	20000.	10.	10.	89.	75.	69.	52.	28.97	2.	000000000000	0.	256.63	132.01	.72
10.	20000.	10.	10.	93.	75.	68.	45.	28.96	4.	000000000000	0.	.00	.00	.00
11.	20000.	10.	10.	94.	74.	66.	40.	28.96	4.	000000000000	0.	.00	.00	.00
12.	20000.	9.	13.	97.	75.	66.	36.	28.94	4.	000000000000	0.	255.70	140.66	.64
13.	20000.	9.	15.	97.	74.	64.	33.	28.92	2.	000000000000	0.	.00	.00	.00
14.	20000.	10.	13.	98.	74.	64.	32.	28.90	4.	000000000000	0.	.00	.00	.00
15.	20000.	10.	13.	98.	74.	63.	31.	28.88	4.	000000000000	0.	148.70	140.03	.57
16.	20000.	10.	13.	97.	75.	66.	36.	28.87	4.	000000000000	0.	.00	.00	.00
17.	20000.	10.	14.	96.	75.	66.	37.	28.86	0.	000000000000	0.	.00	.00	.00
18.	20000.	9.	17.	95.	75.	67.	40.	28.86	0.	000000000000	0.	.00	134.18	.67
19.	20000.	10.	9.	92.	74.	67.	44.	28.86	0.	000000000000	0.	.00	.00	.00
20.	20000.	9.	7.	88.	74.	68.	52.	28.87	0.	000000000000	0.	.00	.00	.00
21.	20000.	9.	6.	85.	73.	68.	57.	28.89	0.	000000000000	0.	.00	125.43	.70
22.	20000.	9.	5.	80.	71.	67.	65.	28.89	0.	000000000000	0.	.00	.00	.00
23.	20000.	11.	5.	79.	71.	67.	67.	28.90	0.	000000000000	0.	.00	.00	.00

[c] The worst evaporation period was obtained by selecting the weather conditions corresponding to the 30 consecutive days for which evaporation was maximum.

[d] June 24, 1954 (midnight) to July 23, 1954 (midnight)

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
2.	1440.	13981.	1.	8.	2.									
0.	20000.	9.	8.	79.	70.	66.	64.	28.90	0.	000000000000	0.	.00	118.86	.64
1.	20000.	9.	9.	77.	70.	66.	68.	28.90	0.	000000000000	0.	.00	.00	.00
2.	20000.	9.	8.	77.	70.	67.	71.	28.90	0.	000000000000	0.	.00	.00	.00
3.	20000.	9.	8.	77.	70.	67.	71.	28.91	0.	000000000000	0.	.00	117.64	.67
4.	20000.	9.	8.	75.	70.	67.	76.	28.92	0.	000000000000	0.	.00	.00	.00
5.	20000.	8.	9.	74.	69.	67.	79.	28.93	0.	000000000000	0.	.00	.00	.00
6.	20000.	9.	9.	77.	71.	68.	74.	28.93	0.	000000000000	0.	120.49	118.24	.70
7.	20000.	10.	12.	83.	72.	68.	61.	28.93	0.	000000000000	0.	.00	.00	.00
8.	20000.	10.	16.	87.	73.	67.	52.	28.93	0.	000000000000	0.	.00	.00	.00
9.	20000.	10.	17.	90.	73.	66.	45.	28.92	0.	000000000000	0.	263.30	128.85	.64
10.	20000.	10.	17.	93.	74.	66.	41.	28.92	0.	000000000000	0.	.00	.00	.00
11.	20000.	10.	17.	95.	73.	63.	35.	28.90	0.	000000000000	0.	.00	.00	.00
12.	20000.	10.	17.	96.	74.	64.	35.	28.89	0.	000000000000	0.	284.22	133.54	.60
13.	20000.	10.	17.	98.	74.	64.	32.	28.88	0.	000000000000	0.	.00	.00	.00
14.	20000.	10.	17.	98.	74.	63.	31.	28.87	0.	000000000000	0.	.00	.00	.00
15.	20000.	10.	23.	98.	74.	62.	30.	28.86	0.	000000000000	0.	165.29	134.13	.55
16.	20000.	10.	19.	97.	73.	62.	31.	28.86	0.	000000000000	0.	.00	.00	.00
17.	20000.	10.	17.	96.	74.	64.	35.	28.85	0.	000000000000	0.	.00	.00	.00
18.	20000.	10.	17.	95.	74.	65.	37.	28.86	0.	000000000000	0.	.00	132.96	.62
19.	20000.	10.	14.	91.	73.	65.	42.	28.87	0.	000000000000	0.	.00	.00	.00
20.	20000.	10.	7.	87.	72.	65.	48.	28.88	0.	000000000000	0.	.00	.00	.00
21.	20000.	9.	7.	83.	71.	66.	56.	28.90	0.	000000000000	0.	.00	122.37	.64
22.	20000.	9.	6.	81.	71.	66.	60.	28.92	0.	000000000000	0.	.00	.00	.00
23.	20000.	9.	7.	80.	70.	66.	62.	28.97	0.	000000000000	0.	.00	.00	.00

WOLF CREEK

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
3.	1440.	13981.	1.	8.	3.									
0.	20000.	10.	9.	77.	70.	66.	68.	28.93	0.	000000000000	0.	.00	117.03	.64
1.	20000.	10.	9.	76.	70.	67.	74.	28.92	0.	000000000000	0.	.00	.00	.00
2.	20000.	11.	9.	76.	70.	67.	74.	28.93	0.	000000000000	0.	.00	.00	.00
3.	20000.	11.	9.	75.	70.	67.	76.	28.94	0.	000000000000	0.	.00	115.92	.67
4.	20000.	11.	8.	75.	69.	67.	76.	28.95	0.	000000000000	0.	.00	.00	.00
5.	20000.	11.	7.	74.	69.	67.	79.	28.97	0.	000000000000	0.	.00	.00	.00
6.	20000.	10.	8.	77.	71.	68.	74.	28.97	0.	000000000000	0.	120.30	118.24	.70
7.	20000.	11.	10.	82.	72.	68.	63.	28.98	0.	000000000000	0.	.00	.00	.00
8.	20000.	11.	10.	86.	73.	67.	53.	28.99	0.	000000000000	0.	.00	.00	.00
9.	20000.	10.	16.	91.	74.	66.	44.	28.99	0.	000000000000	0.	263.17	129.92	.65
10.	20000.	10.	16.	94.	73.	64.	37.	28.99	0.	000000000000	0.	.00	.00	.00
11.	20000.	11.	12.	95.	74.	64.	36.	28.98	0.	000000000000	0.	.00	.00	.00
12.	20000.	10.	17.	96.	73.	63.	33.	28.98	0.	000000000000	0.	284.92	132.70	.57
13.	20000.	10.	16.	97.	74.	63.	32.	28.96	0.	000000000000	0.	.00	.00	.00
14.	20000.	11.	14.	98.	75.	65.	33.	28.95	0.	000000000000	0.	.00	.00	.00
15.	20000.	10.	21.	97.	74.	63.	32.	28.94	0.	000000000000	0.	164.80	133.65	.57
16.	20000.	10.	17.	96.	73.	63.	33.	28.93	1.	000000000000	0.	.00	.00	.00
17.	20000.	10.	15.	96.	74.	64.	35.	28.92	1.	000000000000	0.	.00	.00	.00
18.	20000.	10.	9.	94.	73.	63.	36.	28.92	1.	000000000000	0.	.00	132.24	.58
19.	20000.	9.	7.	91.	73.	65.	42.	28.93	0.	000000000000	0.	.00	.00	.00
20.	20000.	9.	5.	87.	72.	66.	50.	28.93	1.	000000000000	0.	.00	.00	.00
21.	20000.	9.	6.	85.	71.	65.	51.	28.95	0.	000000000000	0.	.00	123.76	.62
22.	20000.	9.	7.	81.	70.	65.	58.	28.96	0.	000000000000	0.	.00	.00	.00
23.	20000.	10.	7.	80.	70.	66.	62.	28.96	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
4.	1440.	13981.	1.	8.	4.									
0.	20000.	10.	8.	78.	70.	66.	66.	28.97	0.	000000000000	0.	.00	117.95	.64
1.	20000.	11.	8.	76.	69.	66.	71.	28.97	0.	00000000000	0.	.00	.00	.00
2.	20000.	11.	8.	76.	69.	66.	71.	28.98	0.	000000000000	0.	.00	.00	.00
3.	20000.	11.	7.	76.	68.	65.	68.	28.98	0.	000000000000	0.	.00	115.72	.62
4.	20000.	11.	7.	75.	68.	65.	71.	28.99	8.	000000000000	0.	.00	.00	.00
5.	20000.	10.	6.	72.	67.	64.	76.	29.00	8.	000000000000	0.	.00	.00	.00
6.	20000.	9.	6.	76.	68.	64.	66.	29.01	8.	000000000000	0.	72.18	124.21	.60
7.	20000.	10.	9.	83.	71.	66.	56.	29.01	5.	00000000000	0.	.00	.00	.00
8.	20000.	11.	9.	85.	72.	66.	53.	29.02	3.	00000000000	0.	.00	.00	.00
9.	20000.	11.	14.	89.	73.	66.	47.	29.01	4.	000000000000	0.	237.90	133.03	.65
10.	20000.	10.	12.	92.	73.	64.	40.	29.02	4.	000000000000	0.	.00	.00	.00
11.	20000.	11.	11.	95.	75.	66.	39.	29.01	6.	000000000000	0.	.00	.00	.00
12.	20000.	9.	13.	94.	73.	63.	36.	29.00	6.	000000000000	0.	219.48	138.83	.58
13.	20000.	9.	14.	95.	74.	65.	37.	28.98	5.	000000000000	0.	.00	.00	.00
14.	20000.	11.	13.	96.	74.	64.	35.	28.96	4.	000000000000	0.	.00	.00	.00
15.	20000.	10.	15.	96.	73.	62.	32.	28.95	4.	000000000000	0.	149.16	137.67	.55
16.	20000.	11.	14.	96.	73.	62.	32.	28.94	3.	000000000000	0.	.00	.00	.00
17.	20000.	10.	10.	94.	73.	63.	36.	28.92	3.	000000000000	0.	.00	.00	.00
18.	20000.	10.	7.	94.	72.	62.	35.	28.91	3.	000000000000	0.	.00	134.66	.57
19.	20000.	10.	9.	90.	74.	67.	47.	28.92	3.	000000000000	0.	.00	.00	.00
20.	20000.	10.	7.	85.	71.	65.	51.	28.92	3.	000000000000	0.	.00	.00	.00
21.	20000.	9.	9.	82.	70.	64.	54.	28.94	2.	000000000000	0.	.00	122.80	.60
22.	20000.	9.	5.	79.	69.	64.	60.	28.95	0.	000000000000	0.	.00	.00	.00
23.	20000.	10.	7.	79.	69.	64.	60.	28.95	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
5.	1440.	13981.	1.	8.	5.									
0.	20000.	10.	9.	78.	68.	63.	60.	28.96	0.	000000000000	0.	.00	116.69	.58
1.	20000.	10.	7.	77.	68.	64.	64.	28.95	0.	000000000000	0.	.00	.00	.00
2.	20000.	10.	7.	77.	69.	65.	66.	28.95	0.	000000000000	0.	.00	.00	.00
3.	20000.	10.	4.	75.	68.	65.	71.	28.95	0.	000000000000	0.	.00	114.99	.63
4.	20000.	6.	5.	72.	67.	65.	78.	28.95	0.	000000000000	0.	.00	.00	.00
5.	20000.	7.	6.	70.	67.	65.	84.	28.97	0.	000000000000	0.	.00	.00	.00
6.	20000.	7.	7.	74.	69.	66.	76.	28.98	0.	000000000000	0.	120.77	114.59	.65
7.	20000.	8.	8.	80.	71.	67.	65.	29.00	0.	000000000000	0.	.00	.00	.00
8.	20000.	9.	9.	86.	72.	66.	51.	29.00	0.	000000000000	0.	.00	.00	.00
9.	20000.	10.	9.	89.	72.	64.	43.	29.00	0.	000000000000	0.	264.37	126.80	.60
10.	20000.	10.	12.	92.	72.	63.	37.	29.00	0.	000000000000	0.	.00	.00	.00
11.	20000.	8.	12.	93.	72.	62.	36.	28.99	0.	000000000000	0.	.00	.00	.00
12.	20000.	9.	9.	93.	72.	62.	36.	28.97	0.	000000000000	0.	285.53	129.79	.56
13.	20000.	9.	12.	97.	73.	63.	32.	28.94	0.	000000000000	0.	.00	.00	.00
14.	20000.	10.	19.	97.	72.	60.	29.	28.94	0.	000000000000	0.	.00	.00	.00
15.	20000.	9.	17.	96.	72.	61.	31.	28.91	2.	000000000000	0.	162.60	134.43	.53
16.	20000.	9.	9.	96.	72.	61.	31.	28.91	2.	000000000000	0.	.00	.00	.00
17.	20000.	10.	15.	95.	71.	60.	31.	28.89	2.	000000000000	0.	.00	.00	.00
18.	20000.	9.	13.	94.	71.	60.	32.	28.88	2.	000000000000	0.	.00	132.15	.52
19.	20000.	11.	9.	91.	72.	63.	39.	28.90	1.	000000000000	0.	.00	.00	.00
20.	20000.	9.	9.	86.	70.	63.	46.	28.91	1.	000000000000	0.	.00	.00	.00
21.	20000.	9.	5.	82.	70.	64.	54.	28.92	1.	000000000000	0.	.00	121.51	.60
22.	20000.	10.	7.	80.	69.	63.	56.	28.93	0.	000000000000	0.	.00	.00	.00
23.	20000.	10.	4.	81.	69.	63.	54.	28.93	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
6.	1440.	13981.	1.	8.	6.									
0.	20000.	10.	6.	79.	68.	63.	58.	28.94	0.	000000000000	0.	.00	117.54	.58
1.	20000.	9.	3.	76.	68.	64.	66.	28.93	0.	000000000000	0.	.00	.00	.00
2.	20000.	7.	4.	77.	68.	64.	64.	28.93	0.	000000000000	0.	.00	.00	.00
3.	20000.	7.	4.	75.	67.	64.	68.	28.94	0.	000000000000	0.	.00	114.43	.60
4.	20000.	7.	4.	73.	67.	64.	73.	28.94	0.	000000000000	0.	.00	.00	.00
5.	20000.	6.	6.	71.	67.	64.	78.	28.96	0.	000000000000	0.	.00	.00	.00
6.	20000.	7.	7.	75.	69.	66.	74.	28.98	0.	000000000000	0.	120.53	115.54	.65
7.	20000.	10.	5.	81.	70.	65.	58.	29.00	0.	000000000000	0.	.00	.00	.00
8.	20000.	11.	9.	87.	72.	63.	45.	29.01	0.	000000000000	0.	.00	.00	.00
9.	20000.	12.	10.	91.	73.	64.	41.	29.01	0.	000000000000	0.	264.20	128.87	.60
10.	20000.	13.	7.	95.	72.	62.	33.	29.00	0.	000000000000	0.	.00	.00	.00
11.	20000.	14.	6.	98.	73.	62.	30.	29.00	0.	000000000000	0.	.00	.00	.00
12.	20000.	9.	9.	98.	72.	59.	27.	28.98	0.	000000000000	0.	287.52	132.76	.49
13.	20000.	13.	7.	98.	72.	59.	27.	28.97	0.	000000000000	0.	.00	.00	.00
14.	20000.	12.	11.	100.	73.	61.	28.	28.94	4.	000000000000	0.	.00	.00	.00
15.	20000.	13.	9.	100.	74.	62.	29.	28.92	4.	000000000000	0.	149.10	141.96	.56
16.	20000.	9.	12.	99.	72.	59.	26.	28.90	4.	000000000000	0.	.00	.00	.00
17.	20000.	11.	10.	98.	72.	59.	27.	28.90	7.	000000000000	0.	.00	.00	.00
18.	20000.	10.	9.	96.	72.	60.	30.	28.92	7.	000000000000	0.	.00	140.70	.52
19.	20000.	9.	6.	92.	71.	61.	36.	28.94	4.	000000000000	0.	.00	.00	.00
20.	20000.	9.	7.	87.	70.	62.	42.	28.95	5.	000000000000	0.	.00	.00	.00
21.	20000.	8.	16.	82.	70.	65.	56.	29.00	4.	000000000000	0.	.00	125.76	.62
22.	20000.	8.	13.	77.	69.	65.	66.	29.00	3.	000000000000	0.	.00	.00	.00
23.	20000.	8.	13.	75.	68.	65.	71.	29.00	3.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
7.	1440.	13981.	1.	8.	7.									
0.	20000.	14.	6.	75.	68.	65.	71.	29.02	3.	000000000000	0.	.00	118.30	.63
1.	20000.	10.	9.	74.	67.	64.	71.	29.01	3.	000000000000	0.	.00	.00	.00
2.	20000.	9.	7.	73.	67.	64.	73.	29.01	4.	000000000000	0.	.00	.00	.00
3.	20000.	10.	3.	72.	67.	64.	76.	29.01	4.	000000000000	0.	.00	116.44	.61
4.	20000.	12.	3.	72.	67.	64.	76.	29.02	5.	000000000000	0.	.00	.00	.00
5.	20000.	9.	3.	72.	66.	64.	76.	29.03	5.	000000000000	0.	.00	.00	.00
6.	12000.	16.	5.	75.	68.	65.	71.	29.06	8.	000000000000	0.	71.51	123.69	.63
7.	20000.	16.	9.	80.	70.	66.	62.	29.06	4.	000000000000	0.	.00	.00	.00
8.	20000.	14.	9.	84.	72.	67.	56.	29.05	2.	000000000000	0.	.00	.00	.00
9.	20000.	12.	11.	89.	74.	67.	48.	29.04	3.	000000000000	0.	248.77	132.05	.66
10.	20000.	14.	9.	92.	75.	68.	45.	29.04	5.	000000000000	0.	.00	.00	.00
11.	20000.	11.	5.	97.	77.	69.	41.	29.04	6.	000000000000	0.	.00	.00	.00
12.	6000.	2.	10.	95.	74.	66.	39.	29.03	6.	000000000000	0.	217.52	141.30	.65
13.	5000.	9.	15.	71.	68.	66.	84.	29.02	10.	000000000000	0.	.00	.00	.00
14.	10000.	10.	10.	71.	66.	63.	76.	29.03	10.	000000000000	0.	.00	.00	.00
15.	5000.	11.	12.	72.	67.	65.	78.	29.04	10.	000000000000	0.	57.58	123.76	.62
16.	5000.	11.	10.	73.	67.	64.	73.	29.04	9.	000000000000	0.	.00	.00	.00
17.	6000.	8.	12.	74.	67.	64.	71.	28.99	10.	000000000000	0.	.00	.00	.00
18.	7000.	15.	4.	76.	67.	62.	62.	29.03	10.	000000000000	0.	.00	126.82	.56
19.	10000.	6.	7.	74.	68.	65.	73.	29.01	10.	000000000000	0.	.00	.00	.00
20.	10000.	2.	6.	73.	67.	65.	76.	29.04	10.	000000000000	0.	.00	.00	.00
21.	25000.	4.	5.	73.	67.	64.	73.	29.05	10.	000000000000	0.	.00	124.45	.60
22.	20000.	9.	4.	71.	68.	67.	87.	29.05	10.	000000000000	0.	.00	.00	.00
23.	20000.	2.	5.	70.	66.	64.	81.	29.07	3.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
8.	1440.	13981.	1.	8.	8.									
0.	20000.	4.	4.	69.	66.	64.	84.	29.06	4.	000000000000	0.	.00	113.81	.60
1.	20000.	7.	3.	70.	66.	65.	84.	29.06	8.	000000000000	0.	.00	.00	.00
2.	20000.	9.	4.	71.	67.	65.	81.	29.06	8.	000000000000	0.	.00	.00	.00
3.	20000.	9.	3.	70.	67.	66.	87.	29.06	7.	000000000000	0.	.00	118.43	.65
4.	20000.	11.	4.	69.	67.	66.	90.	29.07	6.	000000000000	0.	.00	.00	.00
5.	20000.	6.	3.	69.	67.	66.	90.	29.08	8.	000000000000	0.	.00	.00	.00
6.	20000.	7.	3.	72.	68.	66.	81.	29.09	8.	000000000000	0.	71.10	121.25	.65
7.	25000.	7.	3.	78.	71.	68.	71.	29.09	8.	000000000000	0.	.00	.00	.00
8.	20000.	9.	6.	83.	72.	67.	58.	29.11	7.	000000000000	0.	.00	.00	.00
9.	20000.	8.	5.	86.	73.	67.	53.	29.11	6.	000000000000	0.	201.66	132.71	.67
10.	20000.	11.	10.	90.	73.	65.	44.	29.11	8.	000000000000	0.	.00	.00	.00
11.	20000.	9.	8.	92.	74.	66.	42.	29.10	7.	000000000000	0.	.00	.00	.00
12.	20000.	11.	9.	93.	75.	68.	45.	29.08	8.	000000000000	0.	164.81	142.70	.71
13.	20000.	10.	10.	94.	75.	67.	41.	29.07	10.	000000000000	0.	.00	.00	.00
14.	20000.	9.	7.	94.	74.	66.	40.	29.05	10.	000000000000	0.	.00	.00	.00
15.	20000.	10.	9.	95.	75.	67.	40.	29.03	10.	000000000000	0.	57.16	147.25	.67
16.	20000.	11.	9.	97.	76.	67.	37.	29.00	10.	000000000000	0.	.00	.00	.00
17.	20000.	10.	9.	93.	74.	65.	40.	28.99	10.	000000000000	0.	.00	.00	.00
18.	20000.	9.	5.	91.	76.	70.	50.	29.00	7.	000000000000	0.	.00	140.15	.74
19.	20000.	9.	5.	89.	74.	68.	50.	29.00	10.	000000000000	0.	.00	.00	.00
20.	20000.	9.	6.	87.	72.	66.	50.	29.01	10.	000000000000	0.	.00	.00	.00
21.	20000.	8.	8.	85.	71.	65.	51.	29.02	3.	000000000000	0.	.00	127.33	.62
22.	20000.	9.	8.	83.	72.	67.	58.	29.04	3.	000000000000	0.	.00	.00	.00
23.	20000.	9.	6.	82.	71.	67.	60.	29.04	3.	000000000000	0.	.00	.00	.00

WOLF CREEK

TABLE 2.3-9 (continued)

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
9.	1440.	13981.	1.	8.	9.									
0.	20000.	9.	6.	79.	71.	68.	69.	29.02	3.	000000000000	0.	.00	123.28	.69
1.	20000.	10.	4.	78.	70.	67.	69.	29.00	3.	000000000000	0.	.00	.00	.00
2.	20000.	9.	5.	79.	71.	67.	67.	29.01	2.	000000000000	0.	.00	.00	.00
3.	20000.	9.	7.	78.	70.	67.	69.	29.02	0.	000000000000	0.	.00	118.58	.67
4.	20000.	9.	9.	76.	70.	67.	74.	29.02	1.	000000000000	0.	.00	.00	.00
5.	20000.	8.	7.	76.	70.	67.	74.	29.04	1.	000000000000	0.	.00	.00	.00
6.	20000.	8.	8.	77.	70.	67.	71.	29.05	1.	000000000000	0.	118.50	118.56	.67
7.	20000.	9.	4.	81.	72.	68.	65.	29.05	2.	000000000000	0.	.00	.00	.00
8.	20000.	11.	17.	86.	73.	68.	55.	29.05	2.	000000000000	0.	.00	.00	.00
9.	20000.	10.	16.	89.	74.	68.	50.	29.04	2.	000000000000	0.	256.19	131.39	.69
10.	20000.	10.	17.	94.	75.	67.	41.	29.04	0.	000000000000	0.	.00	.00	.00
11.	20000.	10.	19.	94.	75.	67.	41.	29.03	0.	000000000000	0.	.00	.00	.00
12.	20000.	10.	17.	96.	75.	66.	37.	29.03	0.	000000000000	0.	282.13	134.39	.64
13.	20000.	11.	13.	98.	74.	63.	31.	29.01	0.	000000000000	0.	.00	.00	.00
14.	20000.	11.	17.	100.	74.	62.	29.	28.99	0.	000000000000	0.	.00	.00	.00
15.	20000.	10.	15.	98.	73.	61.	29.	28.96	2.	000000000000	0.	162.33	136.30	.53
16.	20000.	10.	16.	99.	74.	63.	30.	28.94	2.	000000000000	0.	.00	.00	.00
17.	20000.	10.	17.	98.	74.	63.	31.	28.94	0.	000000000000	0.	.00	.00	.00
18.	20000.	10.	13.	96.	74.	65.	36.	28.94	0.	000000000000	0.	.00	133.97	.62
19.	20000.	9.	9.	92.	71.	62.	36.	28.95	0.	000000000000	0.	.00	.00	.00
20.	20000.	9.	9.	87.	71.	63.	45.	28.95	0.	000000000000	0.	.00	.00	.00
21.	20000.	9.	12.	87.	71.	63.	45.	28.97	0.	000000000000	0.	.00	124.73	.59
22.	20000.	10.	10.	85.	70.	63.	48.	28.98	0.	000000000000	0.	.00	.00	.00
23.	20000.	9.	9.	81.	69.	63.	54.	28.99	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
10.	1440.	13981.	1.	8.	10.									
0.	20000.	9.	9.	80.	69.	63.	56.	28.99	0.	000000000000	0.	.00	118.39	.58
1.	20000.	10.	7.	77.	68.	64.	64.	28.98	0.	000000000000	0.	.00	.00	.00
2.	20000.	9.	7.	76.	68.	64.	66.	28.98	0.	000000000000	0.	.00	.00	.00
3.	20000.	9.	8.	75.	68.	64.	68.	28.98	0.	000000000000	0.	.00	114.43	.60
4.	20000.	9.	9.	74.	68.	66.	76.	28.98	0.	000000000000	0.	.00	.00	.00
5.	20000.	9.	8.	74.	69.	66.	76.	28.98	1.	000000000000	0.	.00	.00	.00
6.	20000.	10.	10.	77.	70.	66.	68.	29.01	1.	000000000000	0.	118.63	117.96	.64
7.	20000.	10.	15.	81.	70.	66.	60.	29.01	2.	000000000000	0.	.00	.00	.00
8.	20000.	11.	16.	85.	72.	67.	55.	29.02	0.	000000000000	0.	.00	.00	.00
9.	20000.	11.	17.	90.	72.	64.	42.	29.01	0.	000000000000	0.	263.44	127.84	.60
10.	20000.	10.	17.	94.	74.	66.	40.	29.01	0.	000000000000	0.	.00	.00	.00
11.	20000.	10.	21.	96.	73.	63.	33.	29.00	1.	000000000000	0.	.00	.00	.00
12.	20000.	10.	17.	97.	72.	60.	29.	28.99	3.	000000000000	0.	272.27	136.38	.51
13.	20000.	11.	17.	98.	73.	60.	29.	28.97	3.	000000000000	0.	.00	.00	.00
14.	20000.	11.	17.	99.	73.	61.	29.	28.96	3.	000000000000	0.	.00	.00	.00
15.	20000.	10.	19.	98.	73.	61.	29.	28.95	2.	000000000000	0.	162.22	136.30	.53
16.	20000.	10.	16.	99.	71.	57.	24.	28.93	0.	000000000000	0.	.00	.00	.00
17.	20000.	10.	14.	98.	71.	58.	26.	28.92	0.	000000000000	0.	.00	.00	.00
18.	20000.	10.	9.	97.	72.	61.	30.	28.93	0.	000000000000	0.	.00	132.77	.53
19.	20000.	9.	9.	92.	71.	61.	36.	28.93	0.	000000000000	0.	.00	.00	.00
20.	20000.	9.	9.	86.	70.	62.	45.	28.94	0.	000000000000	0.	.00	.00	.00
21.	20000.	10.	13.	86.	73.	67.	53.	28.96	0.	000000000000	0.	.00	125.71	.67
22.	20000.	9.	13.	84.	72.	67.	56.	28.97	0.	000000000000	0.	.00	.00	.00
23.	20000.	9.	12.	82.	71.	66.	58.	28.97	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
11.	1440.	13981.	1.	8.	11.									
0.	20000.	10.	10.	81.	71.	67.	63.	28.97	0.	000000000000	0.	.00	121.35	.68
1.	20000.	9.	7.	78.	69.	65.	64.	28.97	0.	000000000000	0.	.00	.00	.00
2.	20000.	10.	7.	77.	69.	65.	66.	28.98	0.	000000000000	0.	.00	.00	.00
3.	20000.	10.	9.	75.	68.	65.	71.	28.97	0.	000000000000	0.	.00	114.99	.63
4.	20000.	9.	7.	73.	67.	64.	73.	28.97	1.	000000000000	0.	.00	.00	.00
5.	20000.	10.	6.	72.	67.	64.	76.	28.98	2.	000000000000	0.	.00	.00	.00
6.	20000.	10.	7.	75.	68.	65.	71.	29.00	2.	000000000000	0.	116.79	117.13	.63
7.	20000.	10.	8.	78.	70.	66.	66.	29.00	2.	000000000000	0.	.00	.00	.00
8.	20000.	12.	13.	84.	72.	67.	56.	29.01	5.	000000000000	0.	.00	.00	.00
9.	20000.	12.	7.	88.	74.	68.	52.	29.01	3.	000000000000	0.	247.24	131.82	.70
10.	20000.	12.	9.	93.	75.	68.	45.	29.00	2.	000000000000	0.	.00	.00	.00
11.	20000.	11.	9.	94.	75.	67.	41.	29.00	3.	000000000000	0.	.00	.00	.00
12.	20000.	11.	10.	98.	74.	63.	31.	29.00	1.	000000000000	0.	282.37	135.71	.57
13.	20000.	12.	10.	99.	74.	63.	30.	28.98	0.	000000000000	0.	.00	.00	.00
14.	20000.	10.	15.	100.	74.	62.	29.	28.97	0.	000000000000	0.	.00	.00	.00
15.	20000.	10.	12.	100.	73.	61.	28.	28.96	0.	000000000000	0.	165.24	135.94	.54
16.	20000.	11.	10.	100.	73.	60.	26.	28.94	0.	000000000000	0.	.00	.00	.00
17.	20000.	10.	9.	100.	72.	58.	25.	28.94	0.	000000000000	0.	.00	.00	.00
18.	20000.	11.	6.	98.	74.	63.	31.	28.94	8.	000000000000	0.	.00	145.22	.57
19.	20000.	9.	9.	93.	73.	64.	38.	28.94	5.	000000000000	0.	.00	.00	.00
20.	20000.	10.	7.	87.	72.	65.	48.	28.94	3.	000000000000	0.	.00	.00	.00
21.	20000.	10.	7.	84.	70.	63.	49.	28.96	0.	000000000000	0.	.00	121.88	.58
22.	20000.	10.	9.	83.	69.	62.	49.	28.97	0.	000000000000	0.	.00	.00	.00
23.	20000.	10.	8.	81.	68.	62.	52.	28.97	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
12.	1440.	13981.	1.	8.	12.									
0.	20000.	10.	7.	81.	68.	62.	52.	28.98	0.	000000000000	0.	.00	118.74	.56
1.	20000.	10.	9.	80.	68.	62.	54.	28.97	0.	000000000000	0.	.00	.00	.00
2.	20000.	10.	7.	78.	68.	64.	62.	28.96	0.	000000000000	0.	.00	.00	.00
3.	20000.	11.	5.	76.	68.	64.	66.	28.96	0.	000000000000	0.	.00	115.33	.60
4.	20000.	10.	4.	74.	68.	64.	71.	28.97	0.	000000000000	0.	.00	.00	.00
5.	20000.	12.	4.	74.	67.	64.	71.	28.98	0.	000000000000	0.	.00	.00	.00
6.	20000.	11.	4.	77.	70.	67.	71.	29.00	0.	000000000000	0.	118.31	117.64	.67
7.	20000.	11.	5.	84.	72.	67.	56.	29.00	0.	000000000000	0.	.00	.00	.00
8.	20000.	14.	6.	89.	73.	66.	47.	29.00	0.	000000000000	0.	.00	.00	.00
9.	20000.	11.	9.	92.	74.	66.	42.	29.00	0.	000000000000	0.	261.50	130.63	.64
10.	20000.	11.	8.	95.	74.	66.	39.	29.00	0.	000000000000	0.	.00	.00	.00
11.	20000.	9.	5.	98.	76.	66.	35.	28.99	0.	000000000000	0.	.00	.00	.00
12.	20000.	8.	7.	97.	74.	64.	33.	28.99	0.	000000000000	0.	283.33	134.09	.58
13.	20000.	10.	4.	100.	75.	64.	30.	28.97	2.	000000000000	0.	.00	.00	.00
14.	20000.	11.	8.	102.	77.	66.	31.	28.95	5.	000000000000	0.	.00	.00	.00
15.	20000.	5.	5.	100.	74.	63.	29.	28.93	5.	000000000000	0.	138.43	143.27	.56
16.	20000.	11.	9.	101.	74.	62.	28.	28.90	2.	000000000000	0.	.00	.00	.00
17.	20000.	9.	7.	100.	73.	60.	26.	28.90	8.	000000000000	15.	.00	.00	.00
18.	30000.	4.	13.	88.	67.	55.	32.	28.93	9.	000000000000	0.	.00	134.73	.43
19.	30000.	10.	9.	91.	69.	58.	32.	28.90	7.	000000000000	0.	.00	.00	.00
20.	20000.	4.	5.	88.	68.	57.	35.	28.92	4.	000000000000	0.	.00	.00	.00
21.	20000.	6.	9.	84.	67.	58.	41.	28.96	2.	000000000000	0.	.00	122.15	.48
22.	20000.	8.	9.	82.	68.	61.	49.	28.96	0.	000000000000	0.	.00	.00	.00
23.	20000.	9.	9.	78.	66.	60.	54.	28.97	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
13.	1440.	13981.	1.	8.	13.									
0.	20000.	10.	6.	76.	66.	60.	57.	28.95	0.	000000000000	0.	.00	113.58	.52
1.	20000.	9.	4.	75.	65.	60.	60.	28.95	0.	000000000000	0.	.00	.00	.00
2.	20000.	9.	4.	73.	65.	61.	66.	28.95	0.	000000000000	0.	.00	.00	.00
3.	20000.	9.	3.	70.	65.	62.	75.	28.95	0.	000000000000	0.	.00	109.38	.56
4.	20000.	9.	3.	73.	65.	61.	66.	28.97	0.	000000000000	0.	.00	.00	.00
5.	20000.	6.	3.	71.	65.	62.	73.	28.97	0.	000000000000	0.	.00	.00	.00
6.	20000.	7.	4.	74.	67.	64.	71.	28.97	0.	000000000000	0.	119.23	113.70	.60
7.	20000.	10.	7.	80.	67.	61.	52.	28.97	0.	000000000000	0.	.00	.00	.00
8.	20000.	11.	10.	85.	69.	62.	46.	28.96	0.	000000000000	0.	.00	.00	.00
9.	20000.	11.	13.	90.	72.	63.	41.	28.95	0.	000000000000	0.	263.47	127.50	.59
10.	20000.	11.	12.	95.	74.	65.	37.	28.94	0.	000000000000	0.	.00	.00	.00
11.	20000.	11.	13.	97.	74.	64.	33.	28.93	0.	000000000000	0.	.00	.00	.00
12.	20000.	10.	9.	99.	75.	65.	32.	28.92	2.	000000000000	0.	277.69	139.04	.60
13.	20000.	11.	9.	100.	75.	64.	30.	28.88	3.	000000000000	0.	.00	.00	.00
14.	20000.	11.	7.	100.	74.	62.	29.	28.86	5.	000000000000	0.	.00	.00	.00
15.	20000.	10.	13.	101.	75.	63.	29.	28.84	3.	000000000000	0.	155.47	141.92	.58
16.	20000.	9.	17.	101.	73.	59.	25.	28.83	2.	000000000000	0.	.00	.00	.00
17.	20000.	9.	17.	100.	74.	61.	28.	28.80	2.	000000000000	0.	.00	.00	.00
18.	20000.	9.	16.	97.	73.	62.	31.	28.79	0.	000000000000	0.	.00	133.21	.55
19.	20000.	9.	14.	93.	72.	62.	36.	28.78	0.	000000000000	0.	.00	.00	.00
20.	20000.	9.	12.	89.	70.	61.	39.	28.78	0.	000000000000	0.	.00	.00	.00
21.	20000.	9.	15.	87.	70.	62.	42.	28.79	0.	000000000000	0.	.00	123.83	.55
22.	20000.	9.	14.	86.	70.	63.	46.	28.79	0.	000000000000	0.	.00	.00	.00
23.	20000.	9.	14.	84.	69.	62.	48.	28.78	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
14.	1440.	13961.	1.	8.	14.									
0.	20000.	10.	15.	84.	69.	62.	48.	28.78	0.	000000000000	0.	.00	121.61	.57
1.	20000.	10.	14.	82.	69.	63.	52.	28.77	1.	000000000000	12.	.00	.00	.00
2.	12000.	12.	6.	84.	70.	63.	49.	28.82	7.	000000000000	3.	.00	.00	.00
3.	12000.	11.	6.	83.	70.	64.	53.	28.80	6.	000000000000	0.	.00	128.62	.61
4.	8000.	10.	8.	84.	69.	62.	48.	28.79	8.	000000000000	0.	.00	.00	.00
5.	12000.	9.	10.	80.	68.	61.	52.	28.78	8.	000000000000	0.	.00	.00	.00
6.	12000.	10.	9.	81.	68.	62.	52.	28.78	10.	000000000000	0.	42.56	131.53	.56
7.	12000.	11.	7.	84.	70.	63.	49.	28.80	9.	000000000000	0.	.00	.00	.00
8.	12000.	12.	6.	88.	72.	65.	47.	28.82	9.	000000000000	0.	.00	.00	.00
9.	12000.	12.	11.	92.	72.	63.	37.	28.82	9.	000000000000	0.	125.46	140.87	.56
10.	12000.	12.	10.	89.	72.	64.	43.	28.82	10.	000000000000	0.	.00	.00	.00
11.	12000.	11.	9.	89.	73.	66.	47.	28.82	9.	000000000000	0.	.00	.00	.00
12.	25000.	12.	9.	91.	74.	66.	44.	28.82	6.	000000000000	0.	216.86	137.24	.65
13.	20000.	16.	6.	96.	75.	67.	39.	28.80	3.	000000000000	0.	.00	.00	.00
14.	20000.	11.	14.	98.	74.	63.	31.	28.79	4.	000000000000	0.	.00	.00	.00
15.	6500.	10.	7.	97.	74.	64.	33.	28.78	8.	000000000000	0.	96.40	144.54	.58
16.	6500.	11.	7.	96.	76.	67.	39.	28.78	8.	000000000000	0.	.00	.00	.00
17.	20000.	12.	14.	95.	74.	65.	37.	28.78	3.	000000000000	0.	.00	.00	.00
18.	20000.	14.	10.	93.	74.	65.	40.	28.78	1.	000000000000	0.	.00	132.36	.63
19.	20000.	15.	5.	91.	75.	68.	47.	28.81	0.	000000000000	0.	.00	.00	.00
20.	20000.	15.	5.	85.	72.	65.	51.	28.83	0.	000000000000	0.	.00	.00	.00
21.	20000.	1.	8.	83.	71.	65.	55.	28.85	0.	000000000000	0.	.00	122.11	.63
22.	20000.	2.	9.	82.	71.	65.	56.	28.86	0.	000000000000	0.	.00	.00	.00
23.	20000.	2.	9.	81.	71.	67.	63.	28.87	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
15.	1440.	13981.	1.	8.	15.									
0.	20000.	2.	9.	79.	70.	67.	67.	28.88	0.	000000000000	0.	.00	119.51	.67
1.	20000.	2.	9.	77.	70.	67.	71.	28.88	0.	000000000000	0.	.00	.00	.00
2.	20000.	2.	9.	75.	69.	67.	76.	28.88	0.	000000000000	0.	.00	.00	.00
3.	20000.	2.	6.	73.	69.	67.	81.	28.89	0.	000000000000	0.	.00	114.15	.67
4.	20000.	3.	6.	73.	69.	67.	81.	28.91	0.	000000000000	0.	.00	.00	.00
5.	20000.	3.	6.	72.	69.	67.	84.	28.93	0.	000000000000	0.	.00	.00	.00
6.	20000.	4.	10.	73.	68.	66.	78.	28.94	0.	000000000000	0.	117.65	113.63	.64
7.	1100.	4.	12.	74.	69.	67.	79.	28.96	10.	200000000000	0.	.00	.00	.00
8.	20000.	4.	13.	78.	71.	68.	71.	28.96	5.	000000000000	0.	.00	.00	.00
9.	20000.	4.	10.	82.	72.	68.	63.	28.96	3.	000000000000	0.	246.33	126.15	.70
10.	20000.	2.	10.	86.	73.	68.	55.	28.96	3.	000000000000	0.	.00	.00	.00
11.	20000.	4.	12.	87.	72.	65.	48.	28.96	0.	000000000000	0.	.00	.00	.00
12.	20000.	4.	6.	88.	71.	63.	42.	28.95	0.	000000000000	0.	283.61	125.14	.56
13.	20000.	2.	8.	92.	72.	63.	37.	28.94	0.	000000000000	0.	.00	.00	.00
14.	20000.	4.	7.	93.	71.	60.	33.	28.92	0.	000000000000	0.	.00	.00	.00
15.	20000.	5.	6.	93.	69.	56.	29.	28.91	0.	000000000000	0.	166.81	127.14	.45
16.	20000.	2.	9.	94.	72.	62.	35.	28.89	0.	000000000000	0.	.00	.00	.00
17.	20000.	3.	9.	93.	69.	56.	29.	28.89	0.	000000000000	0.	.00	.00	.00
18.	20000.	4.	9.	91.	68.	56.	30.	28.88	0.	000000000000	0.	.00	125.01	.44
19.	20000.	4.	7.	87.	67.	55.	33.	28.89	0.	000000000000	0.	.00	.00	.00
20.	20000.	4.	7.	82.	65.	54.	37.	28.90	0.	000000000000	0.	.00	.00	.00
21.	20000.	4.	6.	78.	62.	52.	40.	28.92	0.	000000000000	0.	.00	112.48	.39
22.	20000.	4.	7.	77.	62.	52.	42.	28.93	0.	000000000000	0.	.00	.00	.00
23.	20000.	5.	6.	75.	60.	49.	40.	28.93	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

16.	A 1440.	B 13981.	C 1.	D 8.	E 16.	F	G	H	I	J	K	L	M	N
0.	20000.	6.	6.	73.	59.	48.	41.	28.94	0.	000000000000	0.	.00	107.29	.34
1.	20000.	5.	6.	73.	58.	48.	41.	28.93	0.	000000000000	0.	.00	.00	.00
2.	20000.	5.	6.	71.	59.	51.	49.	28.93	0.	000000000000	0.	.00	.00	.00
3.	20000.	5.	6.	69.	59.	52.	54.	28.93	0.	000000000000	0.	.00	105.12	.39
4.	20000.	6.	6.	69.	61.	56.	63.	28.93	0.	000000000000	0.	.00	.00	.00
5.	20000.	6.	6.	68.	61.	57.	68.	28.93	0.	000000000000	0.	.00	.00	.00
6.	20000.	6.	9.	72.	64.	60.	66.	28.94	0.	000000000000	0.	119.60	110.37	.53
7.	20000.	6.	9.	76.	67.	62.	62.	28.95	0.	000000000000	0.	.00	.00	.00
8.	20000.	7.	9.	83.	70.	64.	53.	28.95	0.	000000000000	0.	.00	.00	.00
9.	20000.	7.	9.	85.	71.	65.	51.	28.95	0.	000000000000	0.	261.25	123.76	.62
10.	20000.	5.	7.	89.	71.	63.	42.	28.95	0.	000000000000	0.	.00	.00	.00
11.	20000.	8.	14.	91.	70.	60.	35.	28.93	0.	000000000000	0.	.00	.00	.00
12.	20000.	7.	10.	93.	70.	59.	31.	28.92	0.	000000000000	0.	286.22	127.90	.49
13.	20000.	6.	10.	96.	71.	59.	29.	28.90	0.	000000000000	0.	.00	.00	.00
14.	20000.	5.	10.	97.	71.	58.	27.	28.88	0.	000000000000	0.	.00	.00	.00
15.	20000.	6.	9.	98.	70.	55.	24.	28.87	0.	000000000000	0.	167.00	131.39	.44
16.	20000.	6.	9.	99.	70.	56.	24.	28.86	0.	000000000000	0.	.00	.00	.00
17.	20000.	6.	11.	98.	70.	55.	24.	28.84	2.	000000000000	0.	.00	.00	.00
18.	20000.	6.	9.	97.	70.	55.	24.	28.83	3.	000000000000	0.	.00	134.31	.43
19.	20000.	6.	10.	92.	67.	53.	26.	28.84	2.	000000000000	0.	.00	.00	.00
20.	20000.	6.	9.	88.	66.	53.	30.	28.85	3.	000000000000	0.	.00	.00	.00
21.	20000.	6.	12.	86.	66.	54.	33.	28.86	0.	000000000000	0.	.00	119.93	.42
22.	20000.	7.	12.	85.	67.	57.	38.	28.86	0.	000000000000	0.	.00	.00	.00
23.	20000.	7.	11.	83.	67.	58.	42.	28.88	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
17.	1440.	13981.	1.	8.	17.									
0.	20000.	6.	12.	82.	66.	57.	42.	28.89	3.	000000000000	0.	.00	121.26	.47
1.	20000.	6.	10.	81.	66.	58.	45.	28.88	7.	000000000000	0.	.00	.00	.00
2.	20000.	8.	13.	80.	66.	59.	49.	28.86	7.	000000000000	0.	.00	.00	.00
3.	20000.	8.	13.	79.	66.	59.	50.	28.86	6.	000000000000	0.	.00	122.88	.50
4.	20000.	8.	10.	78.	66.	60.	54.	28.88	10.	000000000000	0.	.00	.00	.00
5.	16000.	8.	13.	77.	67.	62.	60.	28.88	10.	000000000000	0.	.00	.00	.00
6.	14000.	8.	13.	78.	68.	63.	60.	28.90	10.	000000000000	0.	42.01	128.96	.58
7.	14000.	8.	13.	80.	69.	64.	58.	28.90	10.	000000000000	0.	.00	.00	.00
8.	12000.	9.	17.	83.	71.	66.	56.	28.89	10.	000000000000	0.	.00	.00	.00
9.	12000.	10.	13.	86.	72.	66.	51.	28.88	7.	000000000000	0.	178.51	133.30	.64
10.	20000.	9.	10.	89.	73.	66.	47.	28.90	5.	000000000000	0.	.00	.00	.00
11.	12000.	9.	13.	94.	76.	69.	44.	28.88	9.	000000000000	0.	.00	.00	.00
12.	12000.	7.	9.	96.	75.	66.	37.	28.86	8.	000000000000	0.	165.03	144.49	.64
13.	12000.	9.	13.	99.	74.	62.	29.	28.84	8.	000000000000	0.	.00	.00	.00
14.	30000.	7.	19.	100.	72.	58.	25.	28.82	7.	000000000000	0.	.00	.00	.00
15.	30000.	8.	15.	102.	72.	57.	23.	28.81	8.	000000000000	0.	97.98	147.57	.47
16.	30000.	8.	14.	101.	75.	63.	29.	28.80	8.	000000000000	0.	.00	.00	.00
17.	30000.	7.	16.	100.	74.	63.	29.	28.80	8.	000000000000	0.	.00	.00	.00
18.	20000.	7.	14.	99.	74.	63.	30.	28.79	7.	000000000000	0.	.00	144.80	.56
19.	20000.	8.	14.	96.	73.	63.	33.	28.80	7.	000000000000	0.	.00	.00	.00
20.	20000.	7.	12.	92.	73.	64.	40.	28.81	4.	000000000000	0.	.00	.00	.00
21.	20000.	7.	14.	90.	72.	63.	41.	28.82	3.	000000000000	0.	.00	131.26	.59
22.	20000.	7.	13.	89.	72.	64.	43.	28.83	0.	000000000000	0.	.00	.00	.00
23.	20000.	7.	12.	88.	71.	63.	42.	28.84	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

18.	A 1440.	B 13981.	C 1.	D 8.	E 18.	F	G	H	I	J	K	L	M	N
0.	20000.	8.	12.	85.	70.	63.	48.	28.85	0.	000000000000	0.	.00	122.93	.59
1.	20000.	8.	12.	84.	70.	64.	51.	28.85	0.	000000000000	0.	.00	.00	.00
2.	20000.	8.	12.	83.	70.	64.	53.	28.85	0.	000000000000	0.	.00	.00	.00
3.	20000.	9.	10.	81.	69.	64.	56.	28.86	0.	000000000000	0.	.00	119.69	.60
4.	20000.	9.	9.	79.	69.	64.	60.	28.88	0.	000000000000	0.	.00	.00	.00
5.	20000.	9.	13.	79.	69.	65.	62.	28.88	0.	000000000000	0.	.00	.00	.00
6.	20000.	9.	13.	81.	71.	66.	60.	28.89	0.	000000000000	0.	116.41	120.64	.64
7.	20000.	9.	15.	84.	72.	67.	56.	28.90	0.	000000000000	0.	.00	.00	.00
8.	20000.	10.	17.	88.	73.	66.	48.	28.90	1.	000000000000	0.	.00	.00	.00
9.	20000.	9.	16.	91.	73.	65.	42.	28.90	2.	000000000000	0.	256.31	131.63	.62
10.	20000.	9.	16.	95.	74.	64.	36.	28.89	2.	000000000000	0.	.00	.00	.00
11.	20000.	10.	13.	97.	74.	64.	33.	28.89	1.	000000000000	0.	.00	.00	.00
12.	20000.	10.	10.	102.	73.	60.	25.	28.89	1.	000000000000	0.	283.31	138.34	.51
13.	20000.	10.	13.	103.	74.	61.	25.	28.87	1.	000000000000	0.	.00	.00	.00
14.	20000.	10.	17.	106.	73.	57.	20.	28.86	2.	000000000000	0.	.00	.00	.00
15.	20000.	10.	14.	107.	74.	58.	20.	28.84	2.	000000000000	0.	162.11	143.95	.48
16.	20000.	10.	15.	106.	73.	56.	19.	28.84	0.	000000000000	0.	.00	.00	.00
17.	20000.	10.	10.	106.	72.	54.	28.	28.84	0.	000000000000	0.	.00	.00	.00
18.	20000.	9.	11.	104.	73.	57.	21.	28.83	2.	000000000000	0.	.00	140.47	.46
19.	20000.	9.	8.	98.	72.	59.	27.	28.83	2.	000000000000	0.	.00	.00	.00
20.	20000.	9.	9.	94.	70.	57.	29.	28.84	2.	000000000000	0.	.00	.00	.00
21.	20000.	9.	9.	90.	69.	58.	33.	28.86	2.	000000000000	0.	.00	127.33	.47
22.	20000.	9.	9.	87.	68.	58.	37.	28.86	0.	000000000000	0.	.00	.00	.00
23.	20000.	9.	10.	87.	68.	58.	37.	28.87	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
19.	1440.	13981.	1.	8.	19.									
0.	20000.	9.	9.	85.	68.	58.	40.	28.88	0.	000000000000	0.	.00	120.70	.49
1.	20000.	9.	10.	84.	67.	58.	41.	28.89	0.	000000000000	0.	.00	.00	.00
2.	20000.	9.	9.	82.	68.	60.	47.	28.89	0.	000000000000	0.	.00	.00	.00
3.	20000.	9.	9.	82.	67.	60.	47.	28.89	0.	000000000000	0.	.00	118.00	.52
4.	20000.	10.	9.	80.	67.	60.	50.	28.90	4.	000000000000	0.	.00	.00	.00
5.	20000.	10.	7.	78.	67.	61.	56.	28.92	10.	000000000000	0.	.00	.00	.00
6.	20000.	10.	9.	80.	68.	62.	54.	28.93	10.	000000000000	0.	41.85	130.60	.56
7.	20000.	10.	10.	85.	70.	63.	48.	28.95	10.	000000000000	0.	.00	.00	.00
8.	20000.	12.	9.	91.	70.	59.	33.	28.95	5.	000000000000	0.	.00	.00	.00
9.	20000.	12.	7.	99.	72.	59.	26.	28.95	5.	000000000000	0.	223.60	140.60	.49
10.	20000.	12.	13.	101.	72.	58.	24.	28.94	5.	000000000000	0.	.00	.00	.00
11.	20000.	11.	10.	105.	73.	58.	21.	28.93	4.	000000000000	0.	.00	.00	.00
12.	20000.	12.	5.	110.	73.	54.	16.	28.91	3.	000000000000	0.	274.35	147.06	.42
13.	20000.	12.	10.	111.	74.	56.	17.	28.89	2.	000000000000	0.	.00	.00	.00
14.	20000.	13.	4.	112.	74.	55.	16.	28.88	2.	000000000000	0.	.00	.00	.00
15.	20000.	12.	5.	112.	73.	53.	15.	28.87	1.	000000000000	0.	165.75	145.70	.41
16.	20000.	11.	8.	111.	74.	55.	16.	28.85	2.	000000000000	0.	.00	.00	.00
17.	20000.	11.	11.	112.	74.	55.	16.	28.84	2.	000000000000	0.	.00	.00	.00
18.	20000.	11.	9.	108.	74.	57.	19.	28.85	3.	000000000000	0.	.00	146.28	.47
19.	20000.	11.	7.	102.	73.	60.	25.	28.84	8.	000000000000	0.	.00	.00	.00
20.	20000.	11.	9.	98.	71.	58.	26.	28.84	7.	000000000000	0.	.00	.00	.00
21.	20000.	11.	10.	94.	70.	58.	29.	28.85	6.	000000000000	0.	.00	136.42	.47
22.	20000.	11.	10.	95.	70.	57.	28.	28.85	3.	000000000000	0.	.00	.00	.00
23.	20000.	11.	9.	92.	69.	57.	30.	28.84	2.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD [a,c,d]

20.	A 1440.	B 13981.	C 1.	D 8.	E 20.	F	G	H	I	J	K	L	M	N
0.	20000.	11.	9.	90.	68.	57.	32.	28.85	2.	000000000000	0.	.00	127.00	.46
1.	20000.	12.	9.	86.	68.	58.	39.	28.85	1.	000000000000	0.	.00	.00	.00
2.	20000.	12.	6.	84.	67.	58.	41.	28.86	0.	000000000000	0.	.00	.00	.00
3.	20000.	13.	6.	82.	67.	58.	44.	28.87	0.	000000000000	0.	.00	118.06	.49
4.	20000.	12.	6.	81.	66.	58.	45.	28.88	0.	000000000000	0.	.00	.00	.00
5.	20000.	13.	4.	80.	66.	58.	47.	28.89	0.	000000000000	0.	.00	.00	.00
6.	20000.	7.	6.	81.	67.	60.	49.	28.91	0.	000000000000	0.	117.83	118.03	.53
7.	20000.	9.	6.	88.	70.	61.	40.	28.92	0.	000000000000	0.	.00	.00	.00
8.	20000.	12.	6.	94.	72.	62.	35.	28.91	0.	000000000000	0.	.00	.00	.00
9.	20000.	14.	6.	100.	74.	61.	28.	28.90	0.	000000000000	0.	262.89	135.94	.54
10.	20000.	12.	4.	105.	76.	63.	26.	28.90	0.	000000000000	0.	.00	.00	.00
11.	20000.	13.	7.	109.	74.	57.	19.	28.88	0.	000000000000	0.	.00	.00	.00
12.	20000.	10.	10.	110.	73.	54.	16.	28.87	0.	000000000000	0.	288.42	142.45	.42
13.	20000.	12.	7.	112.	77.	61.	20.	28.84	1.	000000000000	0.	.00	.00	.00
14.	20000.	9.	6.	111.	75.	57.	17.	28.83	3.	000000000000	0.	.00	.00	.00
15.	20000.	11.	5.	114.	74.	54.	14.	28.81	4.	000000000000	0.	150.12	152.73	.41
16.	20000.	11.	9.	114.	75.	56.	15.	28.80	8.	000000000000	0.	.00	.00	.00
17.	20000.	11.	9.	112.	75.	58.	18.	28.78	8.	000000000000	0.	.00	.00	.00
18.	20000.	11.	7.	110.	75.	59.	19.	28.78	7.	000000000000	0.	.00	154.92	.49
19.	20000.	12.	5.	105.	75.	61.	24.	28.78	4.	000000000000	0.	.00	.00	.00
20.	20000.	10.	8.	99.	73.	60.	28.	28.78	3.	000000000000	0.	.00	.00	.00
21.	20000.	11.	9.	98.	71.	58.	26.	28.80	2.	000000000000	0.	.00	134.98	.47
22.	20000.	11.	8.	96.	72.	60.	30.	28.80	2.	000000000000	0.	.00	.00	.00
23.	20000.	11.	7.	91.	71.	61.	36.	28.80	2.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

21.	A 1440.	B 13981.	C 1.	D 8.	E 21.	F	G	H	I	J	K	L	M	N
0.	20000.	0.	0.	88.	69.	60.	39.	28.81	2.	000000000000	0.	.00	126.65	.52
1.	20000.	9.	4.	89.	69.	59.	36.	28.81	6.	000000000000	0.	.00	.00	.00
2.	20000.	12.	4.	86.	69.	61.	42.	28.81	6.	000000000000	0.	.00	.00	.00
3.	20000.	13.	4.	86.	69.	61.	42.	28.81	4.	000000000000	0.	.00	127.59	.53
4.	20000.	13.	4.	84.	69.	61.	46.	28.82	4.	000000000000	0.	.00	.00	.00
5.	20000.	14.	4.	84.	69.	61.	46.	28.83	8.	000000000000	0.	.00	.00	.00
6.	20000.	12.	6.	87.	70.	62.	42.	28.84	3.	000000000000	0.	110.11	127.55	.55
7.	20000.	12.	6.	94.	72.	62.	35.	28.84	2.	000000000000	0.	.00	.00	.00
8.	20000.	14.	4.	99.	74.	62.	29.	28.84	0.	000000000000	0.	.00	.00	.00
9.	20000.	12.	7.	104.	76.	65.	28.	28.84	0.	000000000000	0.	259.76	141.65	.61
10.	20000.	13.	6.	109.	76.	61.	22.	28.84	2.	000000000000	0.	.00	.00	.00
11.	20000.	12.	10.	111.	78.	64.	22.	28.83	2.	000000000000	0.	.00	.00	.00
12.	20000.	14.	7.	110.	74.	55.	17.	28.83	0.	000000000000	0.	287.61	143.16	.44
13.	20000.	11.	10.	112.	74.	55.	16.	28.80	3.	000000000000	0.	.00	.00	.00
14.	20000.	13.	9.	114.	74.	54.	14.	28.80	3.	000000000000	0.	.00	.00	.00
15.	20000.	10.	8.	115.	74.	54.	13.	28.78	3.	000000000000	0.	157.45	151.58	.39
16.	20000.	12.	9.	113.	75.	57.	16.	28.76	5.	000000000000	0.	.00	.00	.00
17.	20000.	12.	9.	113.	76.	59.	18.	28.75	3.	000000000000	0.	.00	.00	.00
18.	20000.	11.	11.	111.	75.	59.	19.	28.74	3.	000000000000	0.	.00	150.48	.51
19.	20000.	11.	7.	104.	73.	59.	23.	28.74	4.	000000000000	0.	.00	.00	.00
20.	20000.	10.	9.	99.	72.	58.	26.	28.75	3.	000000000000	0.	.00	.00	.00
21.	20000.	10.	9.	95.	70.	57.	28.	28.76	5.	000000000000	0.	.00	136.13	.47
22.	8000.	9.	10.	93.	70.	58.	30.	28.77	8.	000000000000	0.	.00	.00	.00
23.	20000.	8.	12.	94.	72.	62.	35.	28.78	4.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
22.	1440.	13981.	1.	8.	22.									
0.	20000.	13.	9.	94.	73.	63.	36.	28.82	3.	000000000000	0.	.00	135.03	.58
1.	20000.	9.	10.	89.	70.	62.	41.	28.82	2.	000000000000	0.	.00	.00	.00
2.	20000.	9.	9.	85.	70.	62.	46.	28.81	2.	000000000000	0.	.00	.00	.00
3.	20000.	10.	10.	83.	70.	63.	51.	28.81	2.	000000000000	0.	.00	123.39	.58
4.	20000.	12.	5.	83.	70.	64.	53.	28.82	3.	000000000000	0.	.00	.00	.00
5.	20000.	5.	3.	80.	69.	64.	58.	28.84	1.	000000000000	0.	.00	.00	.00
6.	20000.	2.	14.	81.	71.	67.	63.	28.88	3.	000000000000	0.	107.75	124.75	.68
7.	20000.	2.	12.	81.	69.	63.	54.	28.91	3.	000000000000	0.	.00	.00	.00
8.	20000.	2.	10.	83.	69.	63.	51.	28.91	2.	000000000000	0.	.00	.00	.00
9.	20000.	4.	12.	87.	71.	64.	46.	28.93	1.	000000000000	0.	258.47	126.05	.60
10.	20000.	4.	9.	89.	72.	65.	45.	28.93	1.	000000000000	0.	.00	.00	.00
11.	20000.	7.	7.	92.	74.	67.	44.	28.93	1.	000000000000	0.	.00	.00	.00
12.	20000.	6.	5.	97.	76.	67.	37.	28.92	1.	000000000000	0.	277.19	136.92	.66
13.	20000.	16.	4.	98.	76.	67.	36.	28.93	0.	000000000000	0.	.00	.00	.00
14.	20000.	3.	6.	100.	77.	67.	34.	28.92	1.	000000000000	0.	.00	.00	.00
15.	20000.	1.	9.	100.	77.	68.	36.	28.91	1.	000000000000	0.	158.04	140.95	.70
16.	20000.	2.	9.	100.	78.	69.	36.	28.89	1.	000000000000	0.	.00	.00	.00
17.	20000.	2.	7.	99.	78.	70.	39.	28.89	0.	000000000000	0.	.00	.00	.00
18.	20000.	2.	9.	98.	77.	69.	39.	28.89	0.	000000000000	0.	.00	138.24	.71
19.	20000.	2.	10.	93.	75.	67.	42.	28.89	0.	000000000000	0.	.00	.00	.00
20.	20000.	2.	10.	90.	73.	65.	44.	28.91	3.	000000000000	0.	.00	.00	.00
21.	20000.	4.	9.	88.	72.	65.	47.	28.93	2.	000000000000	0.	.00	129.05	.63
22.	20000.	4.	11.	87.	71.	64.	46.	28.94	0.	000000000000	0.	.00	.00	.00
23.	20000.	4.	9.	86.	70.	63.	46.	28.95	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD [a,c,d]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
23.	1440.	13961.	1.	8.	23.									
0.	20000.	4.	9.	84.	69.	62.	48.	28.95	0.	000000000000	0.	.00	121.61	.57
1.	20000.	4.	6.	82.	67.	59.	46.	28.95	0.	000000000000	0.	.00	.00	.00
2.	20000.	4.	6.	81.	65.	55.	41.	28.95	0.	000000000000	0.	.00	.00	.00
3.	20000.	4.	7.	80.	63.	53.	39.	28.95	2.	000000000000	0.	.00	116.92	.41
4.	20000.	5.	7.	79.	63.	53.	40.	28.95	2.	000000000000	0.	.00	.00	.00
5.	20000.	5.	6.	78.	64.	55.	45.	28.96	0.	000000000000	0.	.00	.00	.00
6.	20000.	5.	6.	79.	65.	57.	47.	28.97	0.	000000000000	0.	117.37	115.13	.47
7.	20000.	7.	9.	82.	69.	62.	51.	28.98	3.	000000000000	0.	.00	.00	.00
8.	20000.	0.	0.	88.	72.	65.	47.	29.00	2.	000000000000	0.	.00	.00	.00
9.	20000.	1.	6.	92.	73.	64.	40.	29.01	3.	000000000000	0.	246.93	133.68	.61
10.	20000.	2.	13.	93.	73.	63.	37.	29.01	4.	000000000000	0.	.00	.00	.00
11.	20000.	4.	13.	95.	73.	63.	35.	29.00	5.	000000000000	0.	.00	.00	.00
12.	20000.	4.	12.	95.	73.	62.	33.	28.98	6.	000000000000	0.	217.74	139.15	.55
13.	20000.	5.	9.	97.	73.	62.	31.	28.96	9.	000000000000	0.	.00	.00	.00
14.	20000.	6.	10.	101.	75.	63.	29.	28.93	10.	000000000000	0.	.00	.00	.00
15.	20000.	4.	9.	102.	75.	63.	28.	28.91	10.	000000000000	0.	56.84	153.45	.58
16.	20000.	4.	7.	103.	76.	65.	29.	28.90	10.	000000000000	0.	.00	.00	.00
17.	20000.	5.	4.	102.	75.	64.	29.	28.89	8.	000000000000	0.	.00	.00	.00
18.	20000.	6.	7.	100.	76.	66.	32.	28.88	8.	000000000000	0.	.00	148.39	.62
19.	20000.	4.	9.	95.	74.	64.	36.	28.88	8.	000000000000	0.	.00	.00	.00
20.	20000.	5.	7.	92.	73.	64.	40.	28.90	8.	000000000000	0.	.00	.00	.00
21.	20000.	5.	5.	90.	72.	64.	42.	28.91	8.	000000000000	0.	.00	137.69	.60
22.	20000.	4.	6.	88.	72.	64.	45.	28.91	4.	000000000000	0.	.00	.00	.00
23.	20000.	5.	9.	86.	71.	64.	48.	28.91	5.	000000000000	0.	.00	.00	.00

WOLF CREEK

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
24.	1440.	13981.	1.	8.	24.									
0.	12000.	6.	7.	84.	71.	65.	53.	28.91	6.	000000000000	0.	.00	129.96	.63
1.	12000.	7.	7.	82.	70.	65.	56.	28.90	7.	000000000000	0.	.00	.00	.00
2.	12000.	9.	6.	81.	69.	63.	54.	28.90	7.	000000000000	0.	.00	.00	.00
3.	20000.	9.	9.	80.	68.	62.	54.	28.90	3.	000000000000	0.	.00	121.45	.56
4.	20000.	9.	9.	80.	67.	60.	50.	28.90	4.	000000000000	0.	.00	.00	.00
5.	20000.	10.	8.	78.	65.	58.	50.	28.90	5.	000000000000	0.	.00	.00	.00
6.	12000.	10.	10.	83.	67.	59.	44.	28.90	8.	000000000000	0.	68.89	129.14	.50
7.	20000.	11.	11.	88.	69.	60.	39.	28.90	3.	000000000000	0.	.00	.00	.00
8.	20000.	11.	9.	91.	71.	60.	35.	28.90	0.	000000000000	0.	.00	.00	.00
9.	20000.	13.	10.	98.	73.	62.	30.	28.90	0.	000000000000	0.	260.87	134.13	.55
10.	20000.	11.	10.	102.	75.	63.	28.	28.90	0.	000000000000	0.	.00	.00	.00
11.	20000.	11.	7.	106.	75.	61.	23.	28.89	0.	000000000000	0.	.00	.00	.00
12.	20000.	12.	13.	108.	75.	60.	21.	28.88	0.	000000000000	0.	283.69	143.13	.52
13.	20000.	11.	13.	107.	74.	57.	20.	28.85	0.	000000000000	0.	.00	.00	.00
14.	20000.	11.	14.	109.	74.	57.	19.	28.83	1.	000000000000	0.	.00	.00	.00
15.	20000.	11.	12.	108.	74.	58.	20.	28.82	1.	000000000000	0.	162.35	143.72	.49
16.	20000.	10.	14.	108.	73.	56.	18.	28.80	3.	000000000000	0.	.00	.00	.00
17.	20000.	10.	10.	107.	74.	57.	20.	28.79	2.	000000000000	0.	.00	.00	.00
18.	20000.	11.	15.	106.	72.	55.	19.	28.78	0.	000000000000	0.	.00	139.13	.44
19.	20000.	10.	10.	102.	72.	56.	22.	28.79	0.	000000000000	0.	.00	.00	.00
20.	20000.	9.	9.	94.	70.	57.	29.	28.79	0.	000000000000	0.	.00	.00	.00
21.	20000.	9.	9.	92.	69.	57.	30.	28.81	0.	000000000000	0.	.00	126.26	.46
22.	20000.	10.	10.	89.	68.	57.	33.	28.81	0.	000000000000	0.	.00	.00	.00
23.	20000.	10.	12.	89.	69.	57.	33.	28.81	0.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD [a,c,d]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
25.	1440.	13981.	1.	8.	25.									
0.	20000.	10.	11.	87.	68.	58.	37.	28.82	2.	000000000000	0.	.00	124.79	.43
1.	20000.	11.	10.	85.	67.	58.	40.	28.82	3.	000000000000	0.	.00	.00	.00
2.	20000.	11.	9.	85.	68.	59.	41.	28.82	2.	000000000000	0.	.00	.00	.00
3.	20000.	11.	9.	81.	67.	59.	47.	28.82	2.	000000000000	0.	.00	119.89	.50
4.	20000.	10.	9.	81.	67.	59.	47.	28.83	3.	000000000000	0.	.00	.00	.00
5.	20000.	10.	10.	80.	66.	59.	49.	28.84	2.	000000000000	0.	.00	.00	.00
6.	20000.	11.	10.	84.	68.	60.	44.	28.84	2.	000000000000	0.	112.57	122.92	.52
7.	20000.	11.	10.	88.	70.	61.	40.	28.85	0.	000000000000	0.	.00	.00	.00
8.	20000.	12.	11.	94.	72.	62.	35.	28.86	0.	000000000000	0.	.00	.00	.00
9.	20000.	12.	10.	100.	75.	64.	30.	28.85	0.	000000000000	0.	259.10	136.92	.58
10.	20000.	13.	11.	106.	75.	61.	23.	28.84	0.	000000000000	0.	.00	.00	.00
11.	20000.	13.	9.	108.	73.	56.	18.	28.83	2.	000000000000	0.	.00	.00	.00
12.	20000.	11.	17.	109.	72.	53.	16.	28.82	2.	000000000000	0.	282.83	144.10	.40
13.	20000.	10.	12.	109.	72.	53.	16.	28.80	3.	000000000000	0.	.00	.00	.00
14.	20000.	12.	9.	112.	75.	57.	17.	28.79	3.	000000000000	0.	.00	.00	.00
15.	20000.	11.	16.	112.	75.	58.	18.	28.77	3.	000000000000	0.	154.56	151.20	.50
16.	20000.	12.	7.	109.	75.	58.	19.	28.76	4.	000000000000	0.	.00	.00	.00
17.	20000.	11.	10.	108.	74.	57.	19.	28.74	4.	000000000000	0.	.00	.00	.00
18.	20000.	11.	9.	105.	73.	58.	21.	28.75	4.	000000000000	0.	.00	144.92	.47
19.	8000.	11.	9.	100.	72.	58.	25.	28.77	8.	000000000000	0.	.00	.00	.00
20.	8000.	15.	8.	98.	71.	57.	26.	28.78	8.	000000000000	0.	.00	.00	.00
21.	20000.	0.	0.	98.	69.	53.	22.	28.79	3.	000000000000	0.	.00	134.73	.40
22.	20000.	10.	9.	95.	69.	55.	26.	28.79	4.	000000000000	0.	.00	.00	.00
23.	20000.	11.	10.	92.	68.	55.	29.	28.82	5.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

26.	A 1440.	B 13981.	C 1.	D 8.	E 26.	F	G	H	I	J	K	L	M	N
0.	8000.	11.	9.	90.	69.	59.	35.	28.81	9.	000000000000	0.	.00	137.84	.50
1.	8000.	10.	10.	88.	68.	58.	36.	28.82	10.	000000000000	0.	.00	.00	.00
2.	8000.	11.	11.	88.	69.	59.	37.	28.82	9.	000000000000	0.	.00	.00	.00
3.	8000.	11.	9.	87.	69.	60.	40.	28.83	7.	000000000000	0.	.00	131.90	.52
4.	25000.	11.	9.	85.	69.	61.	44.	28.84	6.	000000000000	0.	.00	.00	.00
5.	20000.	9.	10.	82.	67.	59.	46.	28.86	4.	000000000000	0.	.00	.00	.00
6.	20000.	11.	12.	84.	70.	64.	51.	28.88	8.	000000000000	0.	67.18	131.83	.60
7.	20000.	11.	11.	85.	71.	65.	51.	28.89	8.	000000000000	0.	.00	.00	.00
8.	20000.	12.	9.	93.	74.	66.	41.	28.89	7.	000000000000	0.	.00	.00	.00
9.	20000.	13.	5.	98.	75.	65.	33.	28.88	6.	000000000000	0.	198.95	143.34	.60
10.	20000.	11.	6.	101.	76.	65.	30.	28.88	6.	000000000000	0.	.00	.00	.00
11.	20000.	12.	7.	101.	76.	65.	30.	28.88	6.	000000000000	0.	.00	.00	.00
12.	20000.	10.	9.	103.	76.	64.	28.	28.86	3.	000000000000	0.	266.36	144.30	.59
13.	20000.	10.	12.	106.	78.	66.	28.	28.84	3.	000000000000	0.	.00	.00	.00
14.	20000.	9.	10.	105.	75.	62.	24.	28.82	4.	000000000000	0.	.00	.00	.00
15.	20000.	12.	6.	106.	76.	63.	25.	28.80	4.	000000000000	0.	144.64	148.54	.58
16.	20000.	10.	7.	105.	76.	63.	26.	28.78	5.	000000000000	0.	.00	.00	.00
17.	20000.	10.	14.	103.	75.	62.	26.	28.77	5.	000000000000	0.	.00	.00	.00
18.	8000.	9.	13.	102.	75.	63.	28.	28.77	7.	000000000000	0.	.00	148.19	.58
19.	6500.	7.	22.	94.	75.	67.	41.	28.80	8.	000000000000	0.	.00	.00	.00
20.	20000.	8.	16.	89.	74.	68.	50.	28.82	5.	000000000000	0.	.00	.00	.00
21.	20000.	9.	14.	87.	75.	70.	57.	28.83	3.	000000000000	0.	.00	131.80	.74
22.	20000.	10.	17.	85.	74.	69.	59.	28.84	2.	000000000000	0.	.00	.00	.00
23.	20000.	10.	13.	84.	73.	68.	58.	28.85	2.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
27.	1440.	13981.	1.	8.	27.									
0.	20000.	9.	9.	82.	72.	67.	60.	28.86	0.	000000000000	0.	.00	122.01	.67
1.	20000.	9.	8.	80.	71.	67.	65.	28.84	2.	000000000000	0.	.00	.00	.00
2.	20000.	9.	8.	78.	70.	67.	69.	28.84	4.	000000000000	0.	.00	.00	.00
3.	25000.	9.	7.	77.	70.	66.	68.	28.83	9.	000000000000	0.	.00	127.31	.64
4.	25000.	9.	9.	76.	69.	66.	71.	28.83	9.	000000000000	0.	.00	.00	.00
5.	20000.	9.	7.	75.	69.	66.	74.	28.84	10.	000000000000	0.	.00	.00	.00
6.	20000.	9.	11.	78.	70.	66.	66.	28.84	9.	000000000000	0.	53.82	128.29	.64
7.	20000.	9.	13.	80.	71.	67.	65.	28.84	7.	000000000000	0.	.00	.00	.00
8.	20000.	10.	14.	84.	73.	68.	58.	28.84	3.	000000000000	0.	.00	.00	.00
9.	20000.	10.	12.	88.	74.	68.	52.	28.83	3.	000000000000	0.	242.63	131.82	.70
10.	20000.	9.	15.	92.	75.	68.	45.	28.83	0.	000000000000	0.	.00	.00	.00
11.	20000.	9.	10.	96.	76.	68.	40.	28.82	0.	000000000000	0.	.00	.00	.00
12.	20000.	9.	11.	100.	76.	66.	32.	28.80	0.	000000000000	0.	278.37	137.91	.62
13.	20000.	9.	13.	102.	76.	65.	29.	28.79	0.	000000000000	0.	.00	.00	.00
14.	20000.	10.	10.	102.	75.	64.	29.	28.77	1.	000000000000	0.	.00	.00	.00
15.	20000.	9.	14.	103.	75.	63.	27.	28.75	1.	000000000000	0.	158.87	140.80	.57
16.	20000.	10.	9.	102.	75.	63.	28.	28.73	1.	000000000000	0.	.00	.00	.00
17.	20000.	10.	17.	101.	75.	63.	29.	28.71	2.	000000000000	0.	.00	.00	.00
18.	20000.	10.	17.	100.	74.	63.	29.	28.70	3.	000000000000	0.	.00	140.51	.56
19.	20000.	9.	14.	97.	74.	63.	32.	28.70	4.	000000000000	0.	.00	.00	.00
20.	20000.	9.	12.	93.	73.	63.	37.	28.72	4.	000000000000	0.	.00	.00	.00
21.	20000.	9.	9.	92.	73.	64.	40.	28.72	4.	000000000000	0.	.00	135.03	.61
22.	20000.	9.	13.	92.	73.	65.	41.	28.73	4.	000000000000	0.	.00	.00	.00
23.	20000.	14.	12.	90.	74.	67.	47.	28.76	8.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
28.	1440.	13981.	1.	8.	28.									
0.	20000.	1.	3.	86.	75.	70.	59.	28.77	10.	000000000000	0.	.00	133.96	.74
1.	20000.	9.	5.	85.	73.	68.	57.	28.76	10.	000000000000	0.	.00	.00	.00
2.	20000.	9.	9.	85.	72.	66.	53.	28.75	10.	000000000000	0.	.00	.00	.00
3.	12000.	9.	7.	85.	71.	65.	51.	28.76	10.	000000000000	0.	.00	136.33	.62
4.	12000.	9.	7.	84.	71.	65.	53.	28.76	10.	000000000000	0.	.00	.00	.00
5.	10000.	9.	17.	80.	71.	67.	65.	28.77	10.	000000000000	0.	.00	.00	.00
6.	10000.	9.	14.	81.	70.	65.	58.	28.77	10.	000000000000	0.	39.85	132.37	.62
7.	10000.	9.	13.	81.	71.	66.	60.	28.77	10.	000000000000	0.	.00	.00	.00
8.	8000.	9.	7.	82.	71.	67.	60.	28.80	10.	000000000000	0.	.00	.00	.00
9.	8000.	8.	8.	85.	72.	66.	53.	28.80	10.	000000000000	0.	89.29	136.65	.65
10.	8000.	8.	10.	86.	73.	67.	53.	28.79	9.	000000000000	0.	.00	.00	.00
11.	15000.	7.	10.	90.	76.	70.	52.	28.78	8.	000000000000	0.	.00	.00	.00
12.	15000.	9.	10.	95.	74.	64.	36.	28.77	9.	000000000000	0.	133.18	144.59	.60
13.	12000.	10.	12.	95.	74.	65.	37.	28.75	8.	000000000000	0.	.00	.00	.00
14.	12000.	10.	15.	100.	75.	65.	31.	28.73	8.	000000000000	0.	.00	.00	.00
15.	12000.	10.	16.	100.	75.	64.	30.	28.72	7.	000000000000	0.	109.57	146.21	.58
16.	12000.	11.	15.	100.	75.	64.	30.	28.71	8.	000000000000	0.	.00	.00	.00
17.	20000.	11.	10.	99.	75.	64.	31.	28.70	5.	000000000000	0.	.00	.00	.00
18.	20000.	11.	7.	99.	75.	65.	32.	28.69	5.	000000000000	0.	.00	143.15	.60
19.	20000.	10.	7.	96.	75.	66.	37.	28.68	4.	000000000000	0.	.00	.00	.00
20.	20000.	9.	7.	92.	73.	65.	41.	28.69	5.	000000000000	0.	.00	.00	.00
21.	20000.	9.	9.	90.	73.	65.	44.	28.70	4.	000000000000	0.	.00	133.52	.63
22.	20000.	10.	12.	90.	73.	66.	45.	28.70	3.	000000000000	0.	.00	.00	.00
23.	20000.	10.	16.	90.	73.	65.	44.	28.71	1.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD [(a,c,d)]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
29.	1440.	13981.	1.	8.	29.									
0.	20000.	10.	13.	89.	73.	66.	47.	28.72	3.	000000000000	0.	.00	131.74	.65
1.	20000.	11.	10.	87.	72.	64.	46.	28.72	4.	000000000000	0.	.00	.00	.00
2.	20000.	10.	10.	85.	71.	64.	50.	28.73	2.	000000000000	0.	.00	.00	.00
3.	20000.	9.	9.	83.	70.	64.	53.	28.74	3.	000000000000	0.	.00	125.14	.61
4.	20000.	10.	9.	82.	70.	64.	54.	28.74	1.	000000000000	0.	.00	.00	.00
5.	20000.	10.	9.	81.	70.	65.	58.	28.77	7.	000000000000	0.	.00	.00	.00
6.	20000.	10.	9.	83.	71.	65.	55.	28.75	4.	000000000000	0.	99.82	126.87	.63
7.	20000.	10.	12.	86.	72.	65.	50.	28.75	4.	000000000000	0.	.00	.00	.00
8.	20000.	11.	13.	90.	74.	67.	47.	28.77	4.	000000000000	0.	.00	.00	.00
9.	20000.	11.	15.	96.	75.	66.	37.	28.76	4.	000000000000	0.	231.59	139.61	.64
10.	20000.	12.	13.	100.	77.	68.	36.	28.76	4.	000000000000	0.	.00	.00	.00
11.	20000.	12.	5.	103.	77.	67.	31.	28.75	4.	000000000000	0.	.00	.00	.00
12.	20000.	15.	8.	105.	79.	69.	31.	28.76	4.	000000000000	0.	248.92	150.34	.70
13.	20000.	13.	6.	108.	79.	68.	28.	28.74	4.	000000000000	0.	.00	.00	.00
14.	6500.	2.	22.	93.	77.	71.	49.	28.74	8.	000000000000	0.	.00	.00	.00
15.	5500.	12.	16.	88.	74.	68.	52.	28.74	8.	000000000000	0.	92.36	137.47	.70
16.	5500.	15.	6.	89.	75.	69.	52.	28.75	8.	000000000000	0.	.00	.00	.00
17.	5000.	14.	10.	90.	76.	70.	52.	28.77	10.	000000000000	0.	.00	.00	.00
18.	5000.	2.	9.	93.	75.	68.	45.	28.75	7.	000000000000	0.	.00	141.55	.71
19.	5000.	2.	17.	90.	77.	72.	56.	28.76	7.	000000000000	0.	.00	.00	.00
20.	5000.	4.	9.	87.	76.	71.	59.	28.80	6.	000000000000	0.	.00	.00	.00
21.	5000.	2.	7.	84.	75.	71.	65.	28.84	7.	000000000000	0.	.00	133.76	.77
22.	12000.	2.	6.	81.	74.	71.	71.	28.86	6.	000000000000	0.	.00	.00	.00
23.	12000.	3.	7.	80.	74.	72.	76.	28.87	6.	000000000000	0.	.00	.00	.00

B. WORST EVAPORATION PERIOD (a,c,d)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
30.	1440.	13981.	1.	8.	30.									
0.	12000.	2.	7.	79.	74.	71.	76.	28.86	8.	200000000000	0.	.00	129.78	.76
1.	12000.	3.	4.	78.	73.	71.	79.	28.84	7.	200000000000	0.	.00	.00	.00
2.	12000.	2.	7.	77.	73.	71.	81.	28.86	8.	200000000000	0.	.00	.00	.00
3.	12000.	2.	6.	76.	73.	71.	84.	28.86	8.	200000000000	0.	.00	126.93	.77
4.	12000.	2.	9.	76.	73.	71.	84.	28.87	8.	000000000000	0.	.00	.00	.00
5.	12000.	2.	9.	76.	72.	71.	84.	28.89	8.	200000000000	0.	.00	.00	.00
6.	10000.	2.	7.	76.	73.	72.	87.	28.90	8.	200000000000	0.	63.82	127.38	.79
7.	12000.	2.	7.	79.	74.	72.	79.	28.93	10.	200000000000	0.	.00	.00	.00
8.	8000.	2.	9.	82.	74.	71.	69.	28.94	10.	000000000000	0.	.00	.00	.00
9.	10000.	2.	13.	84.	74.	70.	63.	28.93	10.	000000000000	0.	87.89	136.96	.74
10.	10000.	4.	10.	86.	73.	68.	55.	28.92	10.	000000000000	0.	.00	.00	.00
11.	15000.	3.	10.	90.	74.	67.	47.	28.90	9.	000000000000	0.	.00	.00	.00
12.	20000.	4.	10.	92.	74.	66.	42.	28.89	1.	000000000000	0.	275.54	131.67	.64
13.	20000.	4.	11.	94.	74.	65.	39.	28.88	4.	000000000000	0.	.00	.00	.00
14.	20000.	5.	5.	95.	73.	63.	35.	28.87	3.	000000000000	0.	.00	.00	.00
15.	20000.	6.	9.	96.	74.	64.	35.	28.85	3.	000000000000	0.	149.83	137.45	.60
16.	20000.	4.	10.	97.	74.	64.	33.	28.84	3.	000000000000	0.	.00	.00	.00
17.	12000.	4.	6.	95.	74.	64.	36.	28.83	6.	000000000000	0.	.00	.00	.00
18.	12000.	2.	9.	92.	74.	66.	42.	28.82	6.	000000000000	0.	.00	138.03	.64
19.	20000.	2.	8.	89.	73.	67.	48.	28.83	5.	000000000000	0.	.00	.00	.00
20.	20000.	2.	9.	87.	73.	67.	52.	28.84	7.	000000000000	0.	.00	.00	.00
21.	12000.	3.	9.	85.	72.	67.	55.	28.84	10.	000000000000	0.	.00	136.98	.67
22.	12000.	4.	9.	84.	72.	66.	55.	28.86	10.	000000000000	0.	.00	.00	.00
23.	12000.	2.	4.	83.	72.	67.	58.	28.88	10.	000000000000	0.	.00	.00	.00

WOLF CREEK

TABLE 2.3-10 Sheet 1 of 3

MONTHLY AND ANNUAL AVERAGE
AND EXTREME TEMPERATURES FOR BURLINGTON, KANSAS[(a)]

Month	Average Daily Maximum[(b)]	Average Daily Minimum[(b)]	Average[(c)]	Extreme Maximum	Extreme Minimum
January	42.2	20.5	32.0	75	-22
February	46.8	23.4	36.6	86	-27
March	57.8	32.5	44.6	94	- 6
April	69.1	43.9	56.7	94	13
May	77.3	53.6	65.8	102	24
June	86.4	62.9	75.4	110	40
July	92.2	66.8	80.3	117	47
August	91.9	65.9	79.7	117	43
September	83.9	57.7	71.3	110	30
October	72.6	46.0	60.3	97	15
November	57.5	33.0	45.2	85	0
December	45.1	24.1	35.8	75	- 9
Annual	68.6	44.2	57.0	117	-27

---

[a]In degrees Fahrenheit.

[b]Data Period 1897-1960

[c]Data Period 1931-1960

Source:

U.S. Weather Bureau, 1965, Climatic summary of the United States, supplement for 1951 through 1960: U.S. Weather Bureau, Department of Commerce, pp. 86-112.

TABLE 2.3-10 (continued) Sheet 2 of 3

MONTHLY AND ANNUAL AVERAGE AND EXTREME TEMPERATURES FOR TOPEKA, KANSAS[a]

Month	Average Daily Maximum(b)	Average Daily Minimum(b)	Average(b)	Extreme Maximum(c,d)	Extreme Minimum(c,d)
January	38.3	17.7	28.0	73 (1967)	-20 (1974)
February	44.1	22.7	33.4	84 (1972)	-20 (1971)
March	52.6	29.7	41.2	88 (1966)	-7 (1978)
April	66.3	42.6	54.5	94 (1953)	10 (1975)
May	75.8	53.2	64.5	97 (1975)	26 (1963)
June	84.0	63.0	73.5	107 (1953)	44 (1950)
July	89.2	67.2	78.2	109 (1954)	43 (1972)
August	88.5	65.9	77.2	106 (1956)	45 (1956)
September	80.4	56.0	68.2	109 (1947)	30 (1972)
October	70.3	44.8	57.5	96 (1963)	19 (1976)
November	54.3	31.5	42.9	82 (1978)	2 (1976)
December	41.8	21.8	31.8	70 (1963)	-12 (1961)
Annual	65.5	43.0	54.3	109 (1954)	-20 (1974)

a In degrees Fahrenheit.
b Data Period 1941-1970.
c Data Period 1947-1978.
d Most recent in cases of multiple occurrence.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Topeka, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-10 (continued)

MONTHLY AND ANNUAL AVERAGE AND EXTREME TEMPERATURES FOR WICHITA, KANSAS[a]

Month	Average Daily Maximum(b)	Average Daily Minimum(b)	Average(b)	Extreme Maximum(c,d)	Extreme Minimum(c,d)
January	41.4	21.2	31.3	75 (1967)	-12 (1962)
February	47.1	25.4	36.3	84 (1976)	-6 (1971)
March	55.0	32.1	43.6	89 (1956)	-2 (1960)
April	68.1	45.1	56.6	96 (1972)	15 (1975)
May	77.1	55.0	66.1	100 (1967)	31 (1976)
June	86.5	65.0	75.8	106 (1956)	43 (1969)
July	91.7	69.6	80.7	113 (1954)	51 (1975)
August	91.0	68.3	79.7	110 (1964)	48 (1967)
September	81.9	59.2	70.6	105 (1978)	35 (1967)
October	71.3	47.9	59.6	95 (1954)	21 (1976)
November	55.8	33.8	44.8	81 (1978)	1 (1975)
December	44.3	24.6	34.5	83 (1955)	-5 (1968)
Annual	67.6	45.6	56.6	113 (1954)	-12 (1962)

---

a In degrees Fahrenheit.
b Data Period 1941-1970.
c Data Period 1953-1978.
d Most recent in cases of multiple occurrence.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Wichita, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-11

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(ANNUAL)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: THREE YEARS COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	10.6	5.7	.9	F	1.2	F	4.0	SSE	7.3	S	70.2
2	10.2	5.6	.9	F	1.1	F	4.0	SSE	7.2	S	71.4
3	9.9	5.5	.9	F	1.1	E	3.9	SSE	7.2	S	72.4
4	9.5	5.4	.8	F	1.1	E	4.0	SSE	7.1	S	73.3
5	9.3	5.3	.8	F	1.1	E	4.0	SSE	7.1	S	74.1
6	9.1	5.3	.7	E	1.0	E	4.0	SSE	7.1	S	74.7
7	9.4	5.5	.3	E	.6	E	4.2	SSE	6.9	S	74.2
8	10.2	5.8	-.1	E	-.0	E	4.5	S	6.8	S	72.0
9	11.4	6.1	-.5	D	-.6	D	5.0	S	6.9	SSW	68.5
10	12.6	6.2	-.8	C	-.9	D	5.4	SSW	7.0	SSW	64.4
11	13.8	6.3	-.9	B	-1.0	D	5.6	SSW	7.1	SSW	60.5
12	14.8	6.3	-.9	B	-1.1	D	5.6	SSW	7.1	SSW	57.2
13	15.5	6.3	-.9	B	-1.1	D	5.7	SSW	7.2	SSW	54.7
14	16.1	6.2	-.9	B	-1.1	D	5.8	SSW	7.3	SSW	52.9
15	16.4	6.2	-.8	C	-1.1	D	5.7	SSW	7.3	SSW	51.8
16	16.6	6.1	-.7	D	-1.0	D	5.6	S	7.2	S	51.2
17	16.3	6.0	-.6	D	-.8	D	5.2	S	7.1	S	51.8
18	15.6	6.1	-.2	E	-.4	D	4.7	SSE	7.0	SSE	54.2
19	14.6	6.2	.2	E	.2	E	4.2	SE	7.0	SSE	57.6
20	13.6	6.2	.6	E	.6	E	4.1	SE	7.2	SSE	61.0
21	12.7	6.1	.8	F	.9	E	4.1	SE	7.4	SSE	63.7
22	12.1	6.0	.9	F	1.0	E	4.1	SE	7.4	SSE	65.9
23	11.6	5.9	.9	F	1.1	E	4.1	SE	7.5	SSE	67.4
24	11.0	5.8	.9	F	1.2	F	4.0	SSE	7.4	SSE	68.8
ABSOLUTE MAX	39.6	28.5					16.5		20.7		100.0
AVG DAILY MAX	17.5	8.7					7.3		10.3		79.7
MEAN	12.6	5.9	.1	E	.1	E	4.6	SSE	7.2	S	63.9
CLIMATIC MEAN	12.7	5.9					4.7		7.1		63.5
AVG DAILY MIN	7.9	3.0					2.1		4.0		47.2
ABSOLUTE MIN	-22.7	-27.0					0.0		0.0		11.7
STANDARD DEV	10.9	9.9					2.4		2.9		17.7
VALID OBS	25898	24750	24092	24092	24047	24047	25673	25615	24955	24817	24686
INVALID OBS	406	1554	2212	2212	2257	2257	631	689	1349	1487	1618
TOTAL OBS	26304	26304	26304	26304	26304	26304	26304	26304	26304	26304	26304
DATA RECOVERY	98.5	94.1	91.6	91.6	91.4	91.4	97.6	97.4	94.9	94.3	93.8

TABLE 2.3-11 (Continued)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(ANNUAL)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	11.3	7.1	.9	F	1.1	E	4.1	SSE	7.6	S	71.2
2	11.0	7.1	.9	F	1.1	E	4.1	SSE	7.5	S	72.4
3	10.6	7.0	.9	F	1.0	E	4.0	SSE	7.5	S	73.5
4	10.3	6.9	.9	F	1.0	E	4.1	SSE	7.4	S	74.5
5	10.1	6.9	.8	F	1.0	E	4.1	S	7.4	SSW	75.3
6	10.0	6.8	.7	E	.9	E	4.2	SSE	7.4	SSW	75.6
7	10.4	7.1	.3	E	.5	E	4.3	S	7.2	S	74.8
8	11.2	7.4	-.2	E	-.1	E	4.7	S	7.1	SSW	72.5
9	12.4	7.7	-.5	D	-.7	D	5.2	SSW	7.3	SSW	68.8
10	13.6	7.9	-.8	C	-1.0	D	5.5	SSW	7.3	SSW	64.7
11	14.7	8.0	-.8	C	-1.1	D	5.7	SSW	7.5	SSW	61.0
12	15.7	8.1	-.9	B	-1.1	C	5.7	SSW	7.3	SSW	57.8
13	16.4	8.1	-.9	B	-1.2	C	5.8	SSW	7.5	SSW	55.4
14	16.9	7.9	-.9	B	-1.2	C	5.8	SSW	7.5	SSW	53.9
15	17.3	7.9	-.8	C	-1.1	D	5.7	SSW	7.6	SSW	52.7
16	17.3	7.8	-.7	D	-1.0	D	5.5	S	7.5	SSW	52.6
17	16.9	7.8	-.5	D	-.7	D	5.1	S	7.4	S	53.5
18	16.2	7.8	-.1	E	-.3	E	4.5	SSE	7.3	S	55.8
19	15.2	7.8	.3	E	.2	E	4.1	SSE	7.5	SSE	59.3
20	14.2	7.8	.7	E	.6	E	4.1	SE	7.6	SSE	62.4
21	13.4	7.7	.9	F	.9	E	4.0	SE	7.7	SSE	64.9
22	12.8	7.5	.9	F	1.0	E	4.0	SSE	7.8	SSE	67.0
23	12.3	7.4	1.0	F	1.1	E	4.1	SSE	7.9	SSE	68.5
24	11.7	7.2	1.0	F	1.1	E	4.1	SSE	7.8	S	69.9
ABSOLUTE MAX	37.5	28.5					16.5		20.7		100.0
AVG DAILY MAX	18.3	10.3					7.5		10.8		80.9
MEAN	13.4	7.5	.1	E	.1	E	4.7	S	7.5	S	65.0
CLIMATIC MEAN	13.5	7.4					4.8		7.4		64.4
AVG DAILY MIN	8.8	4.6					2.0		4.0		48.0
ABSOLUTE MIN	-22.7	-27.0					0.0		0.0		16.4
STANDARD DEV	11.1	9.9					2.5		2.9		17.0
VALID OBS	8695	8305	7819	7819	8583	8583	8430	8393	8095	7986	8303
INVALID OBS	65	455	941	941	177	177	330	367	665	774	457
TOTAL OBS	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760
DATA RECOVERY	99.3	94.8	89.3	89.3	98.0	98.0	96.2	95.8	92.4	91.2	94.8

TABLE 2.3-11 (Continued)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(ANNUAL)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB	DEW POINT	DELTA TEMP	STAB CLASS	DELTA TEMP	STAB CLASS	WIND SPEED	WIND DIR	WIND SPEED	WIND DIR	REL HUMID
			10.00	10.00	10.00	10.00					
	10.00	10.00	60.00	60.00	85.00	85.00	10.00	10.00	60.00	60.00	10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	10.3	5.3	.8	F	1.1	E	4.1	SSE	7.1	S	71.2
2	10.0	5.3	.8	F	1.1	E	4.0	SSE	7.0	S	72.4
3	9.6	5.1	.7	E	1.1	E	4.0	SSE	6.9	S	73.2
4	9.3	5.0	.7	E	1.0	E	4.0	SSE	6.9	S	74.1
5	9.0	4.9	.7	E	1.1	E	4.0	SSE	6.8	S	75.0
6	8.9	5.0	.6	E	.9	E	4.0	SSE	6.7	S	75.4
7	9.4	5.2	.1	E	.4	E	4.2	SSE	6.6	S	74.7
8	10.2	5.5	-.4	D	-.2	E	4.6	S	6.4	S	72.5
9	11.4	5.8	-.7	D	-.7	D	5.2	S	6.6	S	68.8
10	12.5	5.8	-.9	B	-1.0	D	5.5	SSW	6.8	S	64.9
11	13.6	5.8	-1.0	A	-1.1	D	5.7	SSW	6.9	S	61.1
12	14.6	5.9	-1.0	A	-1.1	C	5.8	SSW	7.0	SSW	58.0
13	15.3	5.8	-1.0	A	-1.1	C	5.9	SSW	7.1	SSW	55.8
14	15.7	5.8	-1.0	A	-1.1	D	5.9	SSW	7.2	SSW	54.1
15	16.1	5.8	-.9	B	-1.1	D	5.8	SSW	7.1	SSW	52.9
16	16.2	5.7	-.9	B	-1.0	D	5.8	SSW	7.1	SSW	52.2
17	16.0	5.7	-.7	D	-.8	D	5.4	S	7.0	S	53.2
18	15.2	5.8	-.3	D	-.4	D	4.8	S	6.8	S	55.7
19	14.2	5.9	.1	E	.2	E	4.3	SSE	6.8	SSE	59.4
20	13.2	5.9	.5	E	.6	E	4.1	SE	7.0	SSE	62.8
21	12.4	5.8	.7	E	.9	E	4.2	SE	7.2	SSE	65.3
22	11.7	5.7	.7	E	1.0	E	4.2	SE	7.2	SSE	67.1
23	11.2	5.6	.8	F	1.0	E	4.3	SSE	7.3	SSE	68.6
24	10.8	5.4	.8	F	1.1	E	4.2	SSE	7.2	S	69.9
ABSOLUTE MAX	39.6	22.8					15.9		19.7		100.0
AVG DAILY MAX	17.0	8.3					7.4		10.2		80.3
MEAN	12.4	5.6	-.0	E	.1	E	4.8	S	6.9	S	64.9
CLIMATIC MEAN	12.4	5.5					4.8		7.0		64.4
AVG DAILY MIN	7.7	2.7					2.2		3.8		48.6
ABSOLUTE MIN	-15.9	-22.5					0.0		0.0		18.0
STANDARD DEV	10.7	9.2					2.4		2.9		18.2
VALID OBS	8756	8736	8700	8700	8506	8506	8574	8560	8375	8359	8732
INVALID OBS	4	24	60	60	254	254	186	200	385	401	28
TOTAL OBS	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760	8760
DATA RECOVERY	100.0	99.7	99.3	99.3	97.1	97.1	97.9	97.7	95.6	95.4	99.7

TABLE 2.3-11 (Continued)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(ANNUAL)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	10.1	4.5	1.1	F	1.3	F	3.8	SE	7.2	SSE	68.0
2	9.8	4.5	1.0	F	1.3	F	3.8	SSE	7.1	SSE	69.2
3	9.4	4.4	1.0	F	1.3	F	3.8	SSE	7.1	SSE	70.2
4	9.0	4.2	1.0	F	1.3	F	3.8	SSE	7.1	S	71.1
5	8.7	4.1	.9	F	1.2	F	3.8	SSE	7.1	S	71.9
6	8.5	4.0	.9	F	1.2	F	3.8	SSE	7.0	S	72.8
7	8.5	4.1	.6	E	.9	E	3.9	SSE	6.9	S	73.0
8	9.1	4.3	.2	E	.3	E	4.3	S	6.8	S	71.0
9	10.2	4.7	-.3	D	-.4	D	4.7	S	6.7	S	67.7
10	11.7	4.9	-.6	D	-.8	D	5.1	SSW	6.8	SSW	63.5
11	13.0	4.9	-.7	D	-.9	D	5.4	SSW	7.0	SSW	59.3
12	14.2	5.0	-.8	C	-1.0	D	5.4	SSW	7.0	SSW	55.6
13	15.0	4.9	-.8	C	-1.0	D	5.5	SSW	7.1	SSW	52.7
14	15.6	4.7	-.8	C	-1.0	D	5.5	SSW	7.1	S	50.3
15	16.0	4.8	-.7	D	-1.0	D	5.6	S	7.1	S	49.4
16	16.3	4.6	-.6	D	-.9	D	5.5	S	7.2	S	48.4
17	16.1	4.6	-.5	D	-.8	D	5.2	SSE	7.0	SSE	48.6
18	15.4	4.7	-.2	E	-.5	D	4.7	SE	6.8	SE	50.8
19	14.5	4.8	.2	E	.1	E	4.2	SE	6.8	SE	53.8
20	13.3	4.9	.6	E	.6	E	4.0	ESE	7.0	SE	57.7
21	12.3	4.8	.8	F	1.0	E	4.0	ESE	7.3	SE	60.8
22	11.7	4.8	.9	F	1.1	F	4.0	ESE	7.3	SE	63.3
23	11.2	4.7	1.0	F	1.2	F	3.9	SE	7.2	SE	64.9
24	10.5	4.5	1.0	F	1.3	F	3.8	SE	7.2	SSE	66.5
ABSOLUTE MAX	34.1	22.5					14.8		18.8		100.0
AVG DAILY MAX	17.1	7.4					7.0		10.0		77.9
MEAN	12.1	4.6	.2	E	.2	E	4.5	SSE	7.0	SSE	61.7
CLIMATIC MEAN	12.1	4.6					4.6		7.1		61.4
AVG DAILY MIN	7.1	1.8					2.2		4.2		44.9
ABSOLUTE MIN	-18.5	-21.4					0.0		0.0		11.7
STANDARD DEV	10.9	10.3					2.4		2.9		17.8
VALID OBS	8447	7709	7573	7573	6958	6958	8669	8662	8485	8472	7651
INVALID OBS	337	1075	1211	1211	1826	1826	115	122	299	312	1133
TOTAL OBS	8784	8784	8784	8784	8784	8784	8784	8784	8784	8784	8784
DATA RECOVERY	96.2	87.8	86.2	86.2	79.2	79.2	98.7	98.6	96.6	96.4	87.1

WOLF CREEK

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL JANUARY COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	-2.2	-5.7	.6	E	.8	E	3.7	NW	6.7	WNW	69.3
2	-2.3	-5.7	.6	E	.8	E	3.9	NW	6.9	NW	69.7
3	-2.4	-5.9	.5	E	.7	E	4.1	NNW	7.1	NW	70.3
4	-2.8	-6.0	.5	E	.6	E	4.2	NW	7.1	WNW	70.6
5	-3.0	-6.2	.4	E	.6	E	4.2	WNW	7.1	WNW	70.7
6	-3.2	-6.3	.4	E	.5	E	4.1	NW	7.1	NW	70.9
7	-3.3	-6.4	.4	E	.6	E	4.1	NNW	7.1	NW	70.8
8	-3.3	-6.3	.3	E	.5	E	4.2	NW	7.0	WNW	71.5
9	-3.0	-6.1	.1	E	.1	E	4.4	N	7.1	NW	71.7
10	-2.0	-5.3	-.5	D	-.5	D	4.9	NNW	7.0	WNW	70.2
11	-.9	-4.9	-.7	D	-.7	D	5.1	N	6.8	W	68.0
12	.4	-4.3	-.7	D	-.8	D	5.2	W	6.7	WSW	65.1
13	.8	-4.2	-.8	C	-.9	D	5.2	W	6.8	W	63.2
14	1.5	-4.4	-.7	D	-.9	D	5.3	WSW	6.8	WSW	61.7
15	1.9	-4.3	-.7	D	-.9	D	5.3	W	6.8	WSW	59.8
16	1.9	-4.5	-.6	D	-.8	D	5.2	W	6.8	WSW	59.4
17	1.6	-4.7	-.4	D	-.6	D	4.6	NW	6.7	SW	59.4
18	.8	-4.8	-.0	E	-.1	E	4.1	ENE	6.6	SSW	61.3
19	.2	-4.9	.3	E	.3	E	4.0	ENE	6.9	S	63.6
20	-.6	-5.1	.4	E	.5	E	4.1	NE	7.1	NW	65.2
21	-1.0	-5.2	.5	E	.6	E	4.1	ENE	7.3	W	66.1
22	-1.2	-5.4	.5	E	.7	E	3.9	NNE	7.1	W	67.4
23	-1.5	-5.6	.6	E	.9	E	3.8	NNW	7.2	W	67.6
24	-1.9	-5.7	.5	E	.8	E	3.8	W	6.9	WNW	68.2
ABSOLUTE MAX	16.6	10.3					13.8		18.1		94.3
AVG DAILY MAX	3.1	-2.0					7.0		10.1		78.6
MEAN	-1.1	-5.3	.1	E	.1	E	4.4	NW	6.9	WNW	66.7
CLIMATIC MEAN	-1.0	-5.5					4.4		6.7		65.9
AVG DAILY MIN	-5.1	-8.9					1.8		3.4		53.2
ABSOLUTE MIN	-22.7	-27.0					0.0		0.0		19.2
STANDARD DEV	7.1	6.3					2.2		2.9		15.9
VALID OBS	2201	2060	2173	2173	1641	1641	2037	2036	1974	1968	2031
INVALID OBS	31	172	59	59	591	591	195	196	258	264	201
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	98.6	92.3	97.4	97.4	73.5	73.5	91.3	91.2	88.4	88.2	91.0

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD. ALL FEBRUARY COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB	DEW POINT	DELTA TEMP	STAB CLASS	DELTA TEMP	STAB CLASS	WIND SPEED	WIND DIR	WIND SPEED	WIND DIR	REL HUMID
			10.00	10.00	10.00	10.00					
	10.00	10.00	60.00	60.00	85.00	85.00	10.00	10.00	60.00	60.00	10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	-1.2	-5.8	.5	E	.6	E	4.2	NNW	7.3	NNW	68.0
2	-1.4	-6.0	.5	E	.6	E	4.3	N	7.2	N	68.0
3	-1.7	-6.1	.5	E	.6	E	4.2	N	7.3	NNW	68.1
4	-2.0	-6.3	.5	E	.6	E	4.3	NNW	7.5	NW	68.2
5	-2.2	-6.5	.4	E	.6	E	4.4	NNW	7.5	NNW	68.5
6	-2.4	-6.6	.4	E	.5	E	4.4	NW	7.5	NNW	69.2
7	-2.5	-6.6	.3	E	.4	E	4.5	NW	7.2	NNW	69.4
8	-2.6	-6.6	.2	E	.3	E	4.4	NNW	7.0	NNW	70.1
9	-2.0	-6.1	-.2	E	-.3	E	4.9	NW	7.0	NNW	69.8
10	-1.0	-5.4	-.6	D	-.7	D	5.3	NNW	7.0	NNW	68.8
11	.1	-5.1	-.7	D	-1.0	D	5.5	WNW	7.0	NW	66.3
12	1.1	-4.7	-.8	C	-1.1	D	5.6	W	6.8	WNW	64.3
13	1.9	-4.3	-.8	C	-1.1	D	5.7	W	7.0	WNW	62.2
14	2.5	-4.3	-.8	C	-1.1	D	5.8	W	7.1	WNW	60.6
15	3.0	-4.0	-.7	D	-1.1	D	5.7	WNW	7.0	WNW	60.0
16	3.2	-4.0	-.7	D	-1.0	D	5.5	WNW	6.9	NW	59.2
17	3.1	-4.1	-.6	D	-.9	D	5.2	NW	6.9	NW	60.3
18	2.5	-4.3	-.3	D	-.5	D	4.7	NNW	6.8	NNW	61.6
19	1.6	-4.5	.1	E	.0	E	4.1	N	6.8	NNW	63.4
20	1.0	-4.7	.4	E	.3	E	4.1	N	6.9	NNW	65.0
21	.4	-5.0	.5	E	.5	E	4.3	NNW	7.3	NNW	66.1
22	-.1	-5.2	.5	E	.6	E	4.3	N	7.2	NNW	66.8
23	-.4	-5.4	.6	E	.7	E	4.4	N	7.4	NNW	67.2
24	-.7	-5.5	.6	E	.7	E	4.3	NW	7.4	N	67.7
ABSOLUTE MAX	19.3	5.7					16.1		18.6		98.7
AVG DAILY MAX	4.4	-2.0					7.6		10.6		77.7
MEAN	.0	-5.3	-.0	E	-.1	E	4.8	NW	7.1	NW	65.8
CLIMATIC MEAN	.1	-5.3					4.8		7.1		66.1
AVG DAILY MIN	-4.2	-8.6					2.1		3.6		54.4
ABSOLUTE MIN	-18.5	-21.3					0.0		0.0		16.4
STANDARD DEV	6.4	5.0					2.5		3.1		16.2
VALID OBS	2040	2004	2033	2033	2040	2040	1854	1852	1617	1616	2000
INVALID OBS	0	36	7	7	0	0	186	188	423	424	40
TOTAL OBS	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040
DATA RECOVERY	100.0	98.2	99.7	99.7	100.0	100.0	90.9	90.8	79.3	79.2	98.0

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL MARCH COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB	DEW POINT	DELTA TEMP	STAB CLASS	DELTA TEMP	STAB CLASS	WIND SPEED	WIND DIR	WIND SPEED	WIND DIR	REL HUMID
			10.00	10.00	10.00	10.00					
	10.00	10.00	60.00	60.00	85.00	85.00	10.00	10.00	60.00	60.00	10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	4.5	-.9	.5	E	.7	E	4.7	ESE	7.7	SSE	68.1
2	4.2	-.9	.6	E	.8	E	4.8	ESE	7.8	SSE	69.2
3	3.9	-1.0	.5	E	.8	E	4.7	ESE	7.6	SSE	70.3
4	3.6	-1.0	.5	E	.8	E	4.7	ESE	7.8	SSE	71.6
5	3.4	-.9	.5	E	.8	E	4.8	ESE	7.8	S	72.1
6	3.2	-1.0	.4	E	.7	E	5.0	ESE	7.8	SE	72.5
7	3.1	-1.1	.3	E	.5	E	4.9	SE	7.7	SSE	73.1
8	3.5	-.9	-.1	E	.1	E	5.1	SE	7.4	SE	72.4
9	4.5	-.5	-.6	D	-.6	D	5.7	S	7.6	SSE	70.2
10	5.6	-.2	-.8	C	-.9	D	6.2	WSW	7.7	W	67.1
11	6.8	-.2	-.9	B	-1.0	D	6.6	WSW	8.0	W	62.7
12	7.7	-.1	-.9	B	-1.1	D	6.7	WSW	8.2	W	59.9
13	8.7	.1	-.9	B	-1.1	D	6.8	W	8.3	W	57.5
14	9.3	.3	-.9	B	-1.1	D	6.7	WSW	8.1	WSW	55.9
15	9.8	.4	-.9	B	-1.1	D	6.8	W	8.3	W	54.7
16	10.2	.6	-.8	B	-1.0	D	6.7	WSW	8.4	WSW	53.7
17	10.2	.5	-.7	D	-.9	D	6.5	WSW	8.2	SW	53.3
18	9.7	.4	-.5	D	-.6	D	5.7	WSW	7.8	SW	54.7
19	8.7	.4	-.1	E	-.1	E	4.8	NE	7.4	ENE	58.2
20	7.6	.3	.2	E	.2	E	4.8	E	7.6	ESE	61.9
21	6.8	.1	.3	E	.4	E	4.9	E	7.8	ESE	64.0
22	6.0	-.2	.4	E	.6	E	4.9	ENE	8.0	E	65.3
23	5.5	-.4	.5	E	.6	E	4.9	E	8.0	E	66.3
24	5.0	-.7	.5	E	.7	E	4.8	SE	7.9	SE	67.1
ABSOLUTE MAX	28.9	16.0					15.0		18.8		100.0
AVG DAILY MAX	11.4	3.5					8.6		11.4		79.7
MEAN	6.3	-.3	-.1	E	-.1	E	5.5	SSE	7.9	SSE	64.2
CLIMATIC MEAN	6.4	-.3					5.5		7.8		63.7
AVG DAILY MIN	1.4	-4.0					2.4		4.2		47.7
ABSOLUTE MIN	-16.5	-20.0					0.0		.8		17.2
STANDARD DEV	8.0	7.2					2.8		3.3		16.7
VALID OBS	2019	1786	1669	1669	1669	1669	2218	2214	2165	2163	1786
INVALID OBS	213	446	563	563	563	563	14	18	67	69	446
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	90.5	80.0	74.8	74.8	74.8	74.8	99.4	99.2	97.0	96.9	80.0

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL APRIL COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	10.5	4.5	.8	F	1.1	E	5.0	SE	8.3	SSE	66.7
2	10.1	4.3	.7	E	1.0	E	4.9	SE	8.2	SSE	67.6
3	9.7	4.2	.7	E	1.0	E	5.0	SE	8.3	SSE	68.7
4	9.3	4.1	.7	E	1.1	E	4.9	SE	8.2	SSE	69.8
5	9.0	3.9	.7	E	1.0	E	5.0	SE	8.3	SSE	70.7
6	8.8	3.9	.6	E	.9	E	5.0	SSE	8.2	SSE	71.7
7	9.2	4.2	.2	E	.4	E	5.4	SE	8.2	SSE	71.4
8	10.3	4.5	-.5	D	-.4	D	6.2	SSE	8.3	SSE	67.7
9	11.6	4.8	-.7	D	-.9	D	6.7	S	8.2	SSE	63.1
10	13.0	4.8	-.9	B	-1.0	D	6.8	S	8.2	S	58.7
11	14.2	4.7	-.9	B	-1.1	D	7.1	SSW	8.6	SSW	54.3
12	14.9	4.7	-1.0	A	-1.1	D	7.1	SW	8.6	SW	52.0
13	15.7	4.6	-.9	B	-1.1	D	7.2	SW	8.7	SW	50.4
14	16.1	4.7	-.9	B	-1.1	D	7.2	SW	8.6	SSW	49.4
15	16.5	4.5	-.9	B	-1.1	D	7.3	SSW	8.9	SSW	48.1
16	16.6	4.6	-.8	C	-1.0	D	7.2	SSW	8.8	SSW	47.9
17	16.5	4.6	-.7	D	-.8	D	6.9	SSW	8.6	SSW	47.8
18	16.1	4.6	-.5	D	-.6	D	6.2	S	8.1	S	49.2
19	15.2	4.9	-.1	E	-.1	E	5.2	SE	7.6	SSE	52.3
20	14.0	5.0	.4	E	.4	E	4.8	SE	7.7	SE	56.3
21	13.1	5.0	.6	E	.7	E	4.9	ESE	8.1	SE	59.3
22	12.3	4.8	.7	E	.9	E	5.1	SE	8.3	SE	61.4
23	11.7	4.8	.8	F	1.0	E	5.1	SE	8.3	SE	63.8
24	11.1	4.7	.9	F	1.1	F	5.0	SE	8.2	SSE	65.6
ABSOLUTE MAX	28.0	19.2					16.2		20.7		97.9
AVG DAILY MAX	17.7	7.6					9.1		11.9		78.1
MEAN	12.7	4.6	-.0	E	.0	E	5.9	SSE	8.3	SSE	59.8
CLIMATIC MEAN	12.6	4.6					5.9		8.3		60.9
AVG DAILY MIN	7.4	1.6					2.8		4.7		43.6
ABSOLUTE MIN	-7.6	-11.8					.7		.6		19.3
STANDARD DEV	6.6	6.3					2.7		3.1		17.8
VALID OBS	2129	1995	2096	2096	2091	2091	2120	2120	2116	2116	1995
INVALID OBS	31	165	64	64	69	69	40	40	44	44	165
TOTAL OBS	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
DATA RECOVERY	98.6	92.4	97.0	97.0	96.8	96.8	98.1	98.1	98.0	98.0	92.4

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL MAY COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	16.2	10.7	.9	F	1.2	F	4.4	SE	7.2	SSE	70.4
2	15.8	10.6	1.0	F	1.2	F	4.3	SE	7.0	SE	72.0
3	15.4	10.5	.9	F	1.2	F	4.2	SE	7.0	SE	73.2
4	15.0	10.3	.9	F	1.2	F	4.2	SE	7.0	SE	74.3
5	14.5	10.3	1.0	F	1.3	F	4.2	SE	7.0	SSE	75.9
6	14.4	10.3	.9	F	1.3	F	4.2	SE	7.0	SSE	76.7
7	15.0	10.7	.1	E	.4	E	4.4	SSE	6.8	SSE	75.9
8	16.3	11.3	-.6	D	-.5	D	5.0	SSE	6.4	SSE	72.5
9	17.7	11.6	-.8	C	-.9	D	5.8	S	7.0	SSE	68.4
10	18.8	11.5	-.8	C	-1.0	D	6.1	SSE	7.5	SSE	63.8
11	19.8	11.4	-.9	B	-1.1	D	6.2	SSE	7.6	SSE	59.9
12	20.7	11.2	-1.0	A	-1.2	C	6.3	SSE	7.6	SSE	56.1
13	21.4	11.1	-1.0	A	-1.2	C	6.4	SSE	7.7	SSE	53.6
14	21.9	11.0	-.9	B	-1.1	D	6.3	S	7.7	S	51.8
15	22.4	11.1	-.9	B	-1.1	D	6.2	SSE	7.4	SSE	50.4
16	22.6	11.1	-.8	C	-1.0	D	6.1	S	7.5	SSE	49.7
17	22.6	11.1	-.7	D	-.9	D	5.9	SSE	7.4	SSE	49.9
18	22.2	11.2	-.5	D	-.7	D	5.6	SE	7.3	SE	51.5
19	21.2	11.4	-.2	E	-.2	E	4.8	SE	6.9	SE	55.0
20	20.0	11.4	.3	E	.3	E	4.4	SE	7.0	SE	59.0
21	19.0	11.4	.6	E	.8	E	4.1	SE	6.9	SE	62.5
22	18.2	11.4	.8	F	1.0	E	4.3	ESE	7.2	SE	65.3
23	17.6	11.3	.9	F	1.1	E	4.3	SE	7.2	SE	67.3
24	16.9	11.1	.9	F	1.2	F	4.3	SE	7.4	SE	68.9
ABSOLUTE MAX	30.0	22.0					16.5		20.1		98.7
AVG DAILY MAX	23.4	13.8					8.0		10.6		81.2
MEAN	18.6	11.1	.0	E	.0	E	5.1	SE	7.2	SSE	63.4
CLIMATIC MEAN	18.6	11.0					5.1		7.3		63.6
AVG DAILY MIN	13.7	8.3					2.3		4.0		45.9
ABSOLUTE MIN	3.4	-1.5					.5		.6		18.0
STANDARD DEV	5.0	5.1					2.6		3.0		16.6
VALID OBS	2189	2184	2161	2161	2150	2150	2186	2186	2171	2170	2183
INVALID OBS	43	48	71	71	82	82	46	46	61	62	49
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	98.1	97.8	96.8	96.8	96.3	96.3	97.9	97.9	97.3	97.2	97.8

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL JUNE COMBINED

DATA SOURCE: ON-SITE
TABLE GENFRATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

HOUR	DRY BULB 10.00 DEG C	DEW POINT 10.00 DEG C	DELTA TEMP 10.00 60.00 DEG C	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00 DEG C	STAB CLASS 10.00 85.00	WIND SPEED 10.00 M/SEC	WIND DIR 10.00	WIND SPEED 60.00 M/SEC	WIND DIR 60.00	REL HUMID 10.00 PCT
1	19.3	14.4	1.0	F	1.3	F	3.8	S	7.2	S	73.9
2	18.9	14.3	1.0	F	1.2	F	3.7	S	7.0	S	75.1
3	18.4	14.1	1.0	F	1.3	F	3.7	S	7.0	S	76.1
4	18.0	14.0	1.0	F	1.3	F	3.7	S	6.8	S	77.8
5	17.7	13.9	1.0	F	1.3	F	3.5	S	6.5	S	78.9
6	17.9	14.1	.7	E	1.0	E	3.8	S	6.7	SSW	78.9
7	18.9	14.5	-.1	E	.0	E	4.1	S	6.3	S	75.9
8	20.4	14.8	-.6	D	-.7	D	4.8	SSW	6.5	SSW	70.4
9	21.8	14.7	-.8	C	-1.0	D	5.0	SSW	6.6	SSW	64.4
10	22.8	14.5	-.9	B	-1.1	D	5.1	SSW	6.6	SSW	60.4
11	23.8	14.4	-1.0	A	-1.2	C	5.3	SSW	6.7	SSW	56.8
12	24.7	14.3	-1.0	A	-1.2	C	5.4	SSW	6.8	SSW	53.8
13	25.4	14.2	-1.0	A	-1.2	C	5.6	SSW	7.0	SSW	51.2
14	26.0	14.2	-.9	B	-1.2	C	5.5	SSW	7.0	SSW	49.6
15	26.3	14.1	-.9	B	-1.1	D	5.4	SSW	7.0	SSW	48.0
16	26.7	14.3	-.8	C	-1.0	D	5.5	S	7.2	S	47.4
17	26.7	14.3	-.7	D	-.9	D	5.5	S	7.3	S	47.9
18	26.1	14.4	-.5	D	-.8	D	5.2	S	7.2	S	50.3
19	25.0	14.7	-.2	E	-.3	E	4.7	S	7.2	S	54.0
20	23.6	14.9	.3	E	.3	E	4.2	SSE	7.0	S	58.9
21	22.4	14.9	.7	E	.8	E	4.0	SSE	7.4	SSE	63.5
22	21.4	14.9	.9	F	1.0	E	4.0	SSE	7.4	S	66.9
23	20.8	14.8	.9	F	1.1	E	4.0	SSE	7.5	S	69.0
24	20.1	14.7	1.0	F	1.2	F	3.9	S	7.4	S	71.2
ABSOLUTE MAX	37.0	24.7					13.5		17.1		100.0
AVG DAILY MAX	27.1	16.9					7.0		9.9		82.1
MEAN	22.2	14.4	.0	E	-.0	E	4.6	S	7.0	S	63.4
CLIMATIC MEAN	22.1	14.5					4.6		7.0		63.9
AVG DAILY MIN	17.1	12.0					2.2		4.0		45.7
ABSOLUTE MIN	10.6	3.0					0.0		0.0		17.3
STANDARD DEV	4.6	4.3					2.3		2.7		18.2
VALID OBS	2136	2086	2062	2062	1955	1955	2152	2118	2135	2126	2084
INVALID OBS	24	74	98	98	205	205	8	42	25	34	76
TOTAL OBS	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
DATA RECOVERY	98.9	96.6	95.5	95.5	90.5	90.5	99.6	98.1	98.8	98.4	96.5

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL JULY COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB 10.00	DEW POINT 10.00	DELTA TEMP 10.00 60.00	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00	STAB CLASS 10.00 85.00	WIND SPEED 10.00	WIND DIR 10.00	WIND SPEED 60.00	WIND DIR 60.00	REL HUMID 10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	22.5	16.7	1.3	F	1.6	F	3.4	SE	7.1	SSE	70.2
2	22.1	16.7	1.2	F	1.5	F	3.2	SSE	6.8	SSE	71.8
3	21.7	16.7	1.2	F	1.5	F	3.1	SSE	6.9	SSE	73.5
4	21.4	16.7	1.2	F	1.5	F	2.9	SSE	6.6	S	75.2
5	21.0	16.7	1.2	F	1.5	F	2.8	SSE	6.2	S	76.8
6	21.0	16.7	.8	F	1.1	E	2.9	SE	6.0	S	76.7
7	22.2	17.2	-.1	E	.1	E	3.3	SSE	5.6	S	74.1
8	23.7	17.6	-.7	D	-.7	D	4.0	S	5.7	S	69.4
9	25.3	17.7	-.9	B	-1.1	D	4.5	S	6.0	S	63.6
10	26.7	17.6	-1.0	A	-1.2	C	4.6	S	6.1	S	58.6
11	27.9	17.3	-.9	B	-1.2	C	4.7	S	6.1	S	54.3
12	28.9	16.9	-1.0	A	-1.3	B	4.6	S	6.0	S	50.1
13	29.6	16.6	-1.0	A	-1.3	B	4.7	S	6.2	SSE	47.2
14	30.3	16.5	-1.0	A	-1.2	C	4.8	SSE	6.3	SSE	44.9
15	30.5	16.4	-.9	B	-1.2	C	4.7	SSE	6.5	SSE	44.4
16	30.5	16.3	-.9	B	-1.1	D	4.7	SSE	6.4	SSE	44.4
17	30.2	16.2	-.7	D	-.9	D	4.7	SSE	6.4	SSE	44.2
18	29.7	16.5	-.5	D	-.7	D	4.3	SSE	6.5	SSE	46.8
19	28.5	16.7	-.0	E	-.2	E	3.8	SE	6.6	SSE	50.5
20	27.0	16.8	.6	E	.6	E	3.4	SE	6.7	SE	54.9
21	25.7	16.8	1.0	F	1.1	E	3.5	SE	7.1	SE	59.3
22	24.7	16.7	1.1	F	1.3	F	3.5	SE	7.2	SE	62.4
23	23.9	16.6	1.2	F	1.4	F	3.5	SE	7.2	SSE	65.0
24	23.2	16.6	1.2	F	1.5	F	3.4	SE	7.2	SSE	67.1
ABSOLUTE MAX	37.6	28.5					11.9		14.3		100.0
AVG DAILY MAX	30.9	19.1					6.1		9.0		79.4
MEAN	25.8	16.8	.1	E	.1	E	3.9	SSE	6.5	SSE	60.2
CLIMATIC MEAN	25.7	16.9					4.0		6.5		60.9
AVG DAILY MIN	20.4	14.6					1.9		4.0		42.4
ABSOLUTE MIN	14.9	7.3					.4		.8		18.0
STANDARD DEV	4.9	3.3					1.9		2.2		19.1
VALID OBS	2201	2180	2133	2133	2133	2133	2225	2224	2156	2128	2158
INVALID OBS	31	52	99	99	99	99	7	8	76	104	74
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	98.6	97.7	95.6	95.6	95.6	95.6	99.7	99.6	96.6	95.3	96.7

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL AUGUST COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB 10.00	DEW POINT 10.00	DELTA TEMP 10.00 60.00	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00	STAB CLASS 10.00 85.00	WIND SPEED 10.00	WIND DIR 10.00	WIND SPEED 60.00	WIND DIR 60.00	REL HUMID 10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	21.2	16.5	.9	F	1.1	E	3.3	SSE	6.9	S	75.0
2	20.6	16.5	1.0	F	1.1	F	3.2	SSE	6.7	S	77.9
3	20.2	16.3	.9	F	1.1	F	3.0	SSE	6.5	S	78.9
4	19.9	16.3	1.0	F	1.2	F	3.1	SSE	6.3	S	80.1
5	19.5	16.2	1.0	F	1.1	E	3.2	SSE	6.3	S	81.3
6	19.4	16.3	.8	F	1.1	E	3.3	SSE	6.4	S	82.0
7	20.2	16.5	.1	E	.2	E	3.5	S	5.9	S	80.0
8	21.6	17.1	-.5	D	-.6	D	4.0	S	5.6	S	75.7
9	23.2	17.2	-.8	C	-1.0	D	4.4	SSW	5.9	SSW	69.8
10	24.5	17.2	-.8	C	-1.1	C	4.8	SSW	6.2	SSW	64.6
11	25.6	17.0	-.9	B	-1.2	C	4.9	SSW	6.5	SSW	59.9
12	26.5	16.9	-.9	B	-1.2	C	4.9	S	6.4	S	56.9
13	27.2	16.8	-.9	B	-1.2	C	5.0	S	6.5	S	53.9
14	27.7	16.6	-.9	B	-1.2	C	5.2	S	6.7	S	51.7
15	28.1	16.5	-.9	B	-1.2	C	5.0	S	6.6	S	50.4
16	28.1	16.4	-.8	C	-1.1	D	5.1	S	6.8	S	50.4
17	27.7	16.5	-.6	D	-.9	D	4.9	SSE	6.9	SSE	51.7
18	26.9	16.7	-.3	D	-.6	D	4.3	SSE	6.6	SSE	54.9
19	25.7	17.0	.2	E	.0	E	3.8	SE	6.8	SSE	59.8
20	24.3	17.1	.7	E	.7	E	3.5	SE	7.1	SSE	64.9
21	23.3	17.0	1.0	F	1.0	E	3.5	SE	7.4	SSE	68.5
22	22.6	17.0	1.0	F	1.1	E	3.5	SE	7.5	SSE	71.1
23	22.0	16.8	1.0	F	1.1	E	3.6	SE	7.3	SSE	72.7
24	21.6	16.8	.9	F	1.1	E	3.5	SSE	7.1	SSE	74.3
ABSOLUTE MAX	37.5	22.8					14.2		14.8		100.0
AVG DAILY MAX	28.8	18.8					6.5		9.6		84.8
MEAN	23.6	16.7	.1	E	.0	E	4.0	SSE	6.6	S	67.0
CLIMATIC MEAN	23.8	16.6					4.2		6.7		66.2
AVG DAILY MIN	18.8	14.5					2.0		3.8		47.5
ABSOLUTE MIN	11.8	1.8					.4		.7		20.5
STANDARD DEV	4.6	3.6					1.8		2.6		16.9
VALID OBS	2217	2197	2163	2163	2164	2164	2224	2214	2191	2137	2197
INVALID OBS	15	35	69	69	68	68	8	18	41	95	35
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	99.3	98.4	96.9	96.9	97.0	97.0	99.6	99.2	98.2	95.7	98.4

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL SEPTEMBER COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB	DEW POINT	DELTA TEMP 10.00	STAB CLASS 10.00	DELTA TEMP 10.00	STAB CLASS 10.00	WIND SPEED	WIND DIR	WIND SPEED	WIND DIR	REL HUMID
	10.00	10.00	60.00	60.00	85.00	85.00	10.00	10.00	60.00	60.00	10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	16.6	12.2	1.5	F	1.6	F	3.0	SE	6.4	SSE	75.6
2	16.2	12.1	1.5	F	1.6	F	2.9	SE	6.2	SSE	77.2
3	15.8	12.1	1.5	F	1.6	F	2.9	SE	6.2	SSE	78.3
4	15.5	11.9	1.4	F	1.6	F	3.1	SE	6.3	SSE	78.9
5	15.2	11.7	1.4	F	1.5	F	3.0	SE	6.1	SSE	79.3
6	14.9	11.6	1.4	F	1.5	F	3.1	SE	6.1	SSE	80.0
7	14.9	11.6	1.0	F	1.3	F	3.1	SE	5.8	SSE	80.1
8	15.9	12.0	.0	E	.3	E	3.4	SE	5.6	SSE	77.5
9	17.5	12.4	-.7	D	-.8	D	3.9	SSE	5.6	SSE	72.0
10	19.0	12.3	-.9	B	-1.0	D	4.2	S	5.6	SSE	66.3
11	20.3	12.3	-1.0	A	-1.1	D	4.2	SSE	5.7	SSE	62.3
12	21.2	12.1	-1.0	A	-1.2	C	4.4	SSE	5.9	SSE	58.6
13	22.0	12.0	-1.1	A	-1.2	C	4.4	SSE	6.0	SSE	55.7
14	22.4	11.9	-1.0	A	-1.2	C	4.5	SSE	6.1	SE	54.6
15	22.7	11.7	-.9	B	-1.1	D	4.5	SE	6.0	SE	53.6
16	23.0	11.7	-.8	C	-1.0	D	4.3	SE	5.8	SE	52.4
17	22.8	11.8	-.7	D	-.9	D	4.0	SE	5.7	SE	53.1
18	22.0	11.8	-.3	D	-.4	D	3.4	ESE	5.5	SE	55.3
19	20.7	12.1	.5	E	.4	E	2.9	ESE	5.8	SE	60.4
20	19.4	12.3	1.3	F	1.1	F	2.9	ESE	6.3	SE	65.3
21	18.5	12.2	1.4	F	1.4	F	2.9	ESE	6.5	SE	68.1
22	17.8	12.2	1.5	F	1.5	F	2.8	ESE	6.3	SE	70.8
23	17.3	12.2	1.5	F	1.6	F	2.8	SE	6.4	SE	72.3
24	16.8	11.9	1.5	F	1.6	F	2.9	SE	6.4	SE	73.7
ABSOLUTE MAX	31.5	21.7					15.8		16.8		96.9
AVG DAILY MAX	23.7	14.3					5.8		9.1		83.3
MEAN	18.7	12.0	.4	E	.4	E	3.5	SE	6.0	SE	67.6
CLIMATIC MEAN	18.9	11.9					3.6		6.1		65.9
AVG DAILY MIN	14.0	9.4					1.5		3.0		48.5
ABSOLUTE MIN	6.0	-1.5					0.0		0.0		17.0
STANDARD DEV	5.1	5.3					1.8		2.5		18.9
VALID OBS	2157	2114	1666	1666	2139	2139	2144	2143	2134	2103	2113
INVALID OBS	3	46	494	494	21	21	16	17	26	57	47
TOTAL OBS	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
DATA RECOVERY	99.9	97.9	77.1	77.1	99.0	99.0	99.3	99.2	98.8	97.4	97.8

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL OCTOBER COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB	DEW POINT	DELTA TEMP	STAB CLASS	DELTA TEMP	STAB CLASS	WIND SPEED	WIND DIR	WIND SPEED	WIND DIR	REL HUMID
	10.00	10.00	10.00 60.00	10.00 60.00	10.00 85.00	10.00 85.00	10.00	10.00	60.00	60.00	10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	13.1	6.9	1.6	F	1.8	F	3.8	S	7.5	S	67.5
2	12.7	7.0	1.5	F	1.7	F	3.7	SSE	7.2	S	68.8
3	12.4	7.0	1.5	F	1.7	F	3.7	S	7.2	S	70.1
4	12.0	6.9	1.5	F	1.7	F	3.7	S	7.3	S	71.5
5	11.8	6.9	1.3	F	1.6	F	3.9	SSE	7.4	S	72.1
6	11.5	6.9	1.3	F	1.5	F	4.0	SSE	7.6	S	73.0
7	11.6	7.2	1.1	F	1.5	F	4.1	SSE	7.4	S	73.8
8	12.4	7.7	.4	E	.7	E	4.4	SSE	7.3	S	71.9
9	14.0	7.9	-.5	D	-.5	D	5.1	S	7.0	S	66.8
10	15.7	7.9	-.7	D	-1.0	D	5.7	S	7.4	S	61.2
11	17.0	7.9	-.8	C	-1.1	D	5.9	S	7.6	S	56.9
12	18.3	7.7	-.9	B	-1.2	C	6.1	SSW	7.8	S	52.3
13	19.0	7.4	-.9	B	-1.2	C	6.0	SSW	7.7	SSW	49.4
14	19.6	7.1	-.8	C	-1.1	C	6.0	SSW	7.7	SSW	47.0
15	20.1	7.2	-.7	D	-1.1	D	5.8	SSW	7.6	SSW	46.1
16	20.2	7.0	-.6	D	-.9	D	5.6	SSW	7.5	SSW	45.7
17	19.7	7.0	-.3	D	-.6	D	5.0	S	7.2	S	47.2
18	18.5	7.1	.3	E	.1	E	3.9	S	6.8	SSE	50.5
19	17.1	7.1	.9	F	.9	E	3.6	SSE	7.1	SSE	54.8
20	16.1	7.1	1.2	F	1.2	F	3.7	SSE	7.2	SSE	57.6
21	15.2	7.0	1.4	F	1.5	F	3.9	SSE	7.4	SSE	60.1
22	14.5	7.0	1.5	F	1.6	F	3.8	SSE	7.5	S	62.6
23	14.0	7.0	1.5	F	1.6	F	3.8	S	7.5	S	64.3
24	13.4	6.8	1.5	F	1.8	F	3.9	S	7.6	S	66.0
ABSOLUTE MAX	31.7	20.7					14.0		17.8		95.5
AVG DAILY MAX	20.7	9.6					7.3		10.5		75.9
MEAN	15.4	7.2	.5	E	.5	E	4.5	S	7.4	S	60.7
CLIMATIC MEAN	15.5	6.7					4.7		7.3		59.4
AVG DAILY MIN	10.3	3.9					2.0		4.1		43.0
ABSOLUTE MIN	.5	-8.9					0.0		0.0		11.7
STANDARD DEV	5.5	6.6					2.5		3.0		20.4
VALID OBS	2225	2045	1847	1847	1973	1973	2224	2223	2008	2007	2045
INVALID OBS	7	187	385	385	259	259	8	9	224	225	187
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	99.7	91.6	82.8	82.8	88.4	88.4	99.6	99.6	90.0	89.9	91.6

TABLE 2.3-12

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS

(MONTHLY)

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL NOVEMBER COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB	DEW POINT	DELTA TEMP 10.00	STAB CLASS 10.00	DELTA TEMP 10.00	STAB CLASS 10.00	WIND SPEED	WIND DIR	WIND SPEED	WIND DIR	REL HUMID
	10.00	10.00	60.00	60.00	85.00	85.00	10.00	10.00	60.00	60.00	10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	5.3	.2	.8	F	1.0	E	4.2	SSW	7.6	SW	69.0
2	5.0	.1	.8	F	1.0	E	4.2	SW	7.6	SW	69.8
3	4.7	.1	.7	E	.9	E	4.2	SSW	7.5	SW	70.9
4	4.5	-.0	.6	E	.8	E	4.2	SSW	7.4	SW	71.5
5	4.3	-.0	.6	E	.8	E	4.4	SSW	7.5	SW	72.2
6	4.2	.0	.5	E	.7	E	4.3	SW	7.4	SW	73.1
7	4.1	.0	.5	E	.7	E	4.4	SW	7.4	SW	73.8
8	4.2	.0	.2	E	.4	E	4.6	SW	7.4	SW	73.2
9	5.2	.5	-.4	D	-.4	E	5.1	SW	7.2	SW	70.6
10	6.7	.7	-.7	D	-.8	D	5.6	SW	7.2	SW	66.1
11	7.9	.8	-.8	C	-1.0	D	5.8	WSW	7.3	SW	61.4
12	9.0	.8	-.8	C	-1.0	D	5.9	WSW	7.5	SW	57.8
13	9.8	.8	-.8	C	-1.0	D	6.0	WSW	7.6	SW	55.4
14	10.3	.7	-.8	C	-1.0	D	6.0	WSW	7.7	WSW	53.6
15	10.6	.9	-.7	D	-1.0	D	5.9	WSW	7.7	WSW	53.4
16	10.5	.4	-.6	D	-.8	D	5.6	SW	7.6	SW	52.3
17	9.9	.3	-.2	E	-.4	E	4.8	SW	7.3	SW	53.7
18	8.7	.4	.4	E	.3	E	4.3	SW	7.3	SW	57.5
19	7.9	.4	.7	E	.8	E	4.2	SSW	7.6	SW	59.8
20	7.3	.4	.9	F	1.0	E	4.3	SSW	7.8	SW	61.6
21	6.8	.3	.9	F	1.0	E	4.4	SSW	7.9	SW	63.1
22	6.2	.2	.9	F	1.0	E	4.4	SSW	7.9	SW	64.6
23	5.8	.1	.9	F	1.0	E	4.4	SSW	7.9	SSW	66.1
24	5.3	.0	.8	F	1.0	E	4.2	SSW	7.7	SW	67.8
ABSOLUTE MAX	23.9	16.3					15.9		19.7		100.0
AVG DAILY MAX	11.4	3.1					7.6		10.6		77.8
MEAN	6.8	.3	.2	E	.2	E	4.8	SW	7.5	SW	64.2
CLIMATIC MEAN	6.8	.2					5.0		7.6		62.3
AVG DAILY MIN	2.3	-2.8					2.4		4.5		46.9
ABSOLUTE MIN	-7.6	-14.7					.4		0.0		17.9
STANDARD DEV	5.7	6.1					2.3		2.7		17.0
VALID OBS	2160	2084	2131	2131	2160	2160	2151	2148	2146	2143	2084
INVALID OBS	0	76	29	29	0	0	9	12	14	17	76
TOTAL OBS	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
DATA RECOVERY	100.0	96.5	98.7	98.7	100.0	100.0	99.6	99.4	99.4	99.2	96.5

STATISTICS AND DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS
DATA PERIOD: ALL DECEMBER COMBINED

DATA SOURCE: ON-SITE
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

METEOROLOGICAL PARAMETERS (HEIGHTS IN METERS)

	DRY BULB 10.00	DEW POINT 10.00	DELTA TEMP 10.00 60.00	STAB CLASS 10.00 60.00	DELTA TEMP 10.00 85.00	STAB CLASS 10.00 85.00	WIND SPEED 10.00	WIND DIR 10.00	WIND SPEED 60.00	WIND DIR 60.00	REL HUMID 10.00
HOUR	DEG C	DEG C	DEG C		DEG C		M/SEC		M/SEC		PCT
1	.1	-4.5	.6	E	.9	E	4.5	WSW	7.8	WSW	67.7
2	-.2	-4.6	.6	E	.9	E	4.6	SW	7.7	WSW	68.4
3	-.4	-4.8	.5	E	.9	E	4.5	WSW	7.6	WSW	68.8
4	-.6	-4.9	.5	E	.8	E	4.6	WSW	7.6	WSW	69.1
5	-.8	-5.0	.4	E	.7	E	4.5	WSW	7.4	WSW	69.5
6	-1.0	-5.1	.4	E	.7	E	4.4	SW	7.2	W	70.1
7	-1.2	-5.1	.4	E	.8	E	4.3	WSW	7.2	SW	71.0
8	-1.2	-5.0	.3	E	.6	E	4.4	SW	7.2	WSW	71.7
9	-.8	-4.7	-.2	E	.1	E	4.7	SW	7.1	SW	71.2
10	.3	-4.5	-.6	D	-.6	D	5.2	WSW	7.1	W	67.8
11	1.6	-4.1	-.7	D	-.7	D	5.6	W	7.2	W	64.4
12	2.7	-3.8	-.8	C	-.8	D	5.6	W	7.0	W	61.2
13	3.7	-3.6	-.8	C	-.8	D	5.7	W	7.1	W	58.3
14	4.3	-3.7	-.8	C	-.9	D	5.8	WSW	7.2	W	55.1
15	4.7	-3.9	-.7	D	-.8	D	5.7	W	7.2	W	53.6
16	4.9	-3.9	-.6	D	-.7	D	5.4	W	7.1	W	52.2
17	4.2	-4.0	-.4	D	-.4	D	4.8	W	7.0	W	53.9
18	3.2	-4.0	.1	E	.1	E	4.4	WNW	7.1	W	57.1
19	2.4	-4.1	.4	E	.4	E	4.3	NNE	7.5	NW	59.5
20	1.7	-4.3	.5	E	.7	E	4.4	NE	7.6	NW	61.9
21	1.2	-4.2	.6	E	.8	E	4.4	NE	7.7	WNW	64.2
22	.8	-4.2	.6	E	.8	E	4.4	NW	7.7	WSW	65.4
23	.4	-4.3	.6	E	.9	E	4.4	WSW	7.7	WSW	66.4
24	.1	-4.4	.6	E	.9	E	4.3	W	7.7	WSW	67.6
ABSOLUTE MAX	19.7	12.2					13.9		16.9		97.9
AVG DAILY MAX	5.9	-1.4					7.4		10.4		77.5
MEAN	1.3	-4.4	.1	E	.2	E	4.8	W	7.4	WSW	64.0
CLIMATIC MEAN	1.5	-4.4					4.9		7.4		62.8
AVG DAILY MIN	-2.8	-7.4					2.5		4.4		48.1
ABSOLUTE MIN	-18.7	-25.5					.4		0.0		17.0
STANDARD DEV	6.0	5.8					2.4		2.9		15.9
VALID OBS	2224	2015	1958	1958	1932	1932	2138	2137	2142	2140	2010
INVALID OBS	8	217	274	274	300	300	94	95	90	92	222
TOTAL OBS	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232	2232
DATA RECOVERY	99.6	90.3	87.7	87.7	86.6	86.6	95.8	95.7	96.0	95.9	90.1

TABLE 2.3-13

MONTHLY AND ANNUAL AVERAGE DEWPOINT TEMPERATURES FOR TOPEKA AND WICHITA, KANSAS[a]

	Dewpoint Temperature[b]	
Month	Topeka	Wichita
January	19	21
February	23	25
March	29	30
April	41	41
May	53	53
June	63	62
July	66	65
August	65	63
September	56	55
October	45	45
November	31	33
December	23	25
Annual	43	43

[a] Data Period 1946-1965.

[b] In degrees Fahrenheit.

Source:

Environmental Data Service, 1968, Climatic atlas of the United States: Environmental Science Services Administration. U.S. Department of Commerce, Silver Spring, Maryland, p. 58.

TABLE 2.3-14

MEAN RELATIVE HUMIDITY AND MEAN NUMBER OF DAYS WITH HEAVY FOG AT TOPEKA, KANSAS

Month	Central Standard Time[a] 0000	0600	1200	1800	Mean Days with Heavy Fog[b]
January	76	77	65	67	2
February	74	77	61	59	1
March	72	78	56	53	1
April	73	80	55	53	1
May	77	83	57	55	1
June	80	86	60	58	1
July	78	85	59	56	1
August	78	86	57	56	1
September	82	87	59	60	1
October	77	83	54	58	1
November	78	82	61	64	1
December	77	80	65	68	2
Annual	77	82	59	59	14

a Data Period 1965-1978.
b Data Period 1947-1978.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Topeka, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-15

MEAN RELATIVE HUMIDITY AND MEAN NUMBER OF DAYS WITH HEAVY FOG AT WICHITA, KANSAS

Month	Central Standard Time[a] 0000	0600	1200	1800	Mean Days with Heavy Fog[a]
January	76	79	63	65	3
February	74	78	59	59	3
March	69	76	53	51	1
April	70	77	52	50	1
May	76	83	55	53	1
June	74	82	53	49	(b)
July	67	78	49	45	(b)
August	67	78	49	45	(b)
September	74	82	56	53	1
October	73	80	53	55	1
November	74	79	57	62	2
December	75	79	61	66	3
Annual	72	79	55	54	17

a Data Period 1954-1978.
b Less than 1/2.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Wichita, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-16

MONTHLY AND ANNUAL AVERAGE AND MAXIMUM PRECIPITATION AND SNOWFALL FOR BURLINGTON, KANSAS

Month	Average Precipitation[a] (inches)	Maximum Precipitation[a] (inches)	Average Snowfall[b] (inches)	Maximum Snowfall[c] (inches)
January	1.19	4.89	3.6	17.0
February	1.25	2.77	4.0	8.5
March	2.59	7.68	3.3	16.0
April	3.78	10.49	0.3	3.0
May	5.34	15.34	Trace	Trace
June	4.87	8.71	0.0	0.0
July	4.23	14.63	0.0	0.0
August	4.04	9.69	0.0	0.0
September	4.38	9.93	0.0	0.0
October	2.99	9.11	0.2	Trace
November	1.94	9.52	0.8	4.0
December	1.41	3.72	3.0	10.0
Annual	38.01		15.2	

[a] Data Period 1931-1960.

[b] Data Period 1896-1960.

[c] Data Period 1951-1960.

Source:

U.S. Weather Bureau, 1965, Climatic summary of the United States, supplement for 1951 for 1951 through 1960: U.S. Weather Bureau, Department of Commerce, pp. 86-112.

TABLE 2.3-16 (continued) Sheet 2 of 3

MONTHLY AND ANNUAL AVERAGE AND MAXIMUM PRECIPITATION AND SNOWFALL FOR TOPEKA, KANSAS

Month	Average Precipitation[a] (inches)	Maximum Precipitation[b] (inches)	Average Snowfall[b] (inches)	Maximum Snowfall[b] (inches)
January	0.97	5.24 (1949)	5.7	18.0 (1962)
February	0.98	3.49 (1971)	4.5	22.4 (1971)
March	2.17	8.44 (1973)	4.4	22.1 (1960)
April	3.62	8.12 (1967)	0.6	6.8 (1970)
May	4.01	7.83 (1977)	0.0	0.0
June	5.80	15.20 (1967)	0.0	0.0
July	4.21	12.02 (1950)	0.0	0.0
August	4.18	11.18 (1977)	0.0	0.0
September	3.28	12.71 (1973)	0.0	0.0
October	2.65	6.01 (1967)	Trace	0.8 (1970)
November	1.26	6.27 (1964)	1.3	9.4 (1972)
December	1.53	4.30 (1973)	4.9	15.2 (1973)
Annual	34.66	15.20 (1967)	20.9	22.4 (1971)

a Data Period 1941-1970.
b Data Period 1947-1978.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Topeka, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-16 (continued)

MONTHLY AND ANNUAL AVERAGE AND MAXIMUM PRECIPITATION AND SNOWFALL FOR WICHITA, KANSAS

Month	Average Precipitation[a] (inches)	Maximum Precipitation[b] (inches)	Average Snowfall[b] (inches)	Maximum Snowfall[b] (inches)
January	0.85	2.73 (1973)	4.3	18.5 (1962)
February	0.98	2.12 (1975)	4.0	16.7 (1971)
March	1.78	9.17 (1973)	2.9	16.5 (1970)
April	2.95	5.57 (1976)	0.2	2.3 (1973)
May	3.60	8.85 (1977)	0.0	0.0
June	4.49	10.46 (1957)	0.0	0.0
July	4.35	9.22 (1962)	0.0	0.0
August	3.10	7.91 (1960)	0.0	0.0
September	3.69	9.46 (1973)	0.0	0.0
October	2.50	6.13 (1959)	Trace	0.1 (1960)
November	1.17	5.88 (1964)	1.0	7.1 (1972)
December	1.12	2.80 (1973)	3.1	9.7 (1967)
Annual	30.58	10.46 (1957)	15.4	18.5 (1962)

a Data Period 1941-1970.
b Data Period 1954-1978.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Wichita, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

WOLF CREEK

TABLE 2.3-17

ANNUAL PRECIPITATION WIND ROSE

(10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MARCH 1979 THROUGH FEBRUARY 1980

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	3 1.14	7 2.65	4 1.52	1 .38	0 0.00	15 5.68	4.14
NE	0 0.00	5 1.89	7 2.65	4 1.52	1 .38	0 0.00	17 6.44	4.34
ENE	0 0.00	5 1.89	18 6.82	5 1.89	1 .38	0 0.00	29 10.98	4.36
E	0 0.00	2 .76	12 4.55	5 1.89	3 1.14	0 0.00	22 8.33	4.87
ESE	0 0.00	2 .76	6 2.27	7 2.65	2 .76	1 .38	18 6.82	5.70
SE	2 .76	2 .76	7 2.65	12 4.55	3 1.14	0 0.00	26 9.85	5.32
SSE	1 .38	3 1.14	7 2.65	5 1.89	4 1.52	0 0.00	20 7.58	5.24
S	1 .38	4 1.52	15 5.68	9 3.41	2 .76	1 .38	32 12.12	4.65
SSW	1 .38	3 1.14	4 1.52	6 2.27	1 .38	0 0.00	15 5.68	4.80
SW	0 0.00	2 .76	2 .76	4 1.52	2 .76	0 0.00	10 3.79	5.37
WSW	0 0.00	0 0.00	1 .38	1 .38	0 0.00	0 0.00	2 .76	4.65
W	0 0.00	4 1.52	3 1.14	2 .76	0 0.00	0 0.00	9 3.41	3.97
WNW	0 0.00	2 .76	2 .76	1 .38	2 .76	0 0.00	7 2.65	4.67
NW	0 0.00	0 0.00	2 .76	1 .38	0 0.00	0 0.00	3 1.14	4.23
NNW	2 .76	3 1.14	5 1.89	4 1.52	2 .76	0 0.00	16 6.06	4.53
N	1 .38	5 1.89	6 2.27	8 3.03	2 .76	1 .38	23 8.71	4.93
CALM	0 0.00						0 0.00	CALM
TOTAL	8 3.03	45 17.05	104 39.39	78 29.55	26 9.85	3 1.14	264 100.00	4.80

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	264	3.01 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	8399	95.62 PCT.
NUMBER OF INVALID OBSERVATIONS	121	1.38 PCT.
TOTAL NUMBER OF OBSERVATIONS	8784	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		28.15 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-18

ANNUAL PRECIPITATION WIND ROSE

(60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MARCH 1979 THROUGH FEBRUARY 1980

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00	1 .38	1 .38	7 2.65	8 3.03	2 .76	19 7.20	7.44
NE	0 0.00	0 0.00	7 2.65	3 1.14	3 1.14	0 0.00	13 4.92	5.66
ENE	0 0.00	0 0.00	2 .76	18 6.82	11 4.17	4 1.52	35 13.26	7.57
E	0 0.00	0 0.00	2 .76	10 3.79	6 2.27	4 1.52	22 8.33	7.34
ESE	0 0.00	0 0.00	0 0.00	6 2.27	7 2.65	3 1.14	16 6.06	8.74
SE	0 0.00	1 .38	2 .76	4 1.52	10 3.79	6 2.27	23 8.71	8.77
SSE	0 0.00	1 .38	2 .76	7 2.65	7 2.65	4 1.52	21 7.95	7.80
S	0 0.00	1 .38	5 1.89	11 4.17	9 3.41	4 1.52	30 11.36	7.29
SSW	0 0.00	0 0.00	2 .76	6 2.27	5 1.89	2 .76	15 5.68	7.64
SW	0 0.00	0 0.00	2 .76	6 2.27	1 .38	2 .76	11 4.17	7.23
WSW	0 0.00	1 .38	0 0.00	2 .76	0 0.00	1 .38	4 1.52	6.53
W	0 0.00	3 1.14	1 .38	4 1.52	1 .38	2 .76	11 4.17	6.02
WNW	0 0.00	1 .38	1 .38	1 .38	0 0.00	1 .38	4 1.52	6.07
NW	0 0.00	0 0.00	2 .76	1 .38	2 .76	0 0.00	5 1.89	6.22
NNW	0 0.00	0 0.00	3 1.14	5 1.89	2 .76	2 .76	12 4.55	6.86
N	0 0.00	0 0.00	8 3.03	6 2.27	6 2.27	3 1.14	23 8.71	6.75
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	9 3.41	40 15.15	97 36.74	78 29.55	40 15.15	264 100.00	7.37

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	264	3.01 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	8216	93.53 PCT.
NUMBER OF INVALID OBSERVATIONS	304	3.46 PCT.
TOTAL NUMBER OF OBSERVATIONS	8784	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		27.01 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-19

MONTHLY PRECIPITATION WIND ROSE

(10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MARCH 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 / 0.00	2 / 7.14	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	2.20
NE	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	4.30
ENE	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	2.30
E	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
ESE	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	3.90
SE	0 / 0.00	0 / 0.00	0 / 0.00	6 / 21.43	0 / 0.00	0 / 0.00	6 / 21.43	6.38
SSE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	2 / 7.14	8.05
S	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	10.30
SSW	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	2 / 7.14	5.05
SW	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	2.90
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
W	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
WNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NNW	2 / 7.14	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	4 / 14.29	3.65
N	1 / 3.57	2 / 7.14	3 / 10.71	0 / 0.00	0 / 0.00	0 / 0.00	6 / 21.43	2.95
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	4 / 14.29	7 / 25.00	6 / 21.43	7 / 25.00	3 / 10.71	1 / 3.57	28 / 100.00	4.56

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION 28 3.76 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION 713 95.83 PCT.
NUMBER OF INVALID OBSERVATIONS 3 .40 PCT.
TOTAL NUMBER OF OBSERVATIONS 744 100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD 1.45 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: APRIL 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 14.19.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 / 0.00	0 / 0.00	1 / 3.70	0 / 0.00	1 / 3.70	0 / 0.00	2 / 7.41	5.50
NE	0 / 0.00	0 / 0.00	1 / 3.70	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.70	3.60
ENE	0 / 0.00	1 / 3.70	2 / 7.41	0 / 0.00	0 / 0.00	0 / 0.00	3 / 11.11	3.60
E	0 / 0.00	0 / 0.00	1 / 3.70	0 / 0.00	1 / 3.70	0 / 0.00	2 / 7.41	5.50
ESE	0 / 0.00	0 / 0.00	1 / 3.70	2 / 7.41	1 / 3.70	1 / 3.70	5 / 18.52	7.62
SE	0 / 0.00	1 / 3.70	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.70	1.90
SSE	0 / 0.00	0 / 0.00	3 / 11.11	0 / 0.00	2 / 7.41	0 / 0.00	5 / 18.52	6.16
S	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
SSW	0 / 0.00	0 / 0.00	1 / 3.70	1 / 3.70	0 / 0.00	0 / 0.00	2 / 7.41	5.60
SW	0 / 0.00	0 / 0.00	1 / 3.70	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.70	4.00
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
W	0 / 0.00	0 / 0.00	1 / 3.70	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.70	4.20
WNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NNW	0 / 0.00	0 / 0.00	1 / 3.70	1 / 3.70	0 / 0.00	0 / 0.00	2 / 7.41	5.10
N	0 / 0.00	1 / 3.70	0 / 0.00	1 / 3.70	0 / 0.00	0 / 0.00	2 / 7.41	5.00
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	3 / 11.11	13 / 48.15	5 / 18.52	5 / 18.52	1 / 3.70	27 / 100.00	5.44

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION 27 3.75 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION 687 95.42 PCT.
NUMBER OF INVALID OBSERVATIONS 6 .83 PCT.
TOTAL NUMBER OF OBSERVATIONS 720 100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD 1.43 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MAY 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	6.30
NE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	1 / 3.23	0 / 0.00	2 / 6.45	6.95
ENE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	7.20
E	0 / 0.00	0 / 0.00	1 / 3.23	2 / 6.45	1 / 3.23	0 / 0.00	4 / 12.90	6.10
ESE	0 / 0.00	0 / 0.00	2 / 6.45	1 / 3.23	0 / 0.00	0 / 0.00	3 / 9.68	5.00
SE	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	4.90
SSE	0 / 0.00	0 / 0.00	2 / 6.45	3 / 9.68	0 / 0.00	0 / 0.00	5 / 16.13	5.68
S	0 / 0.00	0 / 0.00	4 / 12.90	3 / 9.68	0 / 0.00	0 / 0.00	7 / 22.58	4.86
SSW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	5.10
SW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
W	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	5.80
WNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	1 / 3.23	8.00
N	0 / 0.00	1 / 3.23	0 / 0.00	2 / 6.45	1 / 3.23	0 / 0.00	4 / 12.90	6.62
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	1 / 3.23	10 / 32.26	16 / 51.61	4 / 12.90	0 / 0.00	31 / 100.00	5.79

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION 31 4.17 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION 713 95.83 PCT.
NUMBER OF INVALID OBSERVATIONS 0 0.00 PCT.
TOTAL NUMBER OF OBSERVATIONS 744 100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD 4.03 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JUNE 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	2.55
NE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	7.20
ENE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	7.60
E	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	3.40
ESE	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	2 / 7.14	6.85
SE	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	3.85
SSE	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	4.00
S	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	3.60
SSW	0 / 0.00	1 / 3.57	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	3 / 10.71	4.40
SW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	7.20
WSW	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	4.65
W	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	3.85
WNW	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	2 / 7.14	5.55
NW	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	4.50
NNW	0 / 0.00	0 / 0.00	1 / 3.57	3 / 10.71	0 / 0.00	0 / 0.00	4 / 14.29	5.65
N	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	7.20
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	5 / 17.86	10 / 35.71	10 / 35.71	3 / 10.71	0 / 0.00	28 / 100.00	4.95

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION 28 3.89 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION 689 95.69 PCT.
NUMBER OF INVALID OBSERVATIONS 3 .42 PCT.
TOTAL NUMBER OF OBSERVATIONS 720 100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD 8.35 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-19 (Continued)

MONTHLY PRECIPITATION WIND ROSE

(10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JULY 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	2 7.14	1 3.57	0 0.00	0 0.00	3 10.71	4.27
NE	0 0.00	1 3.57	2 7.14	0 0.00	0 0.00	0 0.00	3 10.71	3.53
ENE	0 0.00	0 0.00	8 28.57	0 0.00	0 0.00	0 0.00	8 28.57	4.37
E	0 0.00	0 0.00	1 3.57	0 0.00	0 0.00	0 0.00	1 3.57	4.50
ESE	0 0.00	0 0.00	0 0.00	1 3.57	0 0.00	0 0.00	1 3.57	5.70
SE	0 0.00	0 0.00	1 3.57	1 3.57	0 0.00	0 0.00	2 7.14	5.70
SSE	0 0.00	1 3.57	1 3.57	0 0.00	0 0.00	0 0.00	2 7.14	3.25
S	0 0.00	0 0.00	3 10.71	0 0.00	0 0.00	0 0.00	3 10.71	4.30
SSW	0 0.00	1 3.57	0 0.00	1 3.57	0 0.00	0 0.00	2 7.14	3.60
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	1 3.57	0 0.00	0 0.00	0 0.00	0 0.00	1 3.57	1.80
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	1 3.57	0 0.00	0 0.00	0 0.00	1 3.57	3.60
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 3.57	1 3.57	10.10
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	4 14.29	19 67.86	4 14.29	0 0.00	1 3.57	28 100.00	4.36

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	28	3.76 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	716	96.24 PCT.
NUMBER OF INVALID OBSERVATIONS	0	0.00 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		4.18 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: AUGUST 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	2 13.33	0 0.00	0 0.00	0 0.00	0 0.00	2 13.33	2.25
ESE	0 0.00	0 0.00	0 0.00	1 6.67	0 0.00	0 0.00	1 6.67	5.40
SE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSE	1 6.67	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 6.67	.40
S	0 0.00	0 0.00	3 20.00	0 0.00	0 0.00	0 0.00	3 20.00	4.07
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	1 6.67	0 0.00	0 0.00	1 6.67	5.70
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	1 6.67	1 6.67	0 0.00	0 0.00	0 0.00	2 13.33	3.15
WNW	0 0.00	1 6.67	1 6.67	0 0.00	0 0.00	0 0.00	2 13.33	2.70
NW	0 0.00	0 0.00	1 6.67	1 6.67	0 0.00	0 0.00	2 13.33	4.10
NNW	0 0.00	1 6.67	0 0.00	0 0.00	0 0.00	0 0.00	1 6.67	2.70
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	1 6.67	5 33.33	6 40.00	3 20.00	0 0.00	0 0.00	15 100.00	3.39

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	15	2.02 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	729	97.98 PCT.
NUMBER OF INVALID OBSERVATIONS	0	0.00 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.69 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: SEPTEMBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	3 16.67	0 0.00	0 0.00	0 0.00	3 16.67	3.93
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	1 5.56	0 0.00	0 0.00	0 0.00	0 0.00	1 5.56	2.40
SE	2 11.11	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 11.11	1.20
SSE	0 0.00	2 11.11	0 0.00	0 0.00	0 0.00	0 0.00	2 11.11	1.70
S	1 5.56	2 11.11	0 0.00	2 11.11	0 0.00	0 0.00	5 27.78	3.00
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	1 5.56	0 0.00	0 0.00	0 0.00	0 0.00	1 5.56	2.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	1 5.56	1 5.56	0 0.00	0 0.00	0 0.00	2 11.11	3.60
N	0 0.00	0 0.00	1 5.56	0 0.00	1 5.56	0 0.00	2 11.11	5.55
CALM	0 0.00						0 0.00	CALM
TOTAL	3 16.67	7 38.89	5 27.78	2 11.11	1 5.56	0 0.00	18 100.00	3.07

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	18	2.50 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	701	97.23 PCT.
NUMBER OF INVALID OBSERVATIONS	2	.28 PCT.
TOTAL NUMBER OF OBSERVATIONS	721	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.47 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: OCTOBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	1 3.85	0 0.00	0 0.00	0 0.00	1 3.85	5.00
SE	0 0.00	0 0.00	0 0.00	3 11.54	2 7.69	0 0.00	5 19.23	7.80
SSE	0 0.00	0 0.00	0 0.00	0 0.00	1 3.85	0 0.00	1 3.85	9.90
S	0 0.00	0 0.00	2 7.69	3 11.54	1 3.85	0 0.00	6 23.08	5.50
SSW	0 0.00	0 0.00	2 7.69	2 7.69	0 0.00	0 0.00	4 15.38	5.60
SW	0 0.00	0 0.00	0 0.00	2 7.69	1 3.85	0 0.00	3 11.54	7.13
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	1 3.85	0 0.00	0 0.00	1 3.85	6.10
WNW	0 0.00	0 0.00	0 0.00	1 3.85	1 3.85	0 0.00	2 7.69	7.20
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	1 3.85	0 0.00	0 0.00	0 0.00	1 3.85	3.60
N	0 0.00	0 0.00	1 3.85	1 3.85	0 0.00	0 0.00	2 7.69	[illegible]
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	7 26.92	13 50.00	6 23.08	0 0.00	26 100.00	6.10

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	26	3.49 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	712	95.70 PCT.
NUMBER OF INVALID OBSERVATIONS	6	.81 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		1.33 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

MONTHLY PRECIPITATION WIND ROSE

(10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: NOVEMBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	1 2.86	1 2.86	0 0.00	0 0.00	0 0.00	2 5.71	3.15
ENE	0 0.00	1 2.86	4 11.43	2 5.71	0 0.00	0 0.00	7 20.00	4.37
E	0 0.00	0 0.00	8 22.86	1 2.86	1 2.86	0 0.00	10 28.57	4.73
ESE	0 0.00	1 2.86	0 0.00	2 5.71	0 0.00	0 0.00	3 8.57	4.47
SE	0 0.00	0 0.00	2 5.71	1 2.86	1 2.86	0 0.00	4 11.43	5.32
SSE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
S	0 0.00	0 0.00	3 8.57	0 0.00	0 0.00	0 0.00	3 8.57	4.10
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	2 5.71	0 0.00	0 0.00	0 0.00	0 0.00	2 5.71	2.80
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	1 2.86	3 8.57	0 0.00	0 0.00	4 11.43	4.95
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	5 14.29	19 54.29	9 25.71	2 5.71	0 0.00	35 100.00	4.47

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	35	4.86 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	685	95.14 PCT.
NUMBER OF INVALID OBSERVATIONS	0	0.00 PCT.
TOTAL NUMBER OF OBSERVATIONS	720	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		3.51 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: DECEMBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 14.19.11.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00	0 0.00	0 0.00	2 66.67	0 0.00	0 0.00	2 66.67	5.35
NE	0 0.00	0 0.00	0 0.00	1 33.33	0 0.00	0 0.00	1 33.33	5.40
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
S	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	0 0.00	3 100.00	5.37

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	3	.40 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	737	99.06 PCT.
NUMBER OF INVALID OBSERVATIONS	4	.54 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.08 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JANUARY 1980

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 14.14.11.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	3 17.65	2 11.76	1 5.88	0 0.00	0 0.00	6 35.29	3.73
ENE	0 0.00	2 11.76	1 5.88	0 0.00	0 0.00	0 0.00	3 17.65	2.57
E	0 0.00	0 0.00	0 0.00	2 11.76	0 0.00	0 0.00	2 11.76	6.05
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	0 0.00	1 5.88	0 0.00	0 0.00	0 0.00	1 5.88	3.30
SSE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
S	0 0.00	1 5.88	0 0.00	0 0.00	1 5.88	0 0.00	2 11.76	6.00
SSW	0 0.00	1 5.88	0 0.00	0 0.00	0 0.00	0 0.00	1 5.88	2.80
SW	0 0.00	0 0.00	0 0.00	0 0.00	1 5.88	0 0.00	1 5.88	7.60
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	1 5.88	0 0.00	0 0.00	0 0.00	0 0.00	1 5.88	2.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	8 47.06	4 23.53	3 17.65	2 11.76	0 0.00	17 100.00	4.11

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	17	2.28 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	706	94.89 PCT.
NUMBER OF INVALID OBSERVATIONS	21	2.82 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.52 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: FEBRUARY 1980

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	3 37.50	2 25.00	0 0.00	0 0.00	5 62.50	5.04
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	0 0.00	2 25.00	0 0.00	0 0.00	0 0.00	2 25.00	4.00
SSE	0 0.00	0 0.00	0 0.00	1 12.50	0 0.00	0 0.00	1 12.50	5.10
S	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	5 62.50	3 37.50	0 0.00	0 0.00	8 100.00	4.81

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	8	1.15 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	612	87.93 PCT.
NUMBER OF INVALID OBSERVATIONS	76	10.92 PCT.
TOTAL NUMBER OF OBSERVATIONS	696	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.11 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-20

MONTHLY PRECIPITATION WIND ROSE

(60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MARCH 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	0 / 0.00	0 / 0.00	2 / 7.14	5.80
NE	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	3.50
ENE	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	5.60
E	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
ESE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	7.20
SE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	6 / 21.43	0 / 0.00	6 / 21.43	9.65
SSE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	14.80
S	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	2 / 7.14	12.30
SSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	13.40
SW	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	5.00
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
W	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	2.70
WNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	13.40
N	0 / 0.00	0 / 0.00	5 / 17.86	3 / 10.71	0 / 0.00	0 / 0.00	8 / 28.57	4.85
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	1 / 3.57	8 / 28.57	8 / 28.57	7 / 25.00	4 / 14.29	28 / 100.00	7.47

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	28	3.76 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	703	94.49 PCT.
NUMBER OF INVALID OBSERVATIONS	13	1.75 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		1.45 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: APRIL 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	0 / 0.00	2 / 7.14	9.80
NE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	5.40
ENE	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	1 / 3.57	0 / 0.00	3 / 10.71	6.70
E	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	1 / 3.57	3 / 10.71	7.00
ESE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	2 / 7.14	2 / 7.14	5 / 17.86	10.54
SE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
SSE	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	2 / 7.14	2 / 7.14	6 / 21.43	8.30
S	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
SSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	8.90
SW	0 / 0.00	0 / 0.00	0 / 0.00	2 / 7.14	0 / 0.00	0 / 0.00	2 / 7.14	6.55
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
W	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	6.30
WNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	9.50
NNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
N	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	1 / 3.57	0 / 0.00	3 / 10.71	6.13
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	1 / 3.57	2 / 7.14	10 / 35.71	10 / 35.71	5 / 17.86	28 / 100.00	8.03

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	28	3.89 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	685	95.14 PCT.
NUMBER OF INVALID OBSERVATIONS	7	.97 PCT.
TOTAL NUMBER OF OBSERVATIONS	720	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		1.44 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MAY 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	1 / 3.23	10.10
NE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	2 / 6.45	0 / 0.00	2 / 6.45	8.25
ENE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	3 / 9.68	0 / 0.00	3 / 9.68	9.20
E	0 / 0.00	0 / 0.00	1 / 3.23	1 / 3.23	1 / 3.23	1 / 3.23	4 / 12.90	7.45
ESE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	1 / 3.23	0 / 0.00	2 / 6.45	7.70
SE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	1 / 3.23	8.00
SSE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	3 / 9.68	0 / 0.00	4 / 12.90	7.42
S	0 / 0.00	0 / 0.00	0 / 0.00	4 / 12.90	3 / 9.68	0 / 0.00	7 / 22.58	7.29
SSW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	6.20
SW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	6.90
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
W	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	1 / 3.23	6.70
WNW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0.00
NNW	0 / 0.00	0 / 0.00	1 / 3.23	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	4.90
N	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.23	2 / 6.45	3 / 9.68	10.40
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	0 / 0.00	2 / 6.45	10 / 32.26	15 / 48.39	4 / 12.90	31 / 100.00	7.87

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	31	4.17 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	699	93.95 PCT.
NUMBER OF INVALID OBSERVATIONS	14	1.88 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		4.83 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JUNE 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	4.25
NE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	8.00
ENE	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	8.00
E	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	10.30
ESE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	6.30
SE	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	4.00
SSE	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	2 / 7.14	7.00
S	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	[illegible]
SSW	0 / 0.00	0 / 0.00	2 / 7.14	2 / 7.14	1 / 3.57	0 / 0.00	5 / 17.86	5.48
SW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	6.10
WSW	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	11.40
W	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	2 / 7.14	7.15
WNW	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	0 / 0.00	0 / 0.00	2 / 7.14	4.70
NW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	0 / 0.00	1 / 3.57	6.30
NNW	0 / 0.00	0 / 0.00	0 / 0.00	1 / 3.57	1 / 3.57	1 / 3.57	3 / 10.71	8.20
N	0 / 0.00	0 / 0.00	1 / 3.57	0 / 0.00	1 / 3.57	0 / 0.00	2 / 7.14	6.70
CALM	0 / 0.00						0 / 0.00	CALM
TOTAL	0 / 0.00	2 / 7.14	6 / 21.43	10 / 35.71	6 / 21.43	4 / 14.29	28 / 100.00	6.50

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	28	3.89 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	674	93.61 PCT.
NUMBER OF INVALID OBSERVATIONS	18	2.50 PCT.
TOTAL NUMBER OF OBSERVATIONS	720	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		8.34 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-20 (Continued)

MONTHLY PRECIPITATION WIND ROSE

(60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JULY 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	1 3.70	1 3.70	1 3.70	3 11.11	8.57
NE	0 0.00	0 0.00	1 3.70	1 3.70	0 0.00	0 0.00	2 7.41	5.10
ENE	0 0.00	0 0.00	1 3.70	6 22.22	0 0.00	0 0.00	7 25.93	5.63
E	0 0.00	0 0.00	0 0.00	4 14.81	1 3.70	0 0.00	5 18.52	6.06
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	1 3.70	0 0.00	1 3.70	0 0.00	0 0.00	2 7.41	4.50
SSE	0 0.00	0 0.00	1 3.70	1 3.70	0 0.00	0 0.00	2 7.41	5.70
S	0 0.00	0 0.00	2 7.41	1 3.70	0 0.00	0 0.00	3 11.11	4.93
SSW	0 0.00	0 0.00	0 0.00	1 3.70	0 0.00	0 0.00	1 3.70	6.20
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	1 3.70	0 0.00	0 0.00	0 0.00	0 0.00	1 3.70	2.10
NW	0 0.00	0 0.00	1 3.70	0 0.00	0 0.00	0 0.00	1 3.70	3.90
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	2 7.41	6 22.22	16 59.26	2 7.41	1 3.70	27 100.00	5.67

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	27	3.63 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	664	89.25 PCT.
NUMBER OF INVALID OBSERVATIONS	53	7.12 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		3.83 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: AUGUST 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	0 0.00	1 6.67	0 0.00	1 6.67	7.60
SE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSE	0 0.00	0 0.00	1 6.67	0 0.00	0 0.00	0 0.00	1 6.67	3.20
S	0 0.00	0 0.00	1 6.67	1 6.67	1 6.67	0 0.00	3 20.00	5.73
SSW	0 0.00	0 0.00	0 0.00	1 6.67	0 0.00	0 0.00	1 6.67	5.10
SW	0 0.00	0 0.00	0 0.00	0 0.00	1 6.67	0 0.00	1 6.67	8.50
WSW	0 0.00	1 6.67	0 0.00	1 6.67	0 0.00	0 0.00	2 13.33	4.25
W	0 0.00	1 6.67	0 0.00	1 6.67	0 0.00	0 0.00	2 13.33	4.30
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	1 6.67	0 0.00	1 6.67	0 0.00	2 13.33	5.70
NNW	0 0.00	0 0.00	0 0.00	1 6.67	0 0.00	0 0.00	1 6.67	5.30
N	0 0.00	0 0.00	1 6.67	0 0.00	0 0.00	0 0.00	1 6.67	4.50
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	2 13.33	4 26.67	5 33.33	4 26.67	0 0.00	15 100.00	5.33

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	15	2.02 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	720	96.77 PCT.
NUMBER OF INVALID OBSERVATIONS	9	1.21 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.69 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: SEPTEMBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	1 5.56	2 11.11	0 0.00	3 16.67	8.13
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	1 5.56	0 0.00	0 0.00	1 5.56	7.20
SE	0 0.00	0 0.00	0 0.00	1 5.56	1 5.56	0 0.00	2 11.11	6.35
SSE	0 0.00	0 0.00	0 0.00	1 5.56	0 0.00	0 0.00	1 5.56	6.70
S	0 0.00	0 0.00	1 5.56	1 5.56	1 5.56	0 0.00	3 16.67	6.93
SSW	0 0.00	0 0.00	0 0.00	0 0.00	1 5.56	0 0.00	1 5.56	8.50
SW	0 0.00	0 0.00	1 5.56	0 0.00	0 0.00	0 0.00	1 5.56	4.70
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	1 5.56	0 0.00	0 0.00	0 0.00	0 0.00	1 5.56	2.20
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	2 11.11	1 5.56	0 0.00	0 0.00	3 16.67	4.53
N	0 0.00	0 0.00	0 0.00	1 5.56	0 0.00	1 5.56	2 11.11	7.75
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	1 5.56	4 22.22	7 38.89	5 27.78	1 5.56	18 100.00	6.46

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	18	2.50 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	685	95.14 PCT.
NUMBER OF INVALID OBSERVATIONS	17	2.36 PCT.
TOTAL NUMBER OF OBSERVATIONS	720	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.47 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: OCTOBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	0 0.00	1 3.85	0 0.00	1 3.85	8.30
SE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	6 23.08	6 23.08	12.60
SSE	0 0.00	0 0.00	0 0.00	0 0.00	1 3.85	1 3.85	2 7.69	10.25
S	0 0.00	0 0.00	0 0.00	1 3.85	3 11.54	3 11.54	7 26.92	9.10
SSW	0 0.00	0 0.00	0 0.00	0 0.00	2 7.69	0 0.00	2 7.69	8.60
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 7.69	2 7.69	12.05
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	1 3.85	1 3.85	2 7.69	9.95
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 3.85	1 3.85	12.80
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	2 7.69	1 3.85	0 0.00	3 11.54	6.83
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	0 0.00	3 11.54	9 34.62	14 53.85	26 100.00	10.10

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	26	3.49 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	712	95.70 PCT.
NUMBER OF INVALID OBSERVATIONS	6	.81 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		3.33 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-20 (Continued)

MONTHLY PRECIPITATION WIND ROSE

(60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: NOVEMBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	3 8.57	0 0.00	0 0.00	0 0.00	3 8.57	4.87
ENE	0 0.00	0 0.00	0 0.00	4 11.43	4 11.43	4 11.43	12 34.29	8.92
E	0 0.00	0 0.00	0 0.00	2 5.71	3 8.57	0 0.00	5 14.29	7.88
ESE	0 0.00	0 0.00	0 0.00	1 2.86	2 5.71	1 2.86	4 11.43	8.80
SE	0 0.00	0 0.00	0 0.00	0 0.00	2 5.71	0 0.00	2 5.71	9.25
SSE	0 0.00	0 0.00	0 0.00	1 2.86	0 0.00	0 0.00	1 2.86	6.60
S	0 0.00	0 0.00	0 0.00	2 5.71	0 0.00	0 0.00	2 5.71	6.85
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	1 2.86	0 0.00	0 0.00	1 2.86	6.00
W	0 0.00	0 0.00	0 0.00	1 2.86	0 0.00	0 0.00	1 2.86	5.50
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	1 2.86	3 8.57	0 0.00	4 11.43	8.37
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	3 8.57	13 37.14	14 40.00	5 14.29	35 100.00	8.00

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	35	4.86 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	685	95.14 PCT.
NUMBER OF INVALID OBSERVATIONS	0	0.00 PCT.
TOTAL NUMBER OF OBSERVATIONS	720	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		3.51 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: DECEMBER 1979

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	1 33.33	2 66.67	0 0.00	3 100.00	7.93
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
S	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	0 0.00	1 33.33	2 66.67	0 0.00	3 100.00	7.93

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	3	.40 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	737	99.06 PCT.
NUMBER OF INVALID OBSERVATIONS	4	.54 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.08 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JANUARY 1980

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	1 5.88	1 5.88	1 5.88	0 0.00	3 17.65	5.87
NE	0 0.00	0 0.00	2 11.76	1 5.88	0 0.00	0 0.00	3 17.65	5.13
ENE	0 0.00	0 0.00	0 0.00	2 11.76	0 0.00	0 0.00	2 11.76	6.75
E	0 0.00	0 0.00	0 0.00	2 11.76	1 5.88	1 5.88	4 23.53	7.67
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	0 0.00	1 5.88	0 0.00	0 0.00	0 0.00	1 5.88	4.70
SSE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
S	0 0.00	0 0.00	1 5.88	0 0.00	0 0.00	0 0.00	1 5.88	4.30
SSW	0 0.00	0 0.00	0 0.00	1 5.88	0 0.00	1 5.88	2 11.76	10.35
SW	0 0.00	0 0.00	0 0.00	1 5.88	0 0.00	0 0.00	1 5.88	5.90
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	5 29.41	8 47.06	2 11.76	2 11.76	17 100.00	6.64

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	17	2.28 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	652	87.63 PCT.
NUMBER OF INVALID OBSERVATIONS	75	10.08 PCT.
TOTAL NUMBER OF OBSERVATIONS	744	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.52 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: FEBRUARY 1980

PRECIPITATION WIND ROSE
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ENE	0 0.00	0 0.00	0 0.00	3 37.50	2 25.00	0 0.00	5 62.50	7.64
E	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
ESE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SE	0 0.00	0 0.00	0 0.00	2 25.00	0 0.00	0 0.00	2 25.00	5.65
SSE	0 0.00	0 0.00	0 0.00	1 12.50	0 0.00	0 0.00	1 12.50	7.20
S	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
SW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WSW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
W	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
WNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
NNW	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
N	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0.00
CALM	0 0.00						0 0.00	CALM
TOTAL	0 0.00	0 0.00	0 0.00	6 75.00	2 25.00	0 0.00	8 100.00	7.09

NUMBER OF VALID OBSERVATIONS WITH PRECIPITATION	8	1.15 PCT.
NUMBER OF VALID OBSERVATIONS WITHOUT PRECIPITATION	600	86.21 PCT.
NUMBER OF INVALID OBSERVATIONS	88	12.64 PCT.
TOTAL NUMBER OF OBSERVATIONS	696	100.00 PCT.
TOTAL AMOUNT OF PRECIPITATION FOR DATA PERIOD		.11 INCHES

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: MARCH 1979 THROUGH FEBRUARY 1980

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
.0 TO .1	197	74.34	35	38.46	12	25.53	0	0.00	0	0.00	0	0.00
.1 TO .2	38	14.34	26	28.57	8	17.02	0	0.00	0	0.00	0	0.00
.2 TO .3	14	5.28	10	10.99	7	14.89	1	12.50	0	0.00	0	0.00
.3 TO .4	5	1.89	5	5.49	6	12.77	0	0.00	0	0.00	0	0.00
.4 TO .5	1	.38	7	7.69	3	6.38	0	0.00	0	0.00	0	0.00
.5 TO .6	3	1.13	2	2.20	4	8.51	1	12.50	0	0.00	0	0.00
.6 TO .7	0	0.00	1	1.10	4	8.51	2	25.00	0	0.00	0	0.00
.7 TO .8	1	.38	0	0.00	0	0.00	1	12.50	0	0.00	0	0.00
.8 TO .9	2	.75	0	0.00	1	2.13	1	12.50	0	0.00	0	0.00
.9 TO 1.0	0	0.00	1	1.10	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	1	.38	1	1.10	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	1	.38	0	0.00	0	0.00	1	12.50	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	1	2.13	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	1	1.10	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	1	1.10	0	0.00	1	12.50	0	0.00	0	0.00
1.7 TO 1.8	1	.38	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	1	.38	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	1	1.10	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	1	2.13	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	265	100.00	91	100.00	47	100.00	8	100.00	1	100.00	0	0.00
MAXIMUM AMT.	1.90		3.65		4.18		1.64		2.07		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD 28.16 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	8506	96.98
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	265	3.02
TOTAL VALID OBSERVATIONS	8771	100.00

	NO.	PCT.
VALID OBSERVATIONS	8771	99.85
INVALID OBSERVATIONS	13	.15
TOTAL OBSERVATIONS	8784	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: 2.15 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: 1.70 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: 1.22 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .97 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .61 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: MARCH 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION	
	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.
.0 TO .1	25	89.29	5	45.45	2	40.00	0	0.00	0	0.00	0	0.00
.1 TO .2	2	7.14	5	45.45	2	40.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.3 TO .4	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	1	9.09	1	20.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	28	100.00	11	100.00	5	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	.31		.43		.46		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD 1.45 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	716	96.24
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	28	3.76
TOTAL VALID OBSERVATIONS	744	100.00

	NO.	PCT.
VALID OBSERVATIONS	744	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .35 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .28 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .20 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .16 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .10 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: APRIL 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
.0 TO .1	24	85.71	6	66.67	2	50.00	0	0.00	0	0.00	0	0.00
.1 TO .2	2	7.14	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00
.2 TO .3	2	7.14	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.3 TO .4	0	0.00	1	11.11	1	25.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	1	25.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	28	100.00	9	100.00	4	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	.28		.38		.60		0.00		0.00		0.80	

TOTAL PRECIPITATION FOR DATA PERIOD . 1.44 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	689	96.09
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	28	3.91
TOTAL VALID OBSERVATIONS	717	100.00

	NO.	PCT.
VALID OBSERVATIONS	717	99.58
INVALID OBSERVATIONS	3	.42
TOTAL OBSERVATIONS	720	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .32 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .25 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .18 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .14 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .09 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: MAY 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION	
	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.
.01 TO .1	19	61.29	4	36.36	2	40.00	0	0.00	0	0.00	0	0.00
.11 TO .2	7	22.58	2	18.18	0	0.00	0	0.00	0	0.00	0	0.00
.21 TO .3	3	9.68	2	18.18	0	0.00	0	0.00	0	0.00	0	0.00
.31 TO .4	0	0.00	1	9.09	1	20.00	0	0.00	0	0.00	0	0.00
.41 TO .5	0	0.00	1	9.09	0	0.00	0	0.00	0	0.00	0	0.00
.51 TO .6	0	0.00	0	0.00	1	20.00	0	0.00	0	0.00	0	0.00
.61 TO .7	0	0.00	0	0.00	0	0.00	1	50.00	0	0.00	0	0.00
.71 TO .8	1	3.23	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.81 TO .9	1	3.23	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.91 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.01 TO 1.1	0	0.00	1	9.09	0	0.00	0	0.00	0	0.00	0	0.00
1.11 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.21 TO 1.3	0	0.00	0	0.00	1	20.00	0	0.00	0	0.00	0	0.00
1.31 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.41 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.51 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.61 TO 1.7	0	0.00	0	0.00	0	0.00	1	50.00	0	0.00	0	0.00
1.71 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.81 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.91 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.01 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.21 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.41 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.61 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.81 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.01 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.21 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.41 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.61 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.81 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.01 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.51 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.01 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.51 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.01 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.51 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.01 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.51 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.01 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.01 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.01 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.01 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	31	100.00	11	100.00	5	100.00	2	100.00	0	0.00	0	0.00
MAXIMUM AMT.	.81		1.06		1.26		1.64		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD 4.03 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	713	95.83
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	31	4.17
TOTAL VALID OBSERVATIONS	744	100.00

	NO.	PCT.
VALID OBSERVATIONS	744	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .92 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .72 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .52 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .41 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .27 INCHES
SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: JUNE 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
.0 TO .1	16	57.14	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00
.1 TO .2	4	14.29	3	37.50	1	20.00	0	0.00	0	0.00	0	0.00
.2 TO .3	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.3 TO .4	2	7.14	1	12.50	1	20.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	1	12.50	2	40.00	0	0.00	0	0.00	0	0.00
.5 TO .6	2	7.14	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	1	20.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	28	100.00	8	100.00	5	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	1.90		3.65		4.18		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD . 8.35 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	692	96.11
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	28	3.89
TOTAL VALID OBSERVATIONS	720	100.00

	NO.	PCT.
VALID OBSERVATIONS	720	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	720	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: 2.15 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: 1.70 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: 1.22 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .97 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .63 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: JULY 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION	
	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.
.0 TO .1	19	67.86	4	36.36	0	0.00	0	0.00	0	0.00	0	0.00
.1 TO .2	5	17.86	2	18.18	1	25.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	2	18.18	1	25.00	0	0.00	0	0.00	0	0.00
.3 TO .4	1	3.57	0	0.00	2	50.00	0	0.00	0	0.00	0	0.00
.4 TO .5	1	3.57	1	9.09	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	1	9.09	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	1	9.09	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	28	100.00	11	100.00	4	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	1.15		1.60		.35		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD 4.18 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	716	96.24
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	28	3.76
TOTAL VALID OBSERVATIONS	744	100.00

	NO.	PCT.
VALID OBSERVATIONS	744	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: 1.30 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: 1.03 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .74 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .59 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .38 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

WOLF CREEK

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: AUGUST 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
.0 TO .1	13	86.67	2	50.00	1	50.00	0	0.00	0	0.00	0	0.00
.1 TO .2	2	13.33	2	50.00	0	0.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	0	0.00	1	50.00	0	0.00	0	0.00	0	0.00
.3 TO .4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	15	100.00	4	100.00	2	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	.14		.17		.29		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD .69 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	729	97.98
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	15	2.02
TOTAL VALID OBSERVATIONS	744	100.00

	NO.	PCT.
VALID OBSERVATIONS	744	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .16 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .13 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .09 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .07 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .05 INCHES
SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

TABLE 2.3-21 (Continued)

FREQUENCY DISTRIBUTION OF PRECIPITATION

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: SEPTEMBER 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION	
	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.
.0 TO .1	17	94.44	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00
.1 TO .2	1	5.56	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	1	50.00	1	100.00	0	0.00	0	0.00	0	0.00
.3 TO .4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	18	100.00	2	100.00	1	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	.20		.21		.23		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD .47 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	703	97.50
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	18	2.50
TOTAL VALID OBSERVATIONS	721	100.00

	NO.	PCT.
VALID OBSERVATIONS	721	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	721	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .23 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .18 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .13 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .10 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .07 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: OCTOBER 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
.0 TO .1	16	61.54	3	25.00	1	14.29	0	0.00	0	0.00	0	0.00
.1 TO .2	4	15.38	4	33.33	1	14.29	0	0.00	0	0.00	0	0.00
.2 TO .3	4	15.38	0	0.00	1	14.29	0	0.00	0	0.00	0	0.00
.3 TO .4	1	3.85	1	8.33	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	2	16.67	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	1	3.85	1	8.33	1	14.29	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	1	8.33	2	28.57	1	50.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	1	50.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	1	14.29	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	26	100.00	12	100.00	7	100.00	2	100.00	0	0.00	0	0.00
MAXIMUM AMT.	.54		.62		.81		.80		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD 3.33 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	712	96.48
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	26	3.52
TOTAL VALID OBSERVATIONS	738	100.00

	NO.	PCT.
VALID OBSERVATIONS	738	99.19
INVALID OBSERVATIONS	6	.81
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .61 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .48 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .35 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .27 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .18 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: NOVEMBER 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION	
	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.
.0 TO .1	21	60.00	1	7.14	0	0.00	0	0.00	0	0.00	0	0.00
.1 TO .2	10	28.57	5	35.71	3	33.33	0	0.00	0	0.00	0	0.00
.2 TO .3	4	11.43	5	35.71	2	22.22	0	0.00	0	0.00	0	0.00
.3 TO .4	0	0.00	1	7.14	1	11.11	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	1	7.14	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	1	7.14	1	11.11	1	33.33	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	2	22.22	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	1	33.33	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	1	33.33	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	35	100.00	14	100.00	9	100.00	3	100.00	1	100.00	0	0.00
MAXIMUM AMT.	.30		.57		.65		1.19		2.07		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD 3.51 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	685	95.14
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	35	4.86
TOTAL VALID OBSERVATIONS	720	100.00

	NO.	PCT.
VALID OBSERVATIONS	720	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	720	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .34 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .27 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .19 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .15 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .10 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: DECEMBER 1979

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
0.0 TO .1	3	100.00	1	100.00	1	100.00	0	0.00	0	0.00	0	0.00
.1 TO .2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.3 TO .4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	3	100.00	1	100.00	1	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	.05		.06		.08		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD .08 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	739	99.60
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	3	.40
TOTAL VALID OBSERVATIONS	742	100.00

	NO.	PCT.
VALID OBSERVATIONS	742	99.73
INVALID OBSERVATIONS	2	.27
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .06 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .04 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .03 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .03 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .02 INCHES
SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

TABLE 2.3-21 (Continued)

FREQUENCY DISTRIBUTION OF PRECIPITATION

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: JANUARY 1980

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 14.19.31.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION		FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION	
	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.	NO.	PCT.
.0 TO .1	16	94.12	4	80.00	2	66.67	0	0.00	0	0.00	0	0.00
.1 TO .2	1	5.88	1	20.00	0	0.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	0	0.00	1	33.33	1	100.00	0	0.00	0	0.00
.3 TO .4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	17	100.00	5	100.00	3	100.00	1	100.00	0	0.00	0	0.00
MAXIMUM AMT.	.12		.18		.21		.30		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD .52 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	725	97.71
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	17	2.29
TOTAL VALID OBSERVATIONS	742	100.00

	NO.	PCT.
VALID OBSERVATIONS	742	99.73
INVALID OBSERVATIONS	2	.27
TOTAL OBSERVATIONS	744	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .14 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .11 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .08 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .06 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .04 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

FREQUENCY DISTRIBUTION OF PRECIPITATION
DATA PERIOD: FEBRUARY 1980

DATA SOURCE: ON-SITE
TABLE GENERATED: 10/07/80. 09.36.11.

WOLF CREEK GENERATING STATION
BURLINGTON,KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-062

PRECIPITATION CLASS INTERVAL (INCHES)	FREQUENCY DISTRIBUTION OF PRECIPITATION 1 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 2 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 3 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 6 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 12 HOUR DURATION NO.	PCT.	FREQUENCY DISTRIBUTION OF PRECIPITATION 24 HOUR DURATION NO.	PCT.
.0 TO .1	8	100.00	3	100.00	1	100.00	0	0.00	0	0.00	0	0.00
.1 TO .2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.2 TO .3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.3 TO .4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.4 TO .5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.5 TO .6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.6 TO .7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.7 TO .8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.8 TO .9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
.9 TO 1.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0 TO 1.1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.1 TO 1.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.2 TO 1.3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.3 TO 1.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.4 TO 1.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.5 TO 1.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.6 TO 1.7	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.7 TO 1.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.8 TO 1.9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.9 TO 2.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0 TO 2.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.2 TO 2.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.4 TO 2.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.6 TO 2.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.8 TO 3.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.0 TO 3.2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.2 TO 3.4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.4 TO 3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.6 TO 3.8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3.8 TO 4.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.0 TO 4.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4.5 TO 5.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.0 TO 5.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5.5 TO 6.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0 TO 6.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.5 TO 7.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.0 TO 7.5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7.5 TO 8.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8.0 TO 9.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9.0 TO 10.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10.0 TO 11.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11.0 TO 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GT 12.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL	8	100.00	3	100.00	1	100.00	0	0.00	0	0.00	0	0.00
MAXIMUM AMT.	.04		.05		.03		0.00		0.00		0.00	

TOTAL PRECIPITATION FOR DATA PERIOD .11 INCHES

	NO.	PCT.
OBSERVATIONS WITH NO PRECIPITATION	688	98.85
OBSERVATIONS WITH PRECIPITATION GE 0.01 INCH	8	1.15
TOTAL VALID OBSERVATIONS	696	100.00

	NO.	PCT.
VALID OBSERVATIONS	696	100.00
INVALID OBSERVATIONS	0	0.00
TOTAL OBSERVATIONS	696	100.00

ESTIMATED MAXIMUM 60 MINUTE PRECIPITATION: .05 INCHES
ESTIMATED MAXIMUM 30 MINUTE PRECIPITATION: .04 INCHES
ESTIMATED MAXIMUM 15 MINUTE PRECIPITATION: .03 INCHES
ESTIMATED MAXIMUM 10 MINUTE PRECIPITATION: .02 INCHES
ESTIMATED MAXIMUM 5 MINUTE PRECIPITATION: .01 INCHES

SOURCE FOR ESTIMATES: U. S. WEATHER BUREAU TECHNICAL PAPER NO. 40

Monthly and Annual Joint Wind Speed and Wind Direction Frequency Distribution at the Chanute Flight Service Station, Kansas

JOINT WIND SPEED, WIND DIRECTION FREQUENCY DISTRIBUITON (IN PERCENT) FOR THE MONTH OF JANUARY

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	.7	.8	2.3	.9	1.3	.6	.4	.2	7.2	11.2
NE	.0	.6	.4	.9	.4	.6	.0	.1	.0	3.0	9.5
ENE	.1	.7	.3	.5	.2	.1	.0	.0	.0	1.9	7.3
E	.0	.7	.6	.7	.2	.2	.0	.0	.0	2.3	7.5
ESE	.0	.9	1.0	1.8	.2	.5	.0	.0	.0	4.5	8.5
SE	.0	1.1	1.1	1.5	.8	.4	.2	.2	.0	5.2	8.8
SSE	.0	1.1	1.2	2.5	1.2	1.4	.4	.6	.2	8.6	10.7
S	.0	.5	.9	3.0	1.9	2.3	1.3	2.1	.9	12.9	13.6
SSW	.0	.7	.4	2.5	1.7	2.5	.6	.6	.5	9.6	12.4
SW	.0	.4	.4	1.0	.7	.7	.2	.1	.1	3.6	10.9
WSW	.0	.8	.5	1.1	.3	.2	.0	.1	.0	3.0	8.4
W	.0	.4	.4	.3	.2	.2	.0	.1	.0	1.8	9.5
WNW	.1	.6	.7	1.3	.5	.4	.2	.3	.1	4.0	9.9
NW	.0	.6	1.0	1.9	.8	1.0	.5	.7	.1	6.5	11.2
NNW	.0	1.0	1.3	2.9	1.7	3.9	1.4	2.8	.5	15.5	13.2
N	.0	.5	.8	2.1	.8	1.7	.4	.8	.4	7.6	12.3
CALM										2.8	
TOTAL	.2	11.2	11.9	26.3	12.4	17.4	5.8	9.0	3.0	100.0	11.0

NUMBER OF INVALID OBSERVATIONS = 3

TABLE 2.3-22 (CONTINUED)

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF FEBRUARY

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.7	1.1	2.8	1.2	1.2	.2	.3	.1	7.6	10.5
NE	.0	.8	.6	2.1	.9	.6	.2	.4	.0	5.6	10.2
ENE	.0	.4	.4	1.0	.6	.4	.0	.0	.0	2.8	9.4
E	.0	.5	.5	1.0	.2	.5	.1	.1	.0	2.9	9.7
ESE	.0	.8	1.1	2.1	.4	.8	.0	.0	.0	5.3	9.1
SE	.0	.7	.7	1.8	.7	.9	.1	.3	.0	5.1	10.2
SSE	.0	.4	.5	1.8	1.1	1.7	1.0	.4	.1	7.1	12.4
S	.0	.6	.8	2.4	1.5	2.5	.9	1.8	.3	10.6	12.9
SSW	.0	.3	.6	1.4	1.1	1.3	1.1	.8	.3	6.8	12.9
SW	.0	.5	.4	.7	.3	.4	.0	.0	.1	2.4	10.0
WSW	.0	.4	.5	.5	.1	.2	.1	.2	.1	2.1	10.1
W	.0	.3	.1	.5	.2	.3	.0	.2	.1	1.7	11.3
WNW	.0	.7	.5	1.1	.5	.6	.1	.4	.0	4.0	10.4
NW	.0	.8	.8	1.7	1.1	.9	.2	.4	.0	5.9	10.6
NNW	.0	1.2	1.2	4.3	1.0	4.2	1.1	1.9	.6	16.2	12.5
N	.0	1.1	.9	2.0	1.3	2.6	.6	1.4	.2	10.2	12.2
CALM										3.5	
TOTAL	.1	10.0	10.6	27.2	12.7	19.2	6.0	8.7	2.1	100.0	11.0

NUMBER OF INVALID OBSERVATIONS = 1

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF MARCH

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	.6	.6	2.2	1.1	1.3	.6	.4	.1	6.9	11.5
NE	.0	.5	.4	1.8	.9	.9	.2	.3	.0	5.2	11.0
ENE	.0	.5	.6	1.7	.6	1.0	.2	.1	.0	4.8	10.3
E	.0	.4	.4	1.7	.3	1.5	.2	.2	.0	4.8	11.1
ESE	.0	.5	.7	2.5	1.0	1.1	.3	.3	.1	6.6	11.0
SE	.0	.4	.4	1.7	.8	1.4	.4	.4	.1	5.6	11.9
SSE	.0	.5	.4	2.2	1.2	1.9	.7	2.3	1.1	10.4	14.3
S	.0	.3	.3	1.1	.7	1.9	.8	2.1	2.7	10.0	17.4
SSW	.0	.2	.2	.7	.5	.8	.5	1.0	1.0	4.9	15.9
SW	.0	.4	.2	.5	.2	.4	.2	.3	.4	2.7	12.8
WSW	.0	.3	.3	.7	.4	.1	.2	.2	.1	2.4	11.1
W	.0	.3	.4	.9	.2	.4	.2	.2	.2	2.8	11.5
WNW	.0	.5	.6	1.2	.5	1.2	.4	1.2	.3	5.9	13.2
NW	.0	.5	.4	1.9	.9	1.6	.8	1.2	.2	7.6	13.0
NNW	.0	.8	1.0	2.4	1.2	1.6	1.0	1.6	.7	10.2	12.8
N	.0	.3	.4	1.2	.7	1.7	.6	1.6	.3	6.9	14.0
CALM										2.3	
TOTAL	.1	7.1	7.3	24.6	11.7	18.9	7.3	13.3	7.5	100.0	12.8

NUMBER OF INVALID OBSERVATIONS = 0

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF APRIL

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)									TOTAL	MEAN SPEED
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0		
NNE	.0	.5	.7	1.4	.9	1.1	.3	.3	.0	5.3	11.1
NE	.0	.5	.4	1.6	.8	1.0	.5	.4	.0	5.1	11.3
ENE	.0	.1	.3	1.3	.4	.5	.3	.0	.1	3.0	11.1
E	.0	.5	.8	1.5	.5	.6	.2	.4	.0	4.6	10.6
ESE	.0	.5	.7	1.9	1.2	.8	.2	.1	.1	5.5	10.4
SE	.0	.8	.7	2.0	.8	.6	.4	.3	.2	5.8	10.6
SSE	.0	.4	.7	2.4	1.3	2.9	.8	2.5	1.5	12.5	14.6
S	.0	.4	.4	2.3	1.0	2.4	.8	4.2	4.0	15.5	17.3
SSW	.0	.5	.2	1.0	.3	1.2	.4	1.4	1.1	6.1	15.8
SW	.0	.2	.3	.5	.4	.5	.2	.2	.4	2.6	13.6
WSW	.0	.5	.1	.5	.1	.4	.0	.1	.3	2.0	11.3
W	.0	.3	.2	.5	.2	.3	.0	.4	.2	2.2	12.4
WNW	.0	.7	.5	.7	.3	.6	.5	.6	.2	4.0	12.3
NW	.1	.8	.7	1.2	.5	.9	.5	1.1	.5	6.3	12.6
NNW	.0	.9	1.2	2.0	1.2	2.0	.6	1.6	.3	9.8	12.3
N	.0	.9	.5	1.6	.8	1.4	.5	.7	.1	6.6	11.5
CALM										3.1	
TOTAL	.3	8.4	8.3	22.5	10.7	17.2	6.1	14.4	9.0	100.0	12.7

NUMBER OF INVALID OBSERVATIONS = 2

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF MAY

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WINC SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	.6	.3	1.3	.6	.7	.1	.2	.0	3.9	10.3
NE	.1	.8	.6	1.6	.8	.7	.2	.2	.0	5.1	9.8
ENE	.0	.6	.6	1.5	.2	.5	.1	.1	.0	3.6	9.1
E	.0	.9	.7	2.1	.6	.6	.0	.2	.0	5.1	9.4
ESE	.0	1.1	1.3	2.9	1.0	.9	.2	.2	.1	7.7	9.7
SE	.0	.8	1.3	3.0	.8	1.0	.4	.6	.0	7.8	10.3
SSE	.0	.7	.9	2.7	2.3	4.0	1.5	2.2	1.5	15.7	14.2
S	.0	.7	.5	2.9	2.3	3.6	1.7	5.3	3.7	20.5	16.1
SSW	.0	.2	.3	1.3	.8	1.5	.5	1.1	1.2	6.8	15.3
SW	.0	.5	.1	.4	.4	.4	.1	.3	.2	2.5	12.1
WSW	.0	.3	.2	.6	.0	.1	.1	.2	.0	1.4	9.4
W	.0	.4	.2	.3	.2	.2	.0	.0	.0	1.2	9.2
WNW	.0	.4	.2	.4	.3	.2	.0	.2	.0	1.6	9.6
NW	.0	1.0	.9	1.3	.4	.6	.1	.2	.0	4.5	9.4
NNW	.0	.7	.5	1.2	.6	1.2	.3	.5	.0	4.9	11.1
N	.0	.6	.6	1.0	.6	1.1	.2	.2	.0	4.3	10.8
CALM										3.3	
TOTAL	.1	10.3	9.1	24.3	12.0	17.1	5.3	11.6	6.9	100.0	12.0

NUMBER OF INVALID OBSERVATIONS = 7

Rev. 0

WOLF CREEK

TABLE 2.3-22 (CONTINUED)

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF JUNE

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.9	1.0	1.0	.7	.8	.1	.1	.0	4.5	9.5
NE	.0	.9	.9	1.4	.4	.7	.2	.0	.0	4.5	9.1
ENE	.0	.7	.5	1.0	.4	.4	.0	.1	.0	3.2	8.9
E	.0	.9	.9	1.6	.5	.7	.0	.0	.0	4.7	8.9
ESE	.0	1.0	1.6	2.7	.7	.7	.2	.2	.0	7.2	9.1
SE	.0	1.0	1.6	4.1	1.3	1.3	.3	.2	.0	9.9	9.6
SSE	.0	1.2	1.5	4.9	2.4	3.2	1.2	1.5	.4	16.2	11.7
S	.0	.9	1.5	4.9	2.4	4.5	1.5	3.3	1.0	20.1	13.2
SSW	.0	.3	.7	1.8	.7	1.6	.6	1.2	.4	7.3	13.1
SW	.0	.4	.3	.9	.5	.2	.2	.0	.0	2.6	9.8
WSW	.0	.2	.4	.4	.1	.1	.0	.0	.0	1.3	8.2
W	.0	.2	.0	.2	.1	.0	.0	.0	.0	.6	9.7
WNW	.0	.5	.4	.6	.3	.1	.1	.0	.0	1.9	8.5
NW	.1	.7	.3	1.3	.2	.3	.0	.0	.0	3.0	8.2
NNW	.0	.7	.8	1.2	.4	.4	.0	.1	.0	3.7	8.8
N	.0	1.0	.4	1.5	.3	.5	.1	.2	.0	4.1	9.4
CALM										5.1	
TOTAL	.2	11.5	12.9	29.7	11.5	15.6	4.6	7.0	1.9	100.0	10.2

NUMBER OF INVALID OBSERVATIONS = 0

Rev. 0

WOLF CREEK

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF JULY

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	.9	.6	1.7	.4	.3	.0	.2	.1	4.2	8.8
NE	.0	.9	1.0	1.9	.4	.2	.0	.0	.0	4.6	8.1
ENE	.0	.9	1.0	1.8	.6	.3	.0	.0	.0	4.6	8.2
E	.0	1.2	.8	1.7	.3	.3	.0	.1	.0	4.4	8.2
ESE	.0	1.5	2.5	3.5	.5	.6	.1	.1	.0	8.9	8.3
SE	.1	1.6	1.8	3.8	.8	.4	.2	.2	.0	8.9	8.5
SSE	.0	1.3	1.9	6.2	2.7	2.3	1.0	.3	.1	15.9	10.4
S	.0	1.4	1.2	6.3	3.6	4.4	1.4	2.0	.2	20.5	11.3
SSW	.0	.3	.6	2.5	1.9	2.5	.7	1.1	.1	9.9	12.5
SW	.0	.6	.4	1.0	.5	.2	.1	.2	.0	2.9	9.3
WSW	.0	.3	.2	.3	.2	.0	.0	.0	.0	1.0	7.8
W	.0	.2	.0	.3	.0	.0	.0	.0	.0	.5	6.5
WNW	.0	.3	.3	.3	.0	.0	.0	.0	.0	1.0	7.0
NW	.0	.5	.2	.3	.1	.0	.0	.0	.0	1.3	8.0
NNW	.0	.8	.4	1.0	.3	.2	.2	.1	.0	3.1	9.4
N	.0	1.0	.8	1.1	.4	.4	.0	.2	.0	3.9	8.9
CALM										4.6	
TOTAL	.2	13.6	13.8	33.5	12.8	12.5	3.9	4.4	.6	100.0	9.5

NUMBER OF INVALID OBSERVATIONS = 1

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF AUGUST

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.9	.9	1.9	.6	.4	.2	.0	.0	4.9	8.7
NE	.0	1.4	1.5	1.2	.3	.2	.0	.0	.0	4.7	7.4
ENE	.0	1.0	1.2	1.2	.4	.2	.1	.0	.0	4.4	7.9
E	.0	1.2	.8	2.0	.2	.3	.0	.1	.0	4.6	7.8
ESE	.0	1.3	1.9	2.8	.7	.3	.1	.1	.0	7.2	8.2
SE	.0	1.5	2.5	5.4	1.0	.9	.0	.2	.0	11.5	8.7
SSE	.0	.6	1.9	6.0	2.7	2.3	.4	.4	.2	14.4	10.5
S	.0	.6	1.6	6.2	3.2	4.9	1.1	1.5	.3	19.4	11.9
SSW	.0	.3	.9	2.1	1.4	2.5	.9	1.3	.1	9.5	12.5
SW	.0	.3	.3	.7	.2	.8	.2	.0	.2	2.7	11.4
WSW	.0	.2	.2	.1	.1	.0	.0	.1	.0	.9	9.6
W	.0	.4	.1	.2	.0	.1	.0	.0	.0	.8	7.3
WNW	.0	.2	.3	.3	.1	.1	.0	.0	.0	1.1	8.8
NW	.0	.6	.2	.3	.1	.0	.0	.1	.0	1.3	7.4
NNW	.0	.7	.5	1.1	.5	.5	.1	.1	.0	3.6	9.4
N	.0	1.2	.5	1.7	.5	.6	.3	.2	.0	5.0	9.4
CALM										4.0	
TOTAL	.2	12.5	15.4	33.1	12.0	14.3	3.5	4.2	.8	100.0	9.5

NUMBER OF INVALID OBSERVATIONS = 0

Rev. 0

WOLF CREEK

TABLE 2.3-22 (CONTINUED) SHEET 9 OF 13

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF SEPTEMBER

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	1.0	1.0	1.8	1.3	1.4	.5	.2	.0	7.0	10.3
NE	.0	.6	.9	2.2	1.0	.8	.1	.2	.0	5.7	9.8
ENE	.0	.7	.6	1.4	.8	.3	.0	.0	.0	3.8	9.0
E	.0	1.0	.6	1.3	.3	.3	.0	.0	.0	3.6	8.0
ESE	.1	1.5	1.8	3.2	.8	.3	.0	.0	.0	7.8	7.9
SE	.0	1.4	1.6	4.0	1.3	.5	.0	.0	.0	9.1	8.6
SSE	.0	.9	1.0	5.5	3.1	3.2	.8	1.0	.2	15.7	11.4
S	.0	.5	1.0	4.0	2.9	3.0	1.3	2.4	1.0	16.2	13.2
SSW	.0	.7	.6	1.7	.8	1.5	.6	1.1	.7	7.7	13.1
SW	.0	.5	.3	.5	.3	.3	.1	.1	.1	2.3	10.4
WSW	.0	.3	.2	.4	.1	.1	.0	.0	.0	1.2	8.7
W	.0	.3	.2	.2	.1	.0	.0	.0	.0	.7	6.8
WNW	.0	.6	.4	.3	.2	.1	.0	.1	.0	1.6	7.9
NW	.1	.5	.3	.7	.1	.1	.0	.0	.0	1.9	7.3
NNW	.0	.7	.7	1.7	.6	1.0	.2	.3	.0	5.3	10.5
N	.0	1.0	.9	1.5	1.0	1.2	.3	.2	.1	6.1	10.2
CALM										4.4	
TOTAL	.5	12.2	12.1	30.3	14.5	14.2	3.9	5.7	2.3	100.0	10.1

NUMBER OF INVALID OBSERVATIONS = 4

Rev. 0

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF OCTOBER

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.8	.7	1.4	.8	.6	.1	.3	.0	4.7	9.8
NE	.0	.8	.6	.5	.3	.1	.1	.0	.0	2.5	7.7
ENE	.0	.4	.5	.6	.3	.5	.1	.0	.0	2.3	9.5
E	.0	.5	.6	1.0	.2	.0	.0	.0	.0	2.3	7.9
ESE	.0	.8	1.5	2.9	.4	.1	.0	.0	.0	5.8	8.2
SE	.0	.8	1.1	4.3	1.5	1.0	.4	.1	.0	9.2	9.7
SSE	.0	1.1	1.0	5.2	2.0	2.5	1.0	1.1	.4	14.3	11.7
S	.0	.3	1.0	5.5	3.2	3.1	1.2	2.5	.6	17.5	12.8
SSW	.0	.4	.8	2.2	1.1	2.1	1.0	1.0	.4	9.1	12.8
SW	.0	.2	.4	.8	.3	.2	.0	.1	.0	2.0	9.7
WSW	.0	.3	.2	.4	.0	.1	.0	.0	.0	1.0	8.0
W	.0	.4	.2	.4	.1	.0	.0	.0	.0	1.2	7.0
WNW	.0	1.1	.6	.4	.0	.2	.0	.2	.1	2.7	8.2
NW	.0	1.1	1.1	.8	.2	.5	.2	.2	.1	4.3	9.1
NNW	.0	1.0	1.3	2.7	.8	1.6	.5	.6	.2	8.7	10.7
N	.0	1.1	1.4	2.3	.8	1.5	.2	.5	.1	7.9	10.4
CALM										4.5	
TOTAL	.1	11.1	13.1	31.4	12.1	14.0	5.0	6.7	2.0	100.0	10.2

NUMBER OF INVALID OBSERVATIONS = 1

Rev. 0

WOLF CREEK

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF NOVEMBER

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.5	.6	1.1	.7	.4	.2	.3	.0	3.8	10.1
NE	.0	.5	.3	.7	.4	.5	.0	.0	.0	2.4	9.7
ENE	.0	.5	.3	1.0	.2	.2	.0	.0	.0	2.1	8.5
E	.0	.4	.4	.7	.1	.1	.0	.0	.0	1.7	7.8
ESE	.0	.5	.8	1.2	.4	.0	.0	.0	.0	2.8	8.1
SE	.0	.5	1.1	2.0	1.2	1.0	.3	.0	.0	6.1	9.9
SSE	.0	.5	.7	2.9	1.8	3.0	1.0	.8	.4	11.2	12.4
S	.0	.4	.8	3.5	2.3	3.9	1.5	3.1	1.3	16.7	14.1
SSW	.0	.4	.8	2.3	1.5	2.2	.8	1.7	.3	10.0	13.0
SW	.0	.6	.4	.9	.4	.5	.1	.4	.2	3.4	11.3
WSW	.0	.8	.5	.7	.4	.3	.1	.1	.1	3.0	9.1
W	.0	1.0	.5	.7	.2	.2	.0	.0	.0	2.6	7.4
WNW	.0	.7	.8	1.1	.4	.7	.2	.2	.0	4.0	9.9
NW	.0	1.1	1.5	2.1	.8	1.4	.8	.3	.3	8.4	10.9
NNW	.0	.8	1.3	2.6	1.6	2.5	1.0	1.7	.5	12.0	12.6
N	.0	1.0	.6	2.1	1.0	1.4	.3	.5	.2	7.2	11.1
CALM										2.7	
TOTAL	.1	10.3	11.0	25.6	13.3	18.1	6.3	9.2	3.3	100.0	11.3

NUMBER OF INVALID OBSERVATIONS = 1

JOINT WIND SPEED, WIND DIRECTION FREQUENCY
DISTRIBUITON (IN PERCENT) FOR THE MONTH OF DECEMBER

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	.7	1.0	2.0	1.1	1.1	.5	.3	.1	6.8	10.7
NE	.0	.6	.9	1.0	.5	.5	.2	.2	.0	4.0	9.5
ENE	.0	.6	.3	.9	.2	.1	.1	.0	.0	2.2	8.4
E	.0	.5	.8	.6	.2	.2	.0	.0	.0	2.5	8.0
ESE	.0	.8	.6	1.3	.6	.4	.0	.0	.0	3.7	8.6
SE	.0	.7	1.0	1.7	.6	.4	.1	.0	.0	4.5	8.8
SSE	.0	.7	1.0	2.7	1.4	1.8	.6	.7	.1	9.0	11.3
S	.0	.5	.8	3.7	2.2	3.1	1.5	1.5	1.0	14.4	13.2
SSW	.0	.8	.7	3.0	1.3	1.8	.2	.6	.3	8.7	11.4
SW	.0	.5	.5	1.0	.3	.4	.0	.1	.1	3.1	9.8
WSW	.0	.7	.2	1.2	.2	.3	.0	.0	.1	2.9	9.0
W	.0	.3	.3	1.4	.2	.1	.0	.0	.0	2.5	8.8
WNW	.0	.8	1.0	1.3	.2	.5	.3	.4	.2	4.7	10.3
NW	.0	.7	1.1	2.0	1.0	1.5	.5	.6	.1	7.6	11.2
NNW	.0	1.2	1.2	3.2	1.5	2.2	1.0	.9	.4	11.5	11.7
N	.0	.5	.9	2.3	1.3	2.5	.5	1.0	.1	9.2	12.0
CALM										2.7	
TOTAL	.1	10.8	12.[illegible]	29.2	13.0	17.0	5.7	6.5	2.5	100.0	10.7

NUMBER OF INVALID OBSERVATIONS = 1

Rev. 0

WOLF CREEK

ANNUAL JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)

DATA SOURCE: CHANUTE F.S.S., KANSAS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.7	.8	1.7	.8	.9	.3	.3	.1	5.6	10.3
NE	.0	.7	.7	1.4	.6	.6	.1	.1	.0	4.4	9.5
ENE	.0	.6	.6	1.2	.4	.4	.1	.0	.0	3.2	9.0
E	.0	.7	.7	1.3	.3	.5	.0	.1	.0	3.6	8.9
ESE	.0	.9	1.3	2.4	.7	.5	.1	.1	.0	6.1	8.9
SE	.0	.9	1.2	2.9	1.0	.8	.2	.2	.0	7.4	9.5
SSE	.0	.8	1.1	3.8	1.9	2.5	.9	1.1	.5	12.6	12.1
S	.0	.6	.9	3.8	2.3	3.3	1.3	2.6	1.4	16.2	13.8
SSW	.0	.4	.6	1.9	1.1	1.8	.7	1.1	.5	8.1	13.2
SW	.0	.4	.3	.7	.4	.4	.1	.2	.1	2.7	10.9
WSW	.0	.4	.3	.6	.2	.2	.1	.1	.1	1.9	9.4
W	.0	.4	.2	.5	.1	.2	.0	.1	.1	1.5	9.5
WNW	.0	.6	.5	.7	.3	.4	.1	.3	.1	3.0	10.4
NW	.0	.7	.7	1.3	.5	.7	.3	.4	.1	4.9	10.8
NNW	.0	.9	.9	2.2	1.0	1.8	.6	1.0	.3	8.6	11.9
N	.0	.8	.7	1.7	.8	1.4	.3	.6	.1	6.6	11.3
CALM										3.6	
TOTAL	.2	10.8	11.5	28.2	12.4	16.3	5.3	8.4	3.5	100.0	10.9

NUMBER OF INVALID OBSERVATIONS = 21

TABLE 2.3- 23

PERSISTENCE OF WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT) AT CHANUTE F.S.S., KANSAS*

SPRING

Upper Class Intervals of Hours of Persistence	Wind Direction							
	NNE	NE	ENE	E	ESE	SE	SSE	S
3	37.60	45.00	49.39	41.92	40.72	47.24	31.01	20.97
6	15.70	28.18	30.49	26.20	27.36	25.20	27.91	20.72
9	22.31	10.91	5.49	13.10	14.66	11.81	10.23	18.73
12	9.92	3.64	7.32	12.23	13.03	9.45	8.06	9.49
15	4.13	6.82	.00	6.55	.00	3.94	9.30	9.99
18	7.44	5.45	7.32	.00	1.95	2.36	4.65	3.00
21	2.89	.00	.00	.00	2.28	.00	3.26	3.50
24	.00	.00	.00	.00	.00	.00	2.48	3.00
27	.00	.00	.00	.00	.00	.00	.00	2.25
30	.00	.00	.00	.00	.00	.00	3.10	1.25
33	.00	.00	.00	.00	.00	.00	.00	1.37
36	.00	.00	.00	.00	.00	.00	.00	1.50
39	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	1.75
45	.00	.00	.00	.00	.00	.00	.00	.00
48	.00	.00	.00	.00	.00	.00	.00	.00
51	.00	.00	.00	.00	.00	.00	.00	.00
54	.00	.00	.00	.00	.00	.00	.00	.00
57	.00	.00	.00	.00	.00	.00	.00	.00
60	.00	.00	.00	.00	.00	.00	.00	2.50

* Data Period 1955-1964.

SPRING

Upper Class Intervals of Hours of Persistence	Wind Direction SSW	SW	WSW	W	WNW	NW	NNW	N	Calm
3	46.83	76.84	83.87	57.69	50.29	38.08	36.10	41.16	58.20
6	26.19	10.53	16.13	30.77	17.54	21.35	21.46	20.94	18.03
9	5.95	12.63	.00	11.54	15.79	14.95	17.56	16.25	12.30
12	6.35	.00	.00	.00	9.36	7.12	10.73	10.11	6.56
15	3.97	.00	.00	.00	2.92	3.56	4.88	3.61	.00
18	7.14	.00	.00	.00	.00	14.95	1.46	2.17	4.92
21	.00	.00	.00	.00	4.09	.00	3.41	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	5.78	.00
27	3.57	.00	.00	.00	.00	.00	4.39	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00
45	.00	.00	.00	.00	.00	.00	.00	.00	.00
48	.00	.00	.00	.00	.00	.00	.00	.00	.00
51	.00	.00	.00	.00	.00	.00	.00	.00	.00
54	.00	.00	.00	.00	.00	.00	.00	.00	.00
57	.00	.00	.00	.00	.00	.00	.00	.00	.00
60	.00	.00	.00	.00	.00	.00	.00	.00	.00

SUMMER

Upper Class Intervals of Hours of Persistence	Wind Direction NNE	NE	ENE	E	ESE	SE	SSE	S
33	54.85	61.11	55.95	50.81	54.19	53.59	43.29	29.06
6	13.59	14.44	30.95	18.38	24.55	28.71	27.13	23.65
9	16.02	11.67	3.57	16.22	9.98	12.92	16.02	18.94
12	.00	6.67	2.38	6.49	5.99	4.78	8.08	9.62
15	12.14	2.78	2.98	8.11	4.49	.00	3.61	5.01
18	.00	3.33	.00	.00	1.80	.00	.87	4.21
21	3.40	.00	4.17	.00	.00	.00	1.01	2.10
24	.00	.00	.00	.00	.00	.00	.00	2.40
27	.00	.00	.00	.00	.00	.00	.00	1.80
30	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	1.10
36	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00
45	.00	.00	.00	.00	.00	.00	.00	.00
48	.00	.00	.00	.00	.00	.00	.00	.00
51	.00	.00	.00	.00	.00	.00	.00	.00
54	.00	.00	.00	.00	.00	.00	.00	.00
57	.00	.00	.00	.00	.00	.00	.00	.00
60	.00	.00	.00	.00	.00	.00	.00	.00
63	.00	.00	.00	.00	.00	.00	.00	.00

TABLE 2.3-23 (continued)

SUMMER

Upper Class Intervals of Hours of Persistence	Wind Direction SSW	SW	WSW	W	WNW	NW	NNW	N	Calm
3	53.39	73.83	77.14	70.00	66.00	61.84	48.48	47.18	45.98
6	25.47	26.17	22.86	30.00	8.00	23.68	31.45	21.54	26.79
9	9.76	.00	.00	.00	18.00	3.95	9.43	10.77	10.71
12	5.42	.00	.00	.00	8.00	10.53	7.55	6.15	8.93
15	4.07	.00	.00	.00	.00	.00	3.14	7.69	4.46
18	.00	.00	.00	.00	.00	.00	.00	3.08	.00
21	1.90	.00	.00	.00	.00	.00	.00	3.59	3.12
24	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00
45	.00	.00	.00	.00	.00	.00	.00	.00	.00
48	.00	.00	.00	.00	.00	.00	.00	.00	.00
51	.00	.00	.00	.00	.00	.00	.00	.00	.00
54	.00	.00	.00	.00	.00	.00	.00	.00	.00
57	.00	.00	.00	.00	.00	.00	.00	.00	.00
60	.00	.00	.00	.00	.00	.00	.00	.00	.00
63	.00	.00	.00	.00	.00	.00	.00	.00	.00

FALL

Upper Class Intervals of Hours of Persistence	Wind Direction NNE	NE	ENE	E	ESE	SE	SSE	S
3	38.08	52.90	47.11	61.70	44.90	44.01	28.32	23.02
6	20.92	36.13	33.06	14.89	21.22	24.51	21.20	20.41
9	18.83	7.74	7.44	19.15	10.86	19.94	18.71	
12	15.06	.00	3.31	4.26	8.16	8.91	10.76	13.15
15	4.18	3.23	4.13	.00	6.12	2.79	11.08	7.37
18	.00	.00	4.96	.00	.00	6.69	3.80	5.44
21	2.93	.00	.00	.00	.00	.00	1.11	1.59
24	.00	.00	.00	.00	.00	2.23	3.80	2.72
27	.00	.00	.00	.00	.00	.00	.00	3.06
30	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	1.25
36	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	1.59
45	.00	.00	.00	.00	.00	.00	.00	1.70

TABLE 2.3-23 (continued)

FALL

Upper Class Intervals of Hours of Persistence	SSW	SW	WSW	W	WNW	NW	NNW	N	Calm
3	40.66	60.00	69.23	83.93	61.47	39.02	26.74	30.00	45.03
6	23.02	40.00	12.31	10.71	16.51	26.34	18.43	26.87	27.23
9	19.18	.00	4.62	5.36	13.76	11.71	14.16	18.75	10.99
12	6.14	.00	6.15	.00	3.67	7.80	12.58	10.00	8.38
15	2.56	.00	7.69	.00	4.59	2.44	6.74	3.12	5.24
18	4.60	.00	.00	.00	.00	5.85	9.44	3.75	3.14
21	1.79	.00	.00	.00	.00	6.83	3.15	2.19	.00
24	2.05	.00	.00	.00	.00	.00	1.80	2.50	.00
27	.00	.00	.00	.00	.00	.00	2.02	2.81	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	4.94	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00
45	.00	.00	.00	.00	.00	.00	.00	.00	.00

WOLF CREEK

TABLE 2.3-23 (continued)

WINTER

Upper Class Intervals of Hours of Persistence	Wind Direction							
	NNE	NE	ENE	E	ESE	SE	SSE	S
3	26.67	44.94	61.19	60.82	34.34	42.63	43.67	22.52
6	21.33	22.47	14.93	26.80	26.26	23.16	20.25	23.05
9	22.00	13.48	17.91	.00	18.18	20.53	7.59	19.68
12	9.33	6.74	5.97	4.12	4.04	4.21	13.92	9.93
15	16.67	5.62	.00	.00	7.58	5.26	7.91	6.21
18	4.00	6.74	.00	.00	6.06	.00	1.90	4.26
21	.00	.00	.00	.00	3.54	.00	2.22	6.21
24	.00	.00	.00	8.25	.00	4.21	2.53	4.26
27	.00	.00	.00	.00	.00	.00	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	1.77
33	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	2.13

TABLE 2.3-23 (continued)

WINTER

Upper Class Intervals of Hours of Persistence	Wind Direction								
	SSW	SW	WSW	W	WNW	NW	NNW	N	Calm
3	40.29	59.00	78.26	63.89	59.35	37.14	19.17	33.33	54.03
6	25.51	28.00	17.39	22.22	20.65	21.43	19.46	24.39	20.97
9	14.78	9.00	4.35	8.33	11.61	16.07	11.59	14.63	9.68
12	12.75	4.00	.00	5.56	.00	7.14	11.44	10.84	6.45
15	2.90	.00	.00	.00	.00	3.57	9.30	9.49	4.03
18	1.74	.00	.00	.00	3.87	2.14	6.87	1.63	4.84
21	2.03	.00	.00	.00	4.52	2.50	9.01	5.69	.00
24	.00	.00	.00	.00	.00	5.71	3.43	.00	.00
27	.00	.00	.00	.00	.00	.00	3.86	.00	.00
30	.00	.00	.00	.00	.00	.00	4.29	.00	.00
33	.00	.00	.00	.00	.00	.00	1.57	.00	.00
36	.00	.00	.00	.00	.00	4.29	.00	.00	.00

TABLE 2.3-24

JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)
BY STABILITY CLASS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

STABILITY CLASS: PASQUILL A
DATA SOURCE: CHANUTE F.S.S., KANSAS

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	3.9	.0	.0	.0	.0	.0	.0	.0	3.9	4.0
NE	.0	1.3	.0	.0	.0	.0	.0	.0	.0	1.3	4.0
ENE	.0	1.9	.0	.0	.0	.0	.0	.0	.0	1.9	4.7
E	.0	2.6	.0	.0	.0	.0	.0	.0	.0	2.6	4.0
ESE	.0	6.5	.0	.0	.0	.0	.0	.0	.0	6.5	4.8
SE	.6	1.9	.0	.0	.0	.0	.0	.0	.0	2.6	3.8
SSE	.0	3.9	.0	.0	.0	.0	.0	.0	.0	3.9	4.5
S	.0	3.2	.0	.0	.0	.0	.0	.0	.0	3.2	4.8
SSW	.0	1.9	.0	.0	.0	.0	.0	.0	.0	1.9	4.0
SW	.0	1.3	.0	.0	.0	.0	.0	.0	.0	1.3	4.5
WSW	.0	.6	.0	.0	.0	.0	.0	.0	.0	.6	3.0
W	.0	1.3	.0	.0	.0	.0	.0	.0	.0	1.3	3.0
WNW	.0	.6	.0	.0	.0	.0	.0	.0	.0	.6	4.0
NW	.6	3.9	.0	.0	.0	.0	.0	.0	.0	4.5	4.1
NNW	.0	1.3	.0	.0	.0	.0	.0	.0	.0	1.3	4.5
N	.0	1.3	.0	.0	.0	.0	.0	.0	.0	1.3	4.5
CALM										61.3	
TOTAL	1.3	37.4	.0	.0	.0	.0	.0	.0	.0	100.0	1.7

NUMBER OF INVALID OBSERVATIONS = 0

TABLE 2.3-24 (CONTINUED) SHEET 2 OF 6

JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)
BY STABILITY CLASS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

STABILITY CLASS: PASQUILL B
DATA SOURCE: CHANUTE F.S.S., KANSAS

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	1.7	3.2	.5	.0	.0	.0	.0	.0	5.4	5.9
NE	.1	1.9	3.3	.2	.0	.0	.0	.0	.0	5.6	5.7
ENE	.0	1.2	1.9	.7	.0	.0	.0	.0	.0	3.9	6.0
E	.0	2.3	2.7	.1	.0	.0	.0	.0	.0	5.1	5.7
ESE	.0	3.5	2.9	.4	.0	.0	.0	.0	.0	6.8	5.6
SE	.1	2.4	4.0	1.5	.0	.0	.0	.0	.0	8.0	6.0
SSE	.1	2.9	2.7	1.0	.0	.0	.0	.0	.0	6.7	5.6
S	.1	2.4	4.1	1.0	.0	.0	.0	.0	.0	7.7	6.0
SSW	.2	1.5	3.2	1.1	.0	.0	.0	.0	.0	6.0	6.2
SW	.1	1.0	2.1	.4	.0	.0	.0	.0	.0	3.5	6.0
WSW	.2	2.1	1.2	.2	.0	.0	.0	.0	.0	3.8	5.2
W	.0	1.1	.4	.1	.0	.0	.0	.0	.0	1.6	4.6
WNW	.0	1.9	2.3	.4	.0	.0	.0	.0	.0	4.6	5.6
NW	.2	2.1	1.1	.7	.0	.0	.0	.0	.0	4.1	5.3
NNW	.2	2.2	2.2	.5	.0	.0	.0	.0	.0	5.1	5.4
N	.4	1.9	2.1	.6	.0	.0	.0	.0	.0	5.0	5.4
CALM										17.1	
TOTAL	1.9	32.3	39.3	9.4	.0	.0	.0	.0	.0	100.0	4.7

NUMBER OF INVALID OBSERVATIONS = 0

TABLE 2.3-24 (CONTINUED) SHEET 3 OF 6

JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)
BY STABILITY CLASS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

STABILITY CLASS: PASQUILL C
DATA SOURCE: CHANUTE F.S.S., KANSAS

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.7	1.3	2.9	.2	.2	.0	.1	.0	5.4	8.3
NE	.0	1.2	.6	2.6	.2	.2	.1	.0	.0	4.9	8.0
ENE	.0	.3	.6	1.7	.1	.1	.0	.0	.0	2.8	8.4
E	.0	.8	.5	2.3	.2	.1	.0	.0	.0	4.0	7.9
ESE	.0	1.2	1.7	3.6	.4	.2	.1	.0	.0	7.3	8.1
SE	.0	1.2	1.4	4.5	.5	.3	.0	.0	.0	8.0	8.2
SSE	.0	1.2	1.6	5.9	1.5	.7	.2	.7	.2	12.1	9.9
S	.0	.8	1.3	5.6	1.0	1.5	.5	1.8	.7	13.1	11.7
SSW	.0	.4	.8	4.7	1.0	1.3	.7	1.5	.6	11.0	12.3
SW	.0	.7	.4	2.1	.6	.6	.1	.1	.1	4.6	9.7
WSW	.0	.7	.6	1.5	.2	.0	.0	.0	.0	3.1	7.5
W	.0	.2	.2	1.0	.1	.0	.0	.0	.0	1.6	8.5
WNW	.0	.8	.5	1.4	.2	.1	.0	.1	.0	3.1	8.0
NW	.0	.9	1.1	2.1	.2	.2	.2	.1	.0	4.8	8.4
NNW	.0	1.1	1.3	3.4	.5	.4	.2	.1	.0	6.9	8.6
N	.0	.8	.6	2.5	.2	.4	.1	.0	.0	4.7	8.7
CALM										2.6	
TOTAL	.0	13.0	14.4	47.7	7.1	6.4	2.3	4.8	1.7	100.0	9.2

NUMBER OF INVALID OBSERVATIONS = 0

TABLE 2.3-24 (CONTINUED) SHEET 4 OF 6

JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)
BY STABILITY CLASS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

STABILITY CLASS: PASQUILL D
DATA SOURCE: CHANUTE F.S.S., KANSAS

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.0	.3	.4	1.6	1.3	1.3	.4	.4	.1	5.9	11.8
NE	.0	.3	.5	1.3	.9	.9	.2	.2	.0	4.3	11.0
ENE	.0	.2	.3	1.1	.6	.6	.1	.0	.0	3.1	10.5
E	.0	.3	.4	1.1	.5	.7	.1	.1	.0	3.1	10.6
ESE	.0	.3	.8	2.0	1.0	.8	.1	.1	.0	5.2	10.4
SE	.0	.4	.6	2.1	1.5	1.2	.4	.3	.0	6.5	11.2
SSE	.0	.3	.6	2.4	2.8	3.8	1.3	1.7	.8	13.8	13.7
S	.0	.2	.3	2.2	3.4	5.0	1.9	3.9	2.1	19.1	15.4
SSW	.0	.2	.2	1.1	1.6	2.6	.9	1.5	.8	8.9	14.7
SW	.0	.2	.1	.5	.5	.6	.2	.2	.2	2.5	13.2
WSW	.0	.1	.1	.3	.2	.2	.1	.1	.1	1.3	12.6
W	.0	.1	.1	.3	.2	.2	.0	.1	.1	1.2	12.6
WNW	.0	.2	.2	.4	.4	.6	.2	.5	.1	2.6	13.3
NW	.0	.2	.3	.9	.8	1.1	.5	.6	.2	4.5	13.4
NNW	.0	.3	.5	1.6	1.5	2.7	.9	1.6	.4	9.6	13.8
N	.0	.3	.4	1.4	1.2	2.1	.5	1.0	.2	7.2	13.1
CALM										1.1	
TOTAL	.1	3.9	5.9	20.4	18.4	24.6	7.9	12.5	5.2	100.0	13.1

NUMBER OF INVALID OBSERVATIONS = 21

TABLE 2.3-24 (CONTINUED) SHEET 5 OF 6

JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)
BY STABILITY CLASS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

STABILITY CLASS: PASQUILL E
DATA SOURCE: CHANUTE F.S.S., KANSAS

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS) 2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	MEAN SPEED
NNE	.0	.7	1.2	2.8	.0	.0	.0	.0	.0	4.8	7.8
NE	.0	.6	1.0	2.2	.0	.0	.0	.0	.0	3.8	7.7
ENE	.0	.7	1.0	2.0	.0	.0	.0	.0	.0	3.6	7.6
E	.0	.8	1.2	2.8	.0	.0	.0	.0	.0	4.8	7.7
ESE	.0	1.0	2.5	5.4	.0	.0	.0	.0	.0	8.9	7.9
SE	.0	1.0	2.7	7.4	.0	.0	.0	.0	.0	11.1	8.1
SSE	.0	.8	1.8	10.8	.0	.0	.0	.0	.0	13.4	8.6
S	.0	.6	1.7	12.3	.0	.0	.0	.0	.0	14.6	8.8
SSW	.0	.3	1.1	4.9	.0	.0	.0	.0	.0	6.2	8.5
SW	.0	.3	.7	1.6	.0	.0	.0	.0	.0	2.6	8.2
WSW	.0	.4	.5	1.4	.0	.0	.0	.0	.0	2.3	7.6
W	.0	.2	.4	1.3	.0	.0	.0	.0	.0	1.9	7.9
WNW	.0	.4	.9	2.1	.0	.0	.0	.0	.0	3.5	8.0
NW	.0	.4	1.3	3.3	.0	.0	.0	.0	.0	5.0	8.1
NNW	.0	.7	1.8	5.3	.0	.0	.0	.0	.0	7.8	8.1
N	.0	.8	1.3	3.6	.0	.0	.0	.0	.0	5.7	8.0
CALM										.0	
TOTAL	.0	9.7	21.1	69.2	.0	.0	.0	.0	.0	100.0	8.2

NUMBER OF INVALID OBSERVATIONS = 0

TABLE 2.3-24 (CONTINUED) SHEET 6 OF 6

JOINT WIND SPEED, WIND DIRECTION
FREQUENCY DISTRIBUTION (IN PERCENT)
BY STABILITY CLASS
DATA PERIOD: JANUARY 1, 1955 TO DECEMBER 31, 1964

STABILITY CLASS: PASQUILL F
DATA SOURCE: CHANUTE F.S.S., KANSAS

SECTOR	UPPER CLASS INTERVALS OF WIND SPEED (KNOTS)										MEAN
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	>20.0	TOTAL	SPEED
NNE	.1	3.2	1.4	.0	.0	.0	.0	.0	.0	4.7	4.9
NE	.1	3.3	1.1	.0	.0	.0	.0	.0	.0	4.5	4.7
ENE	.0	3.1	1.0	.0	.0	.0	.0	.0	.0	4.1	4.8
E	.0	3.4	1.1	.0	.0	.0	.0	.0	.0	4.5	4.8
ESE	.1	3.8	2.2	.0	.0	.0	.0	.0	.0	6.1	5.0
SE	.1	4.4	2.4	.0	.0	.0	.0	.0	.0	6.9	5.0
SSE	.0	3.4	2.4	.0	.0	.0	.0	.0	.0	5.8	5.1
S	.0	2.2	2.3	.0	.0	.0	.0	.0	.0	4.5	5.3
SSW	.0	2.0	1.2	.0	.0	.0	.0	.0	.0	3.2	5.1
SW	.2	2.2	.4	.0	.0	.0	.0	.0	.0	2.8	4.5
WSW	.0	2.2	.8	.0	.0	.0	.0	.0	.0	3.1	4.7
W	.0	2.7	.8	.0	.0	.0	.0	.0	.0	3.5	4.6
WNW	.1	3.5	1.4	.0	.0	.0	.0	.0	.0	4.9	4.8
NW	.2	4.6	2.5	.0	.0	.0	.0	.0	.0	7.3	4.8
NNW	.0	4.5	2.2	.0	.0	.0	.0	.0	.0	6.7	4.9
N	.0	4.5	1.8	.0	.0	.0	.0	.0	.0	6.2	4.9
CALM										21.1	
TOTAL	1.0	52.9	24.9	.0	.0	.0	.0	.0	.0	100.0	3.9

NUMBER OF INVALID OBSERVATIONS = 0

WOLF CREEK

TABLE 2.3-25

JOINT WIND REEQUENCY DISTRIBUTION (ANNUAL - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: THREE YEARS COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	58	389	526	336	139	30	1478	4.49
	.23	1.52	2.05	1.31	.54	.12	5.77	
NE	73	443	438	162	30	3	1149	3.55
	.28	1.73	1.71	.63	.12	.01	4.49	
ENE	67	325	425	146	27	1	991	3.65
	.26	1.27	1.66	.57	.11	.00	3.87	
E	66	351	496	199	26	11	1149	3.84
	.26	1.37	1.94	.78	.10	.04	4.49	
ESE	51	409	466	206	45	24	1201	3.97
	.20	1.60	1.82	.80	.18	.09	4.69	
SE	92	637	552	246	69	14	1610	3.72
	.36	2.49	2.15	.96	.27	.05	6.29	
SSE	76	843	1087	486	118	35	2645	4.06
	.30	3.29	4.24	1.90	.46	.14	10.33	
S	99	685	1475	1327	708	229	4523	5.45
	.39	2.67	5.76	5.18	2.76	.89	17.66	
SSW	88	355	691	834	373	186	2527	5.61
	.34	1.39	2.70	3.26	1.46	.73	9.87	
SW	58	267	297	202	95	48	967	4.62
	.23	1.04	1.16	.79	.37	.19	3.78	
WSW	81	221	178	92	46	12	630	3.76
	.32	.86	.69	.36	.18	.05	2.46	
W	81	275	278	145	43	14	836	3.85
	.32	1.07	1.09	.57	.17	.05	3.26	
WNW	67	296	313	208	59	30	973	4.26
	.26	1.16	1.22	.81	.23	.12	3.80	
NW	73	367	368	380	201	91	1480	5.10
	.28	1.43	1.44	1.48	.78	.36	5.78	
NNW	65	286	445	556	307	76	1735	5.47
	.25	1.12	1.74	2.17	1.20	.30	6.77	
N	61	330	560	481	214	56	1702	5.00
	.24	1.29	2.19	1.88	.84	.22	6.64	
CALM	19						19	CALM
	.07						.07	
TOTAL	1175	6479	8595	6006	2500	860	25615	4.64
	4.59	25.29	33.55	23.45	9.76	3.36	100.00	

NUMBER OF VALID OBSERVATIONS 25615 97.38 PCT.
NUMBER OF INVALID OBSERVATIONS 689 2.62 PCT.
TOTAL NUMBER OF OBSERVATIONS 26304 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	26	157	167	68	45	12	475	4.17
	.31	1.87	1.99	.81	.54	.14	5.66	
NE	32	137	127	46	3	1	346	3.35
	.38	1.63	1.51	.55	.04	.01	4.12	
ENE	18	92	120	50	12	1	293	3.83
	.21	1.10	1.43	.60	.14	.01	3.49	
E	21	117	93	55	8	5	299	3.77
	.25	1.39	1.11	.66	.10	.06	3.56	
ESE	12	123	140	54	11	4	344	3.84
	.14	1.47	1.67	.64	.13	.05	4.10	
SE	20	195	207	60	17	3	502	3.64
	.24	2.32	2.47	.71	.20	.04	5.98	
SSE	18	315	403	175	49	23	983	4.22
	.21	3.75	4.80	2.09	.58	.27	11.71	
S	25	234	526	542	254	99	1680	5.64
	.30	2.79	6.27	6.46	3.03	1.18	20.02	
SSW	26	114	210	241	116	68	775	5.74
	.31	1.36	2.50	2.87	1.38	.81	9.23	
SW	19	80	101	92	38	21	351	5.02
	.23	.95	1.20	1.10	.45	.25	4.18	
WSW	27	70	57	29	16	4	203	3.78
	.32	.83	.68	.35	.19	.05	2.42	
W	23	80	70	25	10	0	208	3.42
	.27	.95	.83	.30	.12	0.00	2.48	
WNW	16	102	116	62	14	11	321	4.16
	.19	1.22	1.38	.74	.17	.13	3.82	
NW	30	115	137	135	70	53	540	5.42
	.36	1.37	1.63	1.61	.83	.63	6.43	
NNW	23	94	152	201	80	21	571	5.31
	.27	1.12	1.81	2.39	.95	.25	6.80	
N	26	102	170	134	48	10	490	4.65
	.31	1.22	2.03	1.60	.57	.12	5.84	
CALM	12						12	CALM
	.14						.14	
TOTAL	374	2127	2796	1969	791	336	8393	4.70
	4.46	25.34	33.31	23.46	9.42	4.00	100.00	

NUMBER OF VALID OBSERVATIONS 8393 95.81 PCT.
NUMBER OF INVALID OBSERVATIONS 367 4.19 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-25

JOINT WIND FREQUENCY DISTRIBUTION (ANNUAL - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	22 .26	115 1.34	176 2.06	139 1.62	51 .60	3 .04	506 5.91	4.61
NE	25 .29	133 1.55	118 1.38	42 .49	2 .02	0 0.00	320 3.74	3.37
ENE	22 .26	92 1.07	137 1.60	48 .56	6 .07	0 0.00	305 3.56	3.68
E	24 .28	96 1.12	181 2.11	57 .67	10 .12	5 .06	373 4.36	3.92
ESE	13 .15	119 1.39	154 1.80	101 1.18	25 .29	17 .20	429 5.01	4.53
SE	31 .36	211 2.46	196 2.29	105 1.23	14 .16	8 .09	565 6.60	3.82
SSE	25 .29	278 3.25	363 4.24	198 2.31	41 .48	8 .09	913 10.67	4.14
S	33 .39	207 2.42	460 5.37	413 4.82	216 2.52	50 .58	1379 16.11	5.34
SSW	31 .36	135 1.58	250 2.92	273 3.19	144 1.68	76 .89	909 10.62	5.65
SW	18 .21	100 1.17	103 1.20	51 .60	31 .36	22 .26	325 3.80	4.54
WSW	26 .30	61 .71	55 .64	35 .41	13 .15	8 .09	198 2.31	4.00
W	22 .26	91 1.06	90 1.05	54 .63	12 .14	14 .16	283 3.31	4.19
WNW	27 .32	81 .95	112 1.31	85 .99	31 .36	19 .22	355 4.15	4.83
NW	24 .28	104 1.21	130 1.52	169 1.97	83 .97	20 .23	530 6.19	5.27
NNW	21 .25	95 1.11	123 1.44	186 2.17	137 1.60	23 .27	585 6.83	5.72
N	19 .22	95 1.11	193 2.25	177 2.07	81 .95	17 .20	582 6.80	5.20
CALM	3 .04						3 .04	CALM
TOTAL	386 4.51	2013 23.52	2841 33.19	2133 24.92	897 10.48	290 3.39	8560 100.00	4.76

NUMBER OF VALID OBSERVATIONS 8560 97.72 PCT.
NUMBER OF INVALID OBSERVATIONS 200 2.28 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	10 .12	117 1.35	183 2.11	129 1.49	43 .50	15 .17	497 5.74	4.69
NE	16 .18	173 2.00	193 2.23	74 .85	25 .29	2 .02	483 5.58	3.81
ENE	27 .31	141 1.63	168 1.94	48 .55	9 .10	0 0.00	393 4.54	3.51
E	21 .24	138 1.59	222 2.56	87 1.00	8 .09	1 .01	477 5.51	3.82
ESE	26 .30	167 1.93	172 1.99	51 .59	9 .10	3 .03	428 4.94	3.52
SE	41 .47	231 2.67	149 1.72	81 .94	38 .44	3 .03	543 6.27	3.67
SSE	33 .38	250 2.89	321 3.71	113 1.30	28 .32	4 .05	749 8.65	3.75
S	41 .47	244 2.82	489 5.65	372 4.29	238 2.75	80 .92	1464 16.90	5.34
SSW	31 .36	106 1.22	231 2.67	320 3.69	113 1.30	42 .48	843 9.73	5.46
SW	21 .24	87 1.00	93 1.07	59 .68	26 .30	5 .06	291 3.36	4.25
WSW	28 .32	90 1.04	66 .76	28 .32	17 .20	0 0.00	229 2.64	3.54
W	36 .42	104 1.20	118 1.36	66 .76	21 .24	0 0.00	345 3.98	3.83
WNW	24 .28	113 1.30	85 .98	61 .70	14 .16	0 0.00	297 3.43	3.69
NW	19 .22	148 1.71	101 1.17	76 .88	48 .55	18 .21	410 4.73	4.47
NNW	21 .24	97 1.12	170 1.96	169 1.95	90 1.04	32 .37	579 6.68	5.38
N	16 .18	133 1.54	197 2.27	170 1.96	85 .98	29 .33	630 7.27	5.09
CALM	4 .05						4 .05	CALM
TOTAL	415 4.79	2339 27.00	2958 34.15	1904 21.98	812 9.37	234 2.70	8662 100.00	4.47

NUMBER OF VALID OBSERVATIONS 8662 98.61 PCT.
NUMBER OF INVALID OBSERVATIONS 122 1.39 PCT.
TOTAL NUMBER OF OBSERVATIONS 8784 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-26

JOINT WIND FREQUENCY DISTRIBUTION (ANNUAL - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: THREE YEARS COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	14 .06	80 .32	273 1.10	494 1.99	331 1.33	192 .77	1384 5.58	6.91
NE	19 .08	142 .57	394 1.59	356 1.43	83 .33	15 .06	1009 4.07	4.98
ENE	12 .05	104 .42	272 1.10	371 1.49	179 .72	41 .17	979 3.94	5.81
E	17 .07	85 .34	225 .91	445 1.79	255 1.03	42 .17	1069 4.31	6.15
ESE	15 .06	95 .38	247 1.00	397 1.60	230 .93	73 .29	1057 4.26	6.25
SE	18 .07	96 .39	289 1.16	557 2.24	350 1.41	146 .59	1456 5.87	6.64
SSE	16 .06	95 .38	350 1.41	720 2.90	631 2.54	311 1.25	2123 8.55	7.29
S	17 .07	120 .48	432 1.74	1471 5.93	1484 5.98	1126 4.54	4650 18.74	8.17
SSW	22 .09	88 .35	343 1.38	968 3.90	881 3.55	562 2.26	2864 11.54	7.77
SW	20 .08	94 .38	273 1.10	450 1.81	266 1.07	142 .57	1245 5.02	6.61
WSW	10 .04	82 .33	175 .71	235 .95	108 .44	52 .21	662 2.67	5.89
W	25 .10	93 .37	238 .96	262 1.06	135 .54	51 .21	804 3.24	5.78
WNW	10 .04	64 .26	158 .64	295 1.19	237 .95	95 .38	859 3.46	6.89
NW	15 .06	55 .22	190 .77	385 1.55	363 1.46	237 .95	1245 5.02	7.63
NNW	15 .06	52 .21	170 .69	539 2.17	493 1.99	334 1.35	1603 6.46	7.88
N	20 .08	70 .28	228 .92	580 2.34	520 2.10	379 1.53	1797 7.24	7.74
CALM	11 .04						11 .04	CALM
TOTAL	276 1.11	1415 5.70	4257 17.15	8525 34.35	6546 26.38	3798 15.30	24817 100.00	7.16

NUMBER OF VALID OBSERVATIONS 24817 94.35 PCT.
NUMBER OF INVALID OBSERVATIONS 1487 5.65 PCT.
TOTAL NUMBER OF OBSERVATIONS 26304 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENFRATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNF	6 .03	18 .23	85 1.06	148 1.85	90 1.13	78 .98	425 5.32	7.21
NE	7 .09	43 .54	107 1.34	123 1.54	23 .29	2 .03	305 3.82	4.95
ENE	2 .03	32 .40	78 .98	105 1.31	67 .84	27 .34	311 3.89	6.23
E	7 .09	28 .35	68 .85	141 1.77	84 1.05	12 .15	340 4.26	6.15
ESE	4 .05	23 .29	74 .93	98 1.23	51 .64	19 .24	269 3.37	6.12
SE	7 .09	23 .29	60 .75	176 2.20	97 1.21	42 .53	405 5.07	6.84
SSE	7 .09	20 .25	79 .99	198 2.48	221 2.77	132 1.65	657 8.23	7.97
S	3 .04	23 .29	107 1.34	412 5.16	604 7.56	471 5.90	1620 20.29	8.70
SSW	6 .08	16 .20	77 .96	279 3.49	374 4.68	250 3.13	1002 12.55	8.43
SW	4 .05	15 .19	80 1.00	176 2.20	142 1.78	62 .78	479 6.00	7.23
WSW	3 .04	24 .30	61 .76	70 .88	36 .45	17 .21	211 2.64	5.93
W	7 .09	27 .34	65 .81	75 .94	25 .31	7 .09	206 2.58	5.47
WNW	0 0.00	17 .21	47 .59	108 1.35	74 .93	14 .18	260 3.26	6.63
NW	6 .08	16 .20	71 .89	160 2.00	106 1.33	102 1.28	461 5.77	7.80
NNW	6 .08	19 .24	52 .65	189 2.37	154 1.93	64 .80	484 6.06	7.47
N	8 .10	26 .33	62 .78	177 2.22	145 1.82	125 1.57	543 6.80	7.81
CALM	8 .10						8 .10	CALM
TOTAL	91 1.14	370 4.63	1173 14.69	2635 33.00	2293 28.71	1424 17.83	7986 100.00	7.49

NUMBER OF VALID OBSERVATIONS 7986 91.16 PCT.
NUMBER OF INVALID OBSERVATIONS 774 8.84 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-26

JOINT WIND FREQUENCY DISTRIBUTION (ANNUAL - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4	31	90	169	125	60	479	6.84
	.05	.37	1.08	2.02	1.50	.72	5.73	
NE	7	55	123	82	16	4	287	4.58
	03	.66	1.47	.98	.19	.05	3.43	
ENE	6	41	98	106	40	1	292	5.26
	.07	.49	1.17	1.27	.48	.01	3.49	
E	5	28	67	107	55	15	277	6.07
	.06	.33	.80	1.28	.66	.18	3.31	
ESE	8	45	95	156	84	36	424	6.25
	.10	.54	1.14	1.87	1.00	.43	5.07	
SE	7	48	103	161	127	52	498	6.55
	.03	.57	1.23	1.93	1.52	.62	5.96	
SSE	9	35	145	270	224	84	767	6.94
	.11	.42	1.73	3.23	2.68	1.00	9.18	
S	10	45	167	547	474	284	1527	7.74
	.12	.54	2.00	6.54	5.67	3.40	18.27	
SSW	13	41	156	353	265	170	998	7.37
	.16	.49	1.87	4.22	3.17	2.03	11.94	
SW	9	33	99	174	53	45	413	6.26
	.11	.39	1.18	2.08	.63	.54	4.94	
WSW	5	35	58	100	23	13	234	5.57
	.06	.42	.69	1.20	.28	.16	2.80	
W	14	29	71	71	27	18	230	5.53
	.17	.35	.85	.85	.32	.22	2.75	
WNW	8	25	65	97	91	59	345	7.24
	.10	.30	.78	1.16	1.09	.71	4.13	
NW	6	26	68	120	138	74	432	7.37
	.07	.31	.81	1.44	1.65	.89	5.17	
NNW	3	16	55	170	181	112	537	7.93
	.04	.19	.66	2.03	2.17	1.34	6.42	
N	8	26	72	209	176	127	618	7.69
	.10	.31	.86	2.50	2.11	1.52	7.39	
CALM	1						1	CALM
	.01						.01	
TOTAL	123	559	1532	2892	2099	1154	8359	6.95
	1.47	6.69	18.33	34.60	25.11	13.81	100.00	

NUMBER OF VALID OBSERVATIONS 8359 95.42 PCT.
NUMBER OF INVALID OBSERVATIONS 401 4.58 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4	31	98	177	116	54	480	6.72
	.05	.37	1.16	2.09	1.37	.64	5.67	
NE	5	44	164	151	44	9	417	5.26
	.06	.52	1.94	1.78	.52	.11	4.92	
ENE	4	31	96	160	72	13	376	5.90
	.05	.37	1.13	1.89	.85	.15	4.44	
E	5	29	90	197	116	15	452	6.19
	.06	.34	1.06	2.33	1.37	.18	5.34	
ESE	3	27	78	143	95	18	364	6.34
	.04	.32	.92	1.69	1.12	.21	4.30	
SE	4	25	126	220	126	52	553	6.57
	.05	.30	1.49	2.60	1.49	.61	6.53	
SSE	0	40	126	252	186	95	699	7.03
	0.00	.47	1.49	2.97	2.20	1.12	8.25	
S	4	52	158	512	406	371	1503	8.04
	.05	.61	1.86	6.04	4.79	4.38	17.74	
SSW	3	31	110	336	242	142	864	7.48
	.04	.37	1.30	3.97	2.86	1.68	10.20	
SW	7	46	94	100	71	35	353	6.17
	.08	.54	1.11	1.18	.84	.41	4.17	
WSW	2	23	56	65	49	22	217	6.19
	.02	.27	.66	.77	.58	.26	2.56	
W	4	37	102	116	83	26	368	6.11
	.05	.44	1.20	1.37	98	.31	4.34	
WNW	2	22	46	90	72	22	254	6.67
	.02	.26	.54	1.06	.85	.26	3.00	
NW	3	13	51	105	119	61	352	7.71
	.04	.15	.60	1.24	1.40	.72	4.15	
NNW	6	17	63	180	158	158	582	8.18
	.07	.20	.74	2.12	1.86	1.86	6.87	
N	4	18	94	194	199	127	636	7.73
	.05	21	1.11	2.29	2.35	1.50	7.51	
CALM	2						2	CALM
	.02						.02	
TOTAL	62	486	1552	2998	2154	1220	8472	7.05
	.73	5.74	18.32	35.39	25.42	14.40	100.00	

NUMBER OF VALID OBSERVATIONS 8472 96.45 PCT.
NUMBER OF INVALID OBSERVATIONS 312 3.55 PCT.
TOTAL NUMBER OF OBSERVATIONS 8784 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-27

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD ALL JANUARY COMBINED

ALL WINDS
DATA SOURCE. ON-SITE
WIND SENSOR HEIGHT 10.00 METERS
TABLE GENERATED: 11/10/81. 15 02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO. 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	9 44	38 1.87	58 2.85	39 1.92	14 .69	0 0.00	158 7 76	4.26
NE	8 .39	46 2.26	70 3.44	22 1.08	9 .44	0 0.00	155 7.61	3.90
ENE	15 .74	25 1.23	28 1 38	7 .34	0 0.00	0 0.00	75 3.68	3.03
E	10 .49	22 1.08	43 2.11	16 .79	1 .05	0 0.00	92 4.52	3.68
ESE	3 .15	20 .98	25 1.23	10 .49	0 0.00	0 0.00	58 2.85	3.62
SE	10 49	27 1.33	28 1.38	15 .74	0 0.00	0 0.00	80 3.93	3.43
SSE	5 .25	34 1.67	71 3.49	38 1.87	3 .15	0 0.00	151 7.42	4.14
S	8 .39	38 1.87	87 4.27	67 3.29	45 2.21	6 .29	251 12.33	5.30
SSW	7 .34	26 1.28	37 1.82	42 2.06	21 1.03	10 .49	143 7.02	5.36
SW	8 .39	31 1.52	16 .79	11 .54	3 .15	0 0.00	69 3.39	3.35
WSW	9 .44	30 1.47	23 1.13	7 .34	1 .05	0 0.00	70 3.44	3.11
W	6 .29	37 1.82	37 1.82	20 .98	2 .10	0 0.00	102 5.01	3.64
WNW	8 .39	41 2.01	39 1.92	43 2.11	11 .54	1 .05	143 7.02	4.43
NW	4 .20	30 1.47	52 2.55	41 2.01	23 1.13	5 .25	155 7.61	5.11
NNW	4 .20	32 1.57	38 1.87	43 2.11	24 1.18	4 .20	145 7.12	5.15
N	9 .44	37 1.82	55 2.70	57 2.80	24 1.18	1 .05	183 8 99	4.90
CALM	6 .29						6 .29	CALM
TOTAL	129 6.34	514 25.25	707 34.72	478 23.48	181 8.89	27 1.33	2036 100.00	4.39

NUMBER OF VALID OBSERVATIONS 2036 91.22 PCT.
NUMBER OF INVALID OBSERVATIONS 196 8.78 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL FEBRUARY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	5 .27	30 1.62	50 2.70	20 1.08	11 .59	3 .16	119 6.43	4.32
NE	3 .16	24 1.30	36 1.94	10 .54	11 .59	2 .11	86 4.64	4.45
ENE	3 .16	21 1.13	25 1.35	23 1.24	5 .27	0 0.00	77 4.16	4.34
E	4 .22	20 1.08	47 2.54	11 .59	1 .05	0 0.00	83 4.48	3.78
ESE	1 .05	19 1.03	29 1.57	12 .65	4 .22	0 0.00	65 3.51	4.12
SE	9 .49	25 1.35	31 1.67	12 .65	0 0.00	2 .11	79 4.27	3.65
SSE	4 .22	14 .76	56 3.02	49 2.65	8 .43	3 .16	134 7.24	4.88
S	6 .32	19 1.03	73 3.94	47 2.54	18 .97	11 .59	174 9.40	5.19
SSW	13 .70	20 1 08	44 2.38	32 1.73	16 .86	1 .05	126 6.80	4.66
SW	9 .49	14 .76	19 1.03	9 .49	6 .32	3 .16	60 3.24	4.30
WSW	6 .32	24 1.30	22 1.19	6 .32	4 .22	1 .05	63 3.40	3.64
W	15 .81	40 2.16	40 2.16	13 .70	3 .16	0 0.00	111 5.99	3.40
WNW	9 .49	30 1.62	27 1.46	21 1.13	4 .22	7 .38	98 5.29	4.37
NW	7 .38	40 2.16	33 1.78	41 2.21	32 1.73	13 .70	166 8.96	5.55
NNW	7 .38	35 1.89	43 2.32	57 3.08	50 2.70	21 1.13	213 11.50	6.05
N	5 .27	28 1.51	64 3.46	65 3.51	25 1.35	10 .54	197 10.64	5.38
CALM	1 .05						1 05	CALM
TOTAL	107 5 78	403 21.76	639 34.50	428 23.11	198 10 69	77 4 16	1852 100.00	4.76

NUMBER OF VALID OBSERVATIONS 1852 90.78 PCT.
NUMBER OF INVALID OBSERVATIONS 188 9.22 PCT.
TOTAL NUMBER OF OBSERVATIONS 2040 100.00 PCT

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL MARCH COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	5 .23	16 .72	47 2.12	51 2.30	38 1.72	5 .23	162 7.32	5.73
NE	3 .14	39 1.76	36 1.63	16 .72	4 .18	0 0.00	98 4.43	3.66
ENE	9 .41	29 1.31	28 1.26	6 .27	5 .23	1 .05	78 3.52	3.64
E	6 .27	28 1.26	33 1.49	17 .77	4 .18	6 .27	94 4.25	4.31
ESE	4 .18	26 1.17	44 1.99	20 .90	13 .59	14 .63	121 5.47	5.25
SE	3 .14	27 1.22	64 2.89	47 2.12	12 .54	1 .05	154 6.96	4.67
SSE	5 .23	27 1.22	68 3.07	43 1.94	13 .59	5 .23	161 7.27	4.84
S	3 .14	18 .81	64 2.89	109 4.92	68 3.07	26 1.17	288 13.01	6.48
SSW	7 .32	24 1.08	33 1.49	54 2.44	47 2.12	30 1.36	195 8.81	6.45
SW	4 .18	21 .95	25 1.13	11 .50	15 .68	7 .32	83 3.75	5.20
WSW	12 .54	13 .59	15 .68	7 .32	9 .41	3 .14	59 2.66	4.41
W	7 .32	13 .59	12 .54	19 .86	4 .18	7 .32	62 2.80	5.19
WNW	3 .14	18 .81	28 1.26	9 .41	0 0.00	16 .72	74 3.34	5.77
NW	5 .23	33 1.49	39 1.76	46 2.08	30 1.36	20 .90	173 7.81	6.00
NNW	8 .36	24 1.08	41 1.85	84 3.79	58 2.62	30 1.36	245 11.07	6.61
N	5 .23	15 .68	69 3.12	57 2.57	17 .77	3 .14	166 7.50	5.15
CALM	1 .05						1 .05	CALM
TOTAL	90 4.07	371 16.76	646 29.18	596 26.92	337 15.22	174 7.86	2214 100.00	5.50

NUMBER OF VALID OBSERVATIONS 2214 99.19 PCT.
NUMBER OF INVALID OBSERVATIONS 18 .81 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL APRIL COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .05	15 .71	39 1.84	22 1.04	6 .28	3 .14	86 4.06	4.81
NE	5 .24	34 1.60	35 1.65	14 .66	0 0.00	0 0.00	88 4.15	3.45
ENE	1 .05	16 .75	44 2.08	15 .71	2 .09	0 0.00	78 3.68	4.06
E	2 .09	6 .28	60 2.83	28 1.32	4 .19	0 0.00	100 4.72	4.58
ESE	1 .05	13 .61	50 2.36	53 2.50	13 .61	6 .28	136 6.42	5.49
SE	0 0.00	32 1.51	57 2.69	74 3.49	24 1.13	7 .33	194 9.15	5.42
SSE	2 .09	30 1.42	95 4.48	71 3.35	52 2.45	25 1.18	275 12.97	6.01
S	3 .14	11 .52	52 2.45	87 4.10	96 4.53	53 2.50	302 14.25	7.55
SSW	1 .05	5 .24	32 1.51	56 2.64	46 2.17	20 .94	160 7.55	7.12
SW	0 0.00	12 .57	18 .85	16 .75	12 .57	11 .52	69 3.25	6.36
WSW	3 .14	12 .57	17 .80	15 .71	12 .57	4 .19	63 2.97	5.41
W	6 .28	5 .24	17 .80	17 .80	19 .90	0 0.00	64 3.02	5.46
WNW	4 .19	13 .61	24 1.13	16 .75	18 .85	4 .19	79 3.73	5.44
NW	1 .05	19 .90	39 1.84	37 1.75	39 1.84	14 .66	149 7.03	6.24
NNW	1 .05	9 .42	47 2.22	50 2.36	28 1.32	5 .24	140 6.60	5.85
N	1 05	17 .80	40 1.89	47 2.22	25 1.18	7 .33	137 6.46	5.77
CALM	0 0.00						0 0.00	CALM
TOTAL	32 1.51	249 11.75	666 31.42	618 29.15	396 18.68	159 7.50	2120 100.00	5.88

NUMBER OF VALID OBSERVATIONS 2120 98.15 PCT.
NUMBER OF INVALID OBSERVATIONS 40 1.85 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-27

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL MAY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4 .18	25 1.14	61 2.79	50 2.29	8 .37	3 .14	151 6.91	4.81
NE	8 .37	36 1.65	57 2.61	15 .69	3 .14	0 0.00	119 5.44	3.57
ENE	6 .27	43 1.97	44 2.01	19 .87	5 .23	0 0.00	117 5.35	3.71
E	5 .23	28 1.28	43 1.97	35 1.60	5 .23	3 .14	119 5.44	4.41
ESE	6 .27	37 1.69	48 2.20	31 1.42	5 .23	4 .18	131 5.99	4.33
SE	5 .23	39 1.78	66 3.02	36 1.65	3 .14	1 .05	150 6.86	4.12
SSE	1 .05	53 2.42	71 3.25	44 2.01	10 .46	1 .05	180 8.23	4.30
S	9 .41	45 2.06	69 3.16	172 7.87	103 4.71	60 2.74	458 20.95	6.70
SSW	9 .41	15 .69	34 1.56	46 2.10	80 3.66	29 1.33	213 9.74	7.18
SW	3 .14	20 .91	20 .91	15 .69	11 .50	4 .18	73 3.34	4.99
WSW	5 .23	13 .59	6 .27	7 .32	1 .05	0 0.00	32 1.46	3.43
W	8 .37	13 .59	22 1.01	2 .09	0 0.00	0 0.00	45 2.06	2.99
WNW	5 .23	23 1.05	17 .78	6 .27	3 .14	0 0.00	54 2.47	3.34
NW	4 .18	22 1.01	16 .73	32 1.46	6 .27	0 0.00	80 3.66	4.52
NNW	1 .05	23 1.05	36 1.65	50 2.29	7 .32	0 0.00	117 5.35	4.74
N	5 .23	32 1.46	45 2.06	44 2.01	20 .91	1 .05	147 6.72	4.91
CALM	0 0.00						0 0.00	CALM
TOTAL	84 3.84	467 21.36	655 29.96	604 27.63	270 12.35	106 4.85	2186 100.00	5.08

NUMBER OF VALID OBSERVATIONS 2186 97.94 PCT.
NUMBER OF INVALID OBSERVATIONS 46 2.06 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY: XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL JUNE COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3 .14	32 1.51	34 1.61	19 .90	2 .09	0 0.00	90 4.25	3.96
NE	6 .28	34 1.61	33 1.56	5 .24	0 0.00	0 0.00	78 3.68	3.18
ENE	4 .19	20 .94	30 1.42	5 .24	1 .05	0 0.00	60 2.83	3.25
E	5 .24	24 1.13	30 1.42	7 .33	2 .09	0 0.00	68 3.21	3.53
ESE	4 .19	30 1.42	30 1.42	5 .24	4 .19	0 0.00	73 3.45	3.52
SE	2 .09	43 2.03	37 1.75	9 .42	1 .05	0 0.00	92 4.34	3.28
SSE	7 .33	71 3.35	110 5.19	53 2.50	6 .28	0 0.00	247 11.66	3.94
S	5 .24	61 2.88	188 8.88	149 7.03	100 4.72	11 .52	514 24.27	5.49
SSW	6 .28	35 1.65	78 3.68	129 6.09	63 2.97	29 1.37	340 16.05	6.09
SW	4 .19	25 1.18	36 1.70	18 .85	8 .38	6 .28	97 4.58	4.69
WSW	4 .19	26 1.23	16 .76	5 .24	0 0.00	2 .09	53 2.50	3.27
W	1 .05	29 1.37	28 1.32	2 .09	1 .05	3 .14	64 3.02	3.72
WNW	2 .09	30 1.42	24 1.13	14 .66	2 .09	2 .09	74 3.49	3.95
NW	5 .24	26 1.23	23 1.09	15 .71	4 .19	0 0.00	73 3.45	3.82
NNW	5 .24	24 1.13	37 1.75	35 1.65	7 .33	0 0.00	108 5.10	4.49
N	3 .14	39 1.84	25 1.18	12 .57	7 .33	0 0.00	86 4.06	3.70
CALM	1 .05						1 .05	CALM
TOTAL	67 3.16	549 25.92	759 35.84	482 22.76	208 9.82	53 2.50	2118 100.00	4.58

NUMBER OF VALID OBSERVATIONS 2118 98.06 PCT.
NUMBER OF INVALID OBSERVATIONS 42 1.94 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY: XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-27

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL JULY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3 .13	58 2.61	32 1.44	13 .58	1 .04	0 0.00	107 4.81	3.34
NE	3 .13	45 2.02	33 1.48	8 .36	1 .04	0 0.00	90 4.05	3.33
ENE	6 .27	51 2.29	69 3.10	16 .72	1 .04	0 0.00	143 6.43	3.51
E	7 .31	63 2.83	74 3.33	16 .72	3 .13	2 .09	165 7.42	3.58
ESE	14 .63	64 2.88	60 2.70	13 .58	1 .04	0 0.00	152 6.83	3.13
SE	11 .49	79 3.55	40 1.80	10 .45	4 .18	0 0.00	144 6.47	3.01
SSE	3 .13	147 6.61	106 4.77	10 .45	1 .04	0 0.00	267 12.01	3.06
S	8 .36	109 4.90	200 8.99	142 6.38	34 1.53	6 .27	499 22.44	4.55
SSW	3 .13	43 1.93	84 3.78	120 5.40	9 .40	22 .99	281 12.63	5.36
SW	0 0.00	20 .90	25 1.12	26 1.17	1 .04	0 0.00	72 3.24	4.19
WSW	2 .09	10 .45	15 .67	7 .31	0 0.00	0 0.00	34 1.53	3.62
W	1 .04	25 1.12	18 .81	14 .63	0 0.00	0 0.00	58 2.61	3.65
WNW	1 .04	12 .54	17 .76	11 .49	0 0.00	0 0.00	41 1.84	3.95
NW	6 .27	10 .45	21 .94	7 .31	0 0.00	0 0.00	44 1.98	3.45
NNW	5 .22	19 .85	10 .45	5 .22	0 0.00	0 0.00	39 1.75	2.76
N	6 .27	22 .99	44 1.98	15 .67	0 0.00	1 .04	88 3.96	3.72
CALM	0 0.00						0 0.00	CALM
TOTAL	79 3.55	777 34.94	848 38.13	433 19.47	56 2.52	31 1.39	2224 100.00	3.88

NUMBER OF VALID OBSERVATIONS 2224 99.64 PCT.
NUMBER OF INVALID OBSERVATIONS 8 .36 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL AUGUST COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	10 .45	42 1.90	26 1.17	24 1.08	3 .14	1 .05	106 4.79	3.73
NE	10 .45	33 1.49	28 1.26	20 .90	0 0.00	0 0.00	91 4.11	3.43
ENE	2 .09	25 1.13	36 1.63	18 .81	3 .14	0 0.00	84 3.79	4.00
E	8 .36	36 1.63	36 1.63	21 .95	2 .09	0 0.00	103 4.65	3.80
ESE	5 .23	36 1.63	38 1.72	12 .54	0 0.00	0 0.00	91 4.11	3.36
SE	8 .36	96 4.34	41 1.85	14 .63	0 0.00	0 0.00	159 7.18	3.03
SSE	6 .27	143 6.46	106 4.79	32 1.45	5 .23	0 0.00	292 13.19	3.42
S	8 .36	123 5.56	240 10.84	177 7.99	46 2.08	0 0.00	594 26.83	4.61
SSW	4 .18	35 1.58	99 4.47	128 5.78	20 .90	0 0.00	286 12.92	5.06
SW	9 .41	15 .68	24 1.08	19 .86	0 0.00	0 0.00	67 3.03	3.96
WSW	4 .18	15 .68	14 .63	3 .14	2 .09	0 0.00	38 1.72	3.36
W	8 .36	11 .50	9 .41	4 .18	0 0.00	0 0.00	32 1.45	2.89
WNW	7 .32	23 1.04	14 .63	0 0.00	1 .05	0 0.00	45 2.03	2.68
NW	9 .41	19 .86	15 .68	22 .99	10 .45	0 0.00	75 3.39	4.38
NNW	5 .23	18 .81	15 .68	20 .90	1 .05	0 0.00	59 2.66	4.07
N	8 .36	38 1.72	33 1.49	10 .45	2 .09	1 .05	92 4.16	3.43
CALM	0 0.00						0 0.00	CALM
TOTAL	111 5.01	708 31.98	774 34.96	524 23.67	95 4.29	2 .09	2214 100.00	4.02

NUMBER OF VALID OBSERVATIONS 2214 99.19 PCT.
NUMBER OF INVALID OBSERVATIONS 18 .81 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-27

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL SEPTEMBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	10 .47	36 1.68	56 2.61	32 1.49	14 .65	0 0.00	148 6.91	4.24
NE	12 .56	65 3.03	29 1.35	18 .84	0 0.00	0 0.00	124 5.79	3.09
ENE	13 .61	40 1.87	39 1.82	15 .70	0 0.00	0 0.00	107 4.99	3.21
E	11 .51	51 2.38	42 1.96	7 .33	0 0.00	0 0.00	111 5.18	3.00
ESE	3 .14	78 3.64	48 2.24	3 .14	0 0.00	0 0.00	132 6.16	2.92
SE	28 1.31	114 5.32	57 2.66	8 .37	1 .05	0 0.00	208 9.71	2.66
SSE	24 1.12	135 6.30	113 5.27	31 1.45	3 .14	0 0.00	306 14.28	3.20
S	27 1.26	85 3.97	111 5.18	77 3.59	17 .79	4 .19	321 14.98	4.11
SSW	18 .84	49 2.29	54 2.52	34 1.59	9 .42	5 .23	169 7.89	4.00
SW	9 .42	39 1.82	19 .89	10 .47	0 0.00	0 0.00	77 3.59	3.06
WSW	8 .37	11 .51	3 .14	3 .14	0 0.00	0 0.00	25 1.17	2.54
W	5 .23	21 .98	8 .37	0 0.00	0 0.00	0 0.00	34 1.59	2.40
WNW	6 .28	17 .79	6 .28	0 0.00	0 0.00	0 0.00	29 1.35	2.40
NW	16 .75	25 1.17	12 .56	6 .28	4 .19	0 0.00	63 2.94	3.03
NNW	16 .75	33 1.54	42 1.96	28 1.31	5 .23	1 .05	125 5.83	4.02
N	7 .33	23 1.07	69 3.22	47 2.19	9 .42	2 .09	157 7.33	4.61
CALM	7 .33						7 .33	CALM
TOTAL	220 10.27	822 38.36	708 33.04	319 14.89	62 2.89	12 .56	2143 100.00	3.48

NUMBER OF VALID OBSERVATIONS 2143 99.21 PCT.
NUMBER OF INVALID OBSERVATIONS 17 .79 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL OCTOBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4 .18	42 1.89	42 1.89	26 1.17	7 .31	7 .31	128 5.76	4.45
NE	8 .36	27 1.21	21 .94	5 .22	0 0.00	0 0.00	61 2.74	3.14
ENE	2 .09	20 .90	17 .76	6 .27	0 0.00	0 0.00	45 2.02	3.34
E	2 .09	40 1.80	38 1.71	6 .27	1 .04	0 0.00	87 3.91	3.41
ESE	4 .18	36 1.62	40 1.80	21 .94	5 .22	0 0.00	106 4.77	4.00
SE	10 .45	77 3.46	45 2.02	9 .40	17 .76	2 .09	160 7.20	3.77
SSE	6 .27	84 3.78	97 4.36	38 1.71	10 .45	1 .04	236 10.62	3.87
S	12 .54	63 2.83	143 6.43	150 6.75	100 4.50	38 1.71	506 22.76	5.92
SSW	12 .54	48 2.16	45 2.02	48 2.16	13 .58	18 .81	184 8.28	5.09
SW	8 .36	34 1.53	30 1.35	24 1.08	13 .58	2 .09	111 4.99	4.40
WSW	17 .76	26 1.17	14 .63	3 .13	4 .18	0 0.00	64 2.88	2.77
W	9 .40	30 1.35	20 .90	5 .22	3 .13	0 0.00	67 3.01	3.11
WNW	9 .40	37 1.66	22 .99	20 .90	7 .31	0 0.00	95 4.27	3.90
NW	6 .27	61 2.74	24 1.08	9 .40	4 .18	8 .36	112 5.04	3.76
NNW	1 .04	19 .85	39 1.75	34 1.53	22 .99	0 0.00	115 5.17	5.07
N	5 .22	30 1.35	30 1.35	46 2.07	24 1.08	8 .36	143 6.43	5.40
CALM	3 .13						3 .13	CALM
TOTAL	118 5.31	674 30.32	667 30.00	450 20.24	230 10.35	84 3.78	2223 100.00	4.54

NUMBER OF VALID OBSERVATIONS 2223 99.60 PCT.
NUMBER OF INVALID OBSERVATIONS 9 .40 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-27

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL NOVEMBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .09	17 .79	49 2.28	26 1.21	24 1.12	0 0.00	118 5.49	5.10
NE	2 .09	28 1.30	42 1.96	12 .56	1 .05	0 0.00	85 3.96	3.59
ENE	3 .14	13 .61	38 1.77	8 .37	1 .05	0 0.00	63 2.93	3.95
E	2 .09	11 .51	24 1.12	14 .65	3 .14	0 0.00	54 2.51	4.30
ESE	4 .19	18 .84	14 .65	11 .51	0 0.00	0 0.00	47 2.19	3.60
SE	3 .14	35 1.63	25 1.16	6 .28	7 .33	1 .05	77 3.58	3.68
SSE	6 .28	60 2.79	103 4.80	44 2.05	4 .19	0 0.00	217 10.10	4.00
S	5 .23	77 3.58	155 7.22	79 3.68	53 2.47	8 .37	377 17.55	4.92
SSW	4 .19	32 1.49	68 3.17	67 3.12	19 .88	15 .70	205 9.54	5.26
SW	2 .09	19 .88	29 1.35	18 .84	23 1.07	12 .56	103 4.80	5.87
WSW	4 .19	28 1.30	14 .65	12 .56	7 .33	1 .05	66 3.07	4.08
W	5 .23	29 1.35	42 1.96	41 1.91	6 .28	0 0.00	123 5.73	4.44
WNW	6 .28	30 1.40	63 2.93	38 1.77	3 .14	0 0.00	140 6.52	4.18
NW	6 .28	32 1.49	50 2.33	66 3.07	28 1.30	14 .65	196 9.12	5.56
NNW	4 .19	15 .70	33 1.54	70 3.26	36 1.68	3 .14	161 7.50	5.93
N	5 .23	20 .93	25 1.16	41 1.91	22 1.02	3 .14	116 5.40	5.41
CALM	0 0.00						0 0.00	CALM
TOTAL	63 2.93	464 21.60	774 36.03	553 25.74	237 11.03	57 2.65	2148 100.00	4.80

NUMBER OF VALID OBSERVATIONS 2148 99.44 PCT.
NUMBER OF INVALID OBSERVATIONS 12 .56 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL DECEMBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .09	38 1.78	32 1.50	14 .66	11 .51	8 .37	105 4.91	4.58
NE	5 .23	32 1.50	18 .84	17 .80	1 .05	1 .05	74 3.46	3.61
ENE	3 .14	22 1.03	27 1.26	8 .37	4 .19	0 0.00	64 2.99	3.90
E	4 .19	22 1.03	26 1.22	21 .98	0 0.00	0 0.00	73 3.42	3.96
ESE	2 .09	32 1.50	40 1.87	15 .70	0 0.00	0 0.00	89 4.16	3.68
SE	3 .14	43 2.01	61 2.85	6 .28	0 0.00	0 0.00	113 5.29	3.34
SSE	7 .33	45 2.11	91 4.26	33 1.54	3 .14	0 0.00	179 8.38	3.94
S	5 .23	36 1.68	93 4.35	71 3.32	28 1.31	6 .28	239 11.18	5.02
SSW	4 .19	23 1.08	83 3.88	78 3.65	30 1.40	7 .33	225 10.53	5.27
SW	2 .09	17 .80	36 1.68	25 1.17	3 .14	3 .14	86 4.02	4.61
WSW	7 .33	13 .61	19 .89	17 .80	6 .28	1 .05	63 2.95	4.39
W	10 .47	22 1.03	25 1.17	8 .37	5 .23	4 .19	74 3.46	3.87
WNW	7 .33	22 1.03	32 1.50	30 1.40	10 .47	0 0.00	101 4.73	4.43
NW	4 .19	50 2.34	44 2.06	58 2.71	21 .98	17 .80	194 9.08	5.39
NNW	8 .37	35 1.64	64 2.99	80 3.74	69 3.23	12 .56	268 12.54	5.94
N	2 .09	29 1.36	61 2.85	40 1.87	39 1.82	19 .89	190 8.89	5.83
CALM	0 0.00						0 0.00	CALM
TOTAL	75 3.51	481 22.51	752 35.19	521 24.38	230 10.76	78 3.65	2137 100.00	4.79

NUMBER OF VALID OBSERVATIONS 2137 95.74 PCT.
NUMBER OF INVALID OBSERVATIONS 95 4.26 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-28

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD ALL JANUARY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .05	9 .46	27 1.37	75 3.81	37 1.88	24 1.22	173 8.79	6.99
NE	5 25	13 66	28 1.42	23 1.17	8 .41	0 0.00	77 3.91	4.69
ENE	1 .05	21 1.07	30 1.52	40 2.03	9 .46	0 0.00	101 5.13	4 82
E	0 0.00	5 .25	17 .86	43 2.18	16 81	1 .05	82 4.17	6.03
ESE	2 .10	8 .41	18 .91	24 1.22	15 .76	4 .20	71 3.61	6.02
SE	2 .10	7 .36	13 .66	16 .81	15 .76	2 .10	55 2.79	5.79
SSE	4 20	4 .20	19 .97	18 .91	36 1.83	24 1.22	105 5.34	7.62
S	0 0.00	7 .36	17 .86	50 2.54	49 2.49	58 2.95	181 9.20	8.51
SSW	2 .10	6 .30	30 1.52	70 3.56	75 3.81	47 2.39	230 11.69	8.01
SW	2 .10	10 .51	14 .71	45 2.29	28 1.42	4 .20	103 5.23	6.33
WSW	3 .15	16 .81	16 .81	35 1.78	11 .56	0 0.00	81 4.12	5.22
W	0 0.00	12 .61	34 1.73	45 2.29	17 .86	4 .20	112 5.69	5.65
WNW	0 0.00	7 .36	22 1.12	42 2.13	31 1.58	24 1.22	126 6.40	7.27
NW	0 0.00	3 .15	29 1.47	54 2.74	59 3.00	23 1.17	168 8.54	7.59
NNW	1 .05	3 .15	13 .66	47 2.39	36 1.83	22 1.12	122 6.20	7.77
N	1 .05	8 .41	26 1.32	55 2.79	54 2.74	35 1.78	179 9.10	7.49
CALM	2 .10						2 .10	CALM
TOTAL	26 1.32	139 7.06	353 17.94	682 34.65	496 25.20	272 13.82	1968 100.00	6.95

NUMBER OF VALID OBSERVATIONS 1969 88.17 PCT.
NUMBER OF INVALID OBSERVATIONS 264 11.83 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
. XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL FEBRUARY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	8 .50	28 1.73	37 2.29	14 .87	18 1.11	105 6.50	6.81
NE	1 .06	19 1.18	27 1.67	23 1.42	16 .99	8 .50	94 5.82	5.53
ENE	0 0.00	5 .31	18 1.11	21 1.30	11 .68	4 .25	59 3.65	6.00
E	1 .06	3 .19	12 .74	29 1.79	14 .87	0 0.00	59 3.65	6.05
ESE	1 .06	2 .12	11 .68	26 1.61	8 .50	0 0.00	48 2.97	5.84
SE	2 .12	8 .50	17 1.05	18 1.11	4 .25	4 .25	53 3.28	5.31
SSE	2 .12	4 .25	14 .87	27 1.67	19 1.18	7 .43	73 4.52	6.60
S	2 .12	4 .25	20 1.24	47 2.91	71 4.39	29 1.79	173 10.71	7.75
SSW	0 0.00	3 .19	13 .80	33 2.04	40 2.48	20 1.24	109 6.75	7.83
SW	0 0.00	10 .62	23 1.42	32 1.98	31 1.92	10 .62	106 6.56	6.79
WSW	2 .12	5 .31	11 .68	29 1.79	11 .68	10 .62	68 4.21	6.60
W	4 25	5 .31	24 1.49	30 1.86	8 .50	4 .25	75 4.64	5.60
WNW	0 0.00	12 .74	17 1.05	25 1.55	16 .99	2 .12	72 4.46	5.69
NW	1 .06	5 .31	20 1.24	26 1.61	23 1.42	19 1.18	94 5.82	7.51
NNW	0 0.00	7 .43	25 1.55	42 2.60	44 2.72	61 3.77	179 11.08	8.70
N	2 .12	4 .25	39 2.41	77 4.76	47 2.91	78 4.83	247 15.28	8.42
CALM	2 .12						2 .12	CALM
TOTAL	20 1.24	104 6.44	319 19.74	522 32.30	377 23.33	274 16.96	1616 100.00	7 13

NUMBER OF VALID OBSERVATIONS 1616 79.22 PCT.
NUMBER OF INVALID OBSERVATIONS 424 20.78 PCT.
TOTAL NUMBER OF OBSERVATIONS 2040 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD ALL MARCH COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	2 .09	7 .32	16 .74	66 3.05	50 2.31	26 1.20	167 7.72	7.37
NE	4 18	9 .42	33 1.53	19 .88	16 .74	2 .09	83 3.84	5.32
ENE	2 .09	10 46	23 1.06	17 .79	9 .42	5 .23	66 3.05	5.46
E	2 .09	11 .51	17 .79	26 1.20	25 1.16	11 .51	92 4.25	6.70
ESE	1 .05	11 51	14 .65	37 1.71	15 .69	23 1.06	101 4.67	7.13
SE	2 .09	9 .42	20 .92	49 2.27	46 2.13	26 1.20	152 7.03	7.54
SSE	1 .05	9 .42	29 1.34	36 1.66	46 2.13	26 1.20	147 6.80	7.43
S	0 0.00	4 .18	15 .69	70 3.24	114 5.27	115 5.32	318 14.70	9.11
SSW	2 .09	4 .18	27 1.25	38 1.76	52 2.40	72 3.33	195 9.02	8.75
SW	1 .05	7 .32	15 .69	29 1.34	15 .69	15 .69	82 3.79	6.95
WSW	1 .05	8 .37	14 .65	21 .97	10 .46	5 .23	59 2.73	6.06
W	6 .28	9 .42	22 1.02	10 .46	10 .46	8 .37	65 3.01	6.02
WNW	0 0.00	3 .14	7 .32	22 1.02	18 .83	18 .83	68 3.14	9.22
NW	1 .05	3 .14	18 .83	37 1.71	32 1.48	37 1.71	128 5.92	8.45
NNW	0 0.00	2 .09	14 .65	53 2.45	77 3.56	88 4.07	234 10.82	9.45
N	3 .14	2 .09	28 1.29	73 3.37	63 2.91	37 1.71	206 9.52	7.53
CALM	0 0.00						0 0.00	CALM
TOTAL	28 1.29	108 4.99	312 14.42	603 27.88	598 27.65	514 23.76	2163 100.00	7.86

NUMBER OF VALID OBSERVATIONS 2163 96.91 PCT.
NUMBER OF INVALID OBSERVATIONS 69 3.09 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD. ALL APRIL COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00	4 .19	16 .76	36 1.70	29 1.37	9 .43	94 4.44	7.04
NE	2 09	11 .52	38 1.80	34 1.61	4 .19	0 0.00	89 4.21	4.89
ENE	0 0.00	3 .14	15 .71	28 1.32	15 .71	2 .09	63 2.98	6.24
E	2 .09	2 .09	12 .57	37 1.75	39 1.84	7 .33	99 4.68	7.03
ESE	0 0.00	4 .19	17 .80	46 2.17	41 1.94	17 .80	125 5.91	7.51
SE	0 0.00	2 .09	11 .52	27 1.28	94 4.44	44 2.08	178 8.41	8.72
SSE	0 0.00	2 .09	7 .33	48 2.27	102 4.82	104 4.91	263 12.43	9.74
S	0 0.00	2 .09	14 .66	63 2.98	111 5.25	142 6.71	332 15.69	9.82
SSW	2 .09	1 .05	15 .71	40 1.89	70 3.31	46 2.17	174 8.22	8.58
SW	0 0.00	2 .09	11 .52	25 1.18	28 1.32	27 1.28	93 4.40	8.69
WSW	0 0.00	5 .24	6 .28	14 .66	9 .43	17 .80	51 2.41	7.77
W	0 0.00	4 .19	18 .85	29 1.37	18 .85	7 .33	76 3.59	6.59
WNW	2 .09	3 .14	12 .57	12 .57	29 1.37	15 .71	73 3.45	7.80
NW	0 0.00	3 .14	15 .71	30 1.42	41 1.94	44 2.08	133 6.29	8.56
NNW	0 0.00	2 .09	16 76	38 1.80	55 2.60	15 .71	126 5.95	7.64
N	1 .05	5 24	10 .47	47 2.22	42 1.98	42 1.98	147 6.95	8.39
CALM	0 0.00						0 0.00	CALM
TOTAL	9 .43	55 2.60	233 11.01	554 26.18	727 34.36	538 25.43	2116 100.00	8.32

NUMBER OF VALID OBSERVATIONS 2116 97.96 PCT
NUMBER OF INVALID OBSERVATIONS 44 2.04 PCT
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL MAY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .05	5 23	31 1.43	45 2.07	38 1.75	18 .83	138 6.36	6.91
NE	0 0.00	15 .69	53 2.44	36 1.66	11 .51	0 0.00	115 5.30	4.88
ENE	2 09	11 .51	31 1.43	42 1.94	29 1.34	5 23	120 5.53	6.04
E	1 .05	7 32	28 1.29	48 2.21	29 1.34	5 23	118 5.44	6.26
ESE	0 0.00	6 28	28 1.29	44 2.03	32 1.47	3 .14	113 5.21	6.37
SE	2 .09	5 .23	36 1.66	78 3.59	39 1.80	11 .51	171 7.88	6.46
SSE	1 .05	9 .41	38 1.75	53 2.44	53 2.44	15 .69	169 7.79	6.68
S	2 .09	13 .60	31 1.43	96 4.42	187 8.62	154 7.10	483 22.26	8.95
SSW	1 .05	6 .28	20 .92	47 2.17	69 3.18	84 3.87	227 10.46	8.97
SW	2 .09	5 .23	15 .69	27 1.24	14 .65	12 .55	75 3.46	6.78
WSW	1 .05	6 .28	9 .41	10 .46	7 .32	1 .05	34 1.57	5.34
W	2 .09	10 .46	24 1.11	14 .65	1 .05	0 0.00	51 2.35	4.32
WNW	1 .05	4 .18	10 .46	13 .60	4 .18	2 .09	34 1.57	5.55
NW	0 0.00	7 .32	11 .51	31 1.43	12 .55	4 .18	65 3.00	6.16
NNW	2 09	3 .14	20 .92	53 2.44	34 1.57	2 .09	114 5.25	6.53
N	2 .09	7 .32	14 .65	48 2.21	50 2.30	22 1.01	143 6.59	7.49
CALM	0 0.00						0 0.00	CALM
TOTAL	20 .92	119 5.48	399 18.39	685 31.57	609 28.06	338 15.58	2170 100.00	7.19

NUMBER OF VALID OBSERVATIONS 2170 97.22 PCT.
NUMBER OF INVALID OBSERVATIONS 62 2.78 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL JUNE COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	10 .47	28 1.32	38 1.79	15 .71	4 .19	95 4.47	5.80
NE	3 .14	9 .42	46 2.16	14 .66	2 .09	1 .05	75 3.53	4.28
ENE	2 .09	8 .38	35 1.65	22 1.03	6 .28	0 0.00	73 3.43	4.83
E	0 0.00	9 .42	17 .80	23 1.08	8 .38	3 .14	60 2.82	5.57
ESE	1 .05	7 .33	23 1.08	34 1.60	9 .42	1 .05	75 3.53	5.53
SE	1 .05	9 .42	25 1.18	38 1.79	9 .42	3 .14	85 4.00	5.57
SSE	0 0.00	7 .33	30 1.41	57 2.68	62 2.92	10 .47	166 7.81	6.83
S	3 .14	18 .85	31 1.46	163 7.67	197 9.27	115 5.41	527 24.79	8.12
SSW	1 .05	8 .38	41 1.93	101 4.75	160 7.53	89 4.19	400 18.81	8.18
SW	2 .09	4 .19	25 1.18	45 2.12	34 1.60	22 1.03	132 6.21	7.19
WSW	1 .05	8 .38	18 .85	20 .94	8 .38	4 .19	59 2.78	5.69
W	4 .19	8 .38	21 .99	24 1.13	3 .14	5 .24	65 3.06	5.37
WNW	2 09	1 .05	14 .66	35 1.65	11 .52	4 .19	67 3.15	6.25
NW	2 .09	2 .09	13 .61	24 1.13	13 .61	4 .19	58 2.73	6.45
NNW	1 .05	4 .19	13 .61	48 2.26	21 .99	9 .42	96 4.52	6.84
N	0 0.00	2 .09	21 .99	38 1.79	27 1.27	4 .19	92 4.33	6.81
CALM	1 .05						1 .05	CALM
TOTAL	24 1.13	114 5.36	401 18.86	724 34.05	585 27.52	278 13.08	2126 100.00	6.98

NUMBER OF VALID OBSERVATIONS 2126 98.43 PCT.
NUMBER OF INVALID OBSERVATIONS 34 1.57 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-28 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL JULY COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00	3 .14	10 .47	49 2.30	19 .89	14 .66	95 4.46	7.25
NE	0 0.00	5 .23	19 .89	40 1.88	3 .14	0 0.00	67 3.15	5.24
ENE	1 .05	8 .38	31 1.46	60 2.82	17 .80	4 .19	121 5.69	5.93
E	2 .09	14 .66	39 1.83	85 3.99	31 1.46	3 .14	174 8.18	5.86
ESE	2 .09	21 .99	45 2.11	31 1.46	27 1.27	4 .19	130 6.11	5.36
SE	1 .05	8 .38	34 1.60	61 2.87	23 1.08	4 .19	131 6.16	5.95
SSE	0 0.00	13 .61	43 2.02	85 3.99	37 1.74	1 .05	179 8.41	5.94
S	0 0.00	17 .80	44 2.07	266 12.50	149 7.00	49 2.30	525 24.67	7.13
SSW	1 .05	11 .52	34 1.60	152 7.14	113 5.31	27 1.27	338 15.88	7.19
SW	2 .09	5 .23	25 1.17	61 2.87	21 .99	3 .14	117 5.50	6.09
WSW	0 0.00	2 .09	12 .56	21 .99	10 .47	0 0.00	45 2.11	6.04
W	1 .05	6 .28	11 .52	14 .66	13 .61	2 .09	47 2.21	5.89
WNW	0 0.00	3 .14	10 .47	10 .47	13 .61	0 0.00	36 1.69	6.21
NW	2 .09	3 .14	7 .33	15 .70	10 .47	0 0.00	37 1.74	5.91
NNW	4 .19	1 .05	4 .19	13 .61	3 .14	1 .05	26 1.22	5.18
N	1 .05	3 .14	8 .38	28 1.32	13 .61	7 .33	60 2.82	6.86
CALM	0 0.00						0 0.00	CALM
TOTAL	17 .80	123 5.78	376 17.67	991 46.57	502 23.59	119 5.59	2128 100.00	6.46

NUMBER OF VALID OBSERVATIONS 2128 95.34 PCT.
NUMBER OF INVALID OBSERVATIONS 104 4.66 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL AUGUST COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	2 .09	5 .23	26 1.22	35 1.64	13 .61	5 .23	86 4.02	5.95
NE	1 .05	11 .51	33 1.54	38 1.78	2 .09	2 .09	87 4.07	4.97
ENE	1 .05	7 .33	28 1.31	47 2.20	9 .42	1 .05	93 4.35	5.61
E	3 .14	9 .42	21 .98	43 2.01	18 .84	4 .19	98 4.59	5.88
ESE	1 .05	8 .37	17 .80	28 1.31	11 .51	2 .09	67 3.14	5.75
SE	1 .05	14 .66	35 1.64	53 2.48	24 1.12	5 .23	132 6.18	5.87
SSE	1 .05	12 .56	40 1.87	91 4.26	43 2.01	24 1.12	211 9.87	6.75
S	1 .05	11 .51	60 2.81	229 10.72	143 6.69	147 6.88	591 27.66	7.86
SSW	1 .05	3 .14	50 2.34	181 8.47	76 3.56	48 2.25	359 16.80	7.20
SW	5 .23	14 .66	46 2.15	37 1.73	20 .94	6 .28	128 5.99	5.48
WSW	0 0.00	7 .33	10 .47	8 .37	6 .28	0 0.00	31 1.45	5.06
W	1 .05	9 .42	12 .56	9 .42	3 .14	1 .05	35 1.64	4.68
WNW	2 .09	7 .33	8 .37	11 .51	2 .09	1 .05	31 1.45	5.04
NW	2 .09	4 .19	13 .61	12 .56	11 .51	4 .19	46 2.15	6.22
NNW	1 .05	5 .23	14 .66	28 1.31	11 .51	4 .19	63 2.95	6.17
N	2 .09	7 .33	20 .94	33 1.54	10 .47	7 .33	79 3.70	5.99
CALM	0 0.00						0 0.00	CALM
TOTAL	25 1.17	133 6.22	433 20.26	883 41.32	402 18.81	261 12.21	2137 100.00	6.64

NUMBER OF VALID OBSERVATIONS 2137 95.74 PCT.
NUMBER OF INVALID OBSERVATIONS 95 4.26 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-28 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL SEPTEMBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	4 .19	5 24	28 1.33	33 1.57	35 1.66	22 1.05	127 6.04	7.04
NE	1 05	19 .90	39 1.85	34 1.62	8 .38	1 .05	102 4.85	4.85
ENE	0 0.00	12 .57	21 1.00	30 1.43	32 1.52	8 .38	103 4.90	6.57
E	0 0.00	11 .52	24 1.14	54 2.57	26 1.24	3 .14	118 5.61	6.04
ESE	0 0.00	15 .71	31 1.47	54 2.57	14 .67	0 0.00	114 5.42	5.45
SE	4 .19	18 .86	50 2.38	104 4.95	29 1.38	9 .43	214 10.18	5.76
SSE	4 .19	20 .95	61 2.90	106 5.04	49 2.33	24 1.14	264 12.55	6.30
S	2 .10	27 1.28	88 4.18	145 6.89	69 3.28	44 2.09	375 17.83	6.49
SSW	5 .24	24 1.14	50 2.38	69 3.28	22 1.05	8 .38	178 8.46	5.64
SW	0 0.00	20 .95	32 1.52	34 1.62	5 .24	0 0.00	91 4.33	4.81
WSW	1 .05	11 .52	16 .76	7 .33	2 .10	0 0.00	37 1.76	3.99
W	4 .19	13 .62	22 1.05	3 .14	2 .10	0 0.00	44 2.09	3.46
WNW	1 .05	6 .29	11 .52	4 .19	1 .05	0 0.00	23 1.09	3.94
NW	2 .10	11 .52	16 .76	19 .90	8 .38	3 .14	59 2.81	5.34
NNW	2 .10	7 .33	12 .57	44 2.09	25 1.19	2 .10	92 4.37	6.28
N	2 .10	12 .57	8 .38	60 2.85	54 2.57	24 1.14	160 7.61	7.36
CALM	2 .10						2 .10	CALM
TOTAL	34 1.62	231 10.98	509 24.20	800 38.04	381 18.12	148 7.04	2103 100.00	6.01

NUMBER OF VALID OBSERVATIONS 2103 97.36 PCT.
NUMBER OF INVALID OBSERVATIONS 57 2.64 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL OCTOBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00	7 .35	13 .65	29 1.44	25 1.25	7 .35	81 4.04	6.82
NE	0 0.00	8 .40	23 1.15	15 .75	0 0.00	0 0.00	46 2.29	4.47
ENE	1 .05	3 .15	22 1.10	24 1.20	9 .45	0 0.00	59 2.94	5.47
E	2 .10	4 .20	19 .95	20 1.00	24 1.20	1 .05	70 3.49	6.14
ESE	4 .20	0 0.00	27 1.35	29 1.44	28 1.40	10 .50	98 4.88	6.70
SE	0 0.00	7 .35	17 .85	50 2.49	28 1.40	29 1.44	131 6.53	7.68
SSE	1 .05	8 .40	23 1.15	64 3.19	68 3.39	35 1.74	199 9.92	7.83
S	4 .20	6 .30	39 1.94	134 6.68	165 8.22	131 6.53	479 23.87	8.70
SSW	4 .20	12 .60	28 1.40	69 3.44	46 2.29	19 .95	178 8.87	6.89
SW	1 .05	6 .30	31 1.54	29 1.44	14 .70	12 .60	93 4.63	6.32
WSW	1 .05	5 .25	27 1.35	23 1.15	2 .10	3 .15	61 3.04	5.10
W	0 0.00	9 .45	19 .95	14 .70	9 .45	8 .40	59 2.94	6.02
WNW	0 0.00	7 .35	21 1.05	25 1.25	29 1.44	10 .50	92 4.58	6.88
NW	1 .05	4 .20	19 .95	30 1.49	34 1.69	14 .70	102 5.08	7.40
NNW	0 0.00	2 .10	13 .65	31 1.54	37 1.84	17 .85	100 4.98	7.59
N	3 .15	4 .20	10 .50	39 1.94	58 2.89	44 2.19	158 7.87	8.46
CALM	1 .05						1 .05	CALM
TOTAL	23 1.15	92 4.58	351 17.49	625 31.14	576 28.70	340 16.94	2007 100.00	7.40

NUMBER OF VALID OBSERVATIONS 2007 89.92 PCT.
NUMBER OF INVALID OBSERVATIONS 225 10.08 PCT
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-28 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION (MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL NOVEMBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.03.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .09	6 .28	25 1.17	36 1.68	35 1.63	21 .98	125 5.83	7.09
NE	1 .05	7 .33	32 1.49	39 1.82	4 .19	0 0.00	83 3.87	5.00
ENE	1 .05	5 .23	9 .42	19 .89	18 .84	10 .47	62 2.89	6.98
E	1 .05	1 .05	10 .47	20 .93	18 .84	4 .19	54 2.52	6.94
ESE	2 .09	6 .28	3 .14	21 .98	8 .37	6 .28	46 2.15	6.61
SE	0 0.00	5 .23	14 .65	25 1.17	18 .84	6 .28	68 3.17	6.69
SSE	0 0.00	2 .09	22 1.03	65 3.03	56 2.61	40 1.87	185 8.63	7.91
S	3 .14	8 .37	47 2.19	130 6.07	120 5.60	76 3.55	384 17.92	7.87
SSW	1 .05	5 .23	18 .84	92 4.29	63 2.94	49 2.29	228 10.64	7.89
SW	2 .09	6 .28	17 .79	33 1.54	35 1.63	20 .93	113 5.27	7.52
WSW	0 0.00	3 .14	17 .79	26 1.21	25 1.17	4 .19	75 3.50	6.58
W	1 .05	3 .14	20 .93	49 2.29	44 2.05	8 .37	125 5.83	7.04
WNW	0 0.00	4 .19	14 .65	54 2.52	50 2.33	5 .23	127 5.93	7.08
NW	2 .09	2 .09	8 .37	52 2.43	69 3.22	46 2.15	179 8.35	8.67
NNW	2 .09	3 .14	10 .47	50 2.33	64 2.99	50 2.33	179 8.35	8.49
N	2 .09	6 .28	15 .70	26 1.21	47 2.19	13 .61	109 5.09	7.53
CALM	1 .05						1 .05	CALM
TOTAL	21 .98	72 3.36	281 13.11	737 34.39	674 31.45	358 16.71	2143 100.00	7.54

NUMBER OF VALID OBSERVATIONS 2143 99.21 PCT.
NUMBER OF INVALID OBSERVATIONS 17 .79 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION
DATA PERIOD: ALL DECEMBER COMBINED

ALL WINDS
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .09	11 .51	25 1.17	15 .70	21 .98	24 1.12	98 4.58	7.26
NE	1 .05	16 .75	23 1.07	41 1.92	9 .42	1 .05	91 4.25	5.30
ENE	1 .05	11 .51	9 .42	21 .98	15 .70	2 .09	59 2.76	5.85
E	3 .14	9 .42	9 .42	17 .79	7 .33	0 0.00	45 2.10	4.92
ESE	1 .05	7 .33	13 .61	23 1.07	22 1.03	3 .14	69 3.22	6.37
SE	3 .14	4 .19	17 .79	38 1.78	21 .98	3 .14	86 4.02	6.25
SSE	2 .09	5 .23	24 1.12	70 3.27	60 2.80	1 .05	162 7.57	6.84
S	0 0.00	3 .14	26 1.21	78 3.64	109 5.09	66 3.08	282 13.18	8.32
SSW	2 .09	5 .23	17 .79	76 3.55	95 4.44	53 2.48	248 11.59	8.11
SW	3 .14	5 .23	19 .89	53 2.48	21 .98	11 .51	112 5.23	6.54
WSW	0 0.00	6 .28	19 .89	21 .98	7 .33	8 .37	61 2.85	6.14
W	2 .09	5 .23	11 51	21 .98	7 .33	4 .19	50 2.34	6.07
WNW	2 .09	7 .33	12 .56	42 1.96	33 1.54	14 65	110 5.14	7.14
NW	2 .09	8 .37	21 .98	55 2.57	51 2.38	39 1.82	176 8.22	7.92
NNW	2 .09	13 .61	16 .75	92 4.30	86 4.02	63 2.94	272 12.71	7.99
N	1 .05	10 .47	29 1.36	56 2.62	55 2.57	66 3.08	217 10.14	8.24
CALM	2 .09						2 .09	CALM
TOTAL	29 1.36	125 5.84	290 13.55	719 33.60	619 28.93	358 16.73	2140 100.00	7.36

NUMBER OF VALID OBSERVATIONS 2140 95.88 PCT.
NUMBER OF INVALID OBSERVATIONS 92 4.12 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	4 .14 .02	24 .87 .10	47 1.70 .19	62 2.25 .25	14 .51 .06	0 0.00 0.00	151 5.47 .62	4.99
NE	2 .07 .01	17 .62 .07	35 1.27 .14	15 .54 .06	5 .18 .02	0 0.00 0.00	74 2.68 .30	4.33
ENE	2 .07 .01	7 .25 .03	33 1.20 .13	14 .51 .06	0 0.00 0.00	0 0.00 0.00	56 2.03 .23	4.24
E	1 .04 .00	10 .36 .04	23 .83 .09	10 .36 .04	3 .11 .01	0 0.00 0.00	47 1.70 .19	4.47
ESE	2 .07 .01	30 1.09 .12	34 1.23 .14	25 .91 .10	6 .22 .02	3 .11 .01	100 3.62 .41	4.57
SE	6 .22 .02	24 .87 .10	38 1.38 .16	37 1.34 .15	4 .14 .02	2 .07 .01	111 4.02 .45	4.45
SSE	1 .04 .00	22 .80 .09	78 2.83 .32	67 2.43 .27	28 1.01 .11	6 .22 .02	202 7.32 .83	5.40
S	3 .11 .01	31 1.12 .13	106 3.84 .43	207 7.50 .85	145 5.25 .59	49 1.77 .20	541 19.59 2.21	6.75
SSW	6 .22 .02	22 .80 .09	92 3.33 .38	205 7.42 .84	107 3.88 .44	78 2.83 .32	510 18.47 2.09	6.99
SW	4 .14 .02	23 .83 .09	44 1.59 .18	39 1.41 .16	34 1.23 .14	29 1.05 .12	173 6.27 .71	6.41
WSW	6 .22 .02	21 .76 .09	17 .62 .07	11 .40 .04	11 .40 .04	5 .18 .02	71 2.57 .29	4.89
W	2 .07 .01	23 .83 .09	27 .98 .11	27 .98 .11	8 .29 .03	1 .04 .00	88 3.19 .36	4.75
WNW	4 .14 .02	14 .51 .06	18 .65 .07	25 .91 .10	11 .40 .04	8 .29 .03	80 2.90 .33	6.02
NW	4 .14 .02	7 .25 .03	24 .87 .10	56 2.03 .23	38 1.38 .16	16 .58 .07	145 5.25 .59	6.81
NNW	2 .07 .01	8 .29 .03	34 1.23 .14	95 3.44 .39	77 2.79 .31	7 .25 .03	223 8.08 .91	6.77
N	3 .11 .01	14 .51 .06	44 1.59 .18	82 2.97 .34	32 1.16 .13	11 .40 .04	186 6.74 .76	6.01
CALM	3 .11 .01						3 .11 .01	CALM
TOTAL	55 1.99 .22	297 10.76 1.21	694 25.14 2.84	977 35.39 4.00	523 18.94 2.14	215 7.79 .88	2761 100.00 11.29	6.07

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .08 .00	10 .80 .04	24 1.91 .10	14 1.12 .06	12 .96 .05	4 .32 .02	65 5.18 .27	5.40
NE	2 .16 .01	24 1.91 .10	29 2.31 .12	9 .72 .04	1 .08 .00	0 0.00 0.00	65 5.18 .27	3.64
ENE	1 .08 .00	10 .80 .04	11 .88 .04	9 .72 .04	2 .16 .01	0 0.00 0.00	33 2.63 .13	4.25
E	2 .16 .01	1 .08 .00	10 .80 .04	2 .16 .01	1 .08 .00	3 .24 .01	19 1.52 .08	5.28
ESE	0 0.00 0.00	13 1.04 .05	14 1.12 .06	11 .88 .04	3 .24 .01	5 .40 .02	46 3.67 .19	5.04
SE	0 0.00 0.00	13 1.04 .05	22 1.75 .09	10 .80 .04	2 .16 .01	0 0.00 0.00	47 3.75 .19	4.20
SSE	0 0.00 0.00	8 .64 .03	24 1.91 .10	20 1.59 .08	5 .40 .02	2 .16 .01	59 4.70 .24	5.29
S	2 .16 .01	13 1.04 .05	61 4.86 .25	89 7.10 .36	45 3.59 .18	19 1.52 .08	229 18.26 .94	6.28
SSW	2 .16 .01	8 .64 .03	44 3.51 .18	63 5.02 .26	33 2.63 .13	14 1.12 .06	164 13.08 .67	6.41
SW	0 0.00 0.00	15 1.20 .06	16 1.28 .07	29 2.31 .12	15 1.20 .06	5 .40 .02	80 6.38 .33	5.83
WSW	1 .08 .00	6 .48 .02	5 .40 .02	16 1.28 .07	6 .48 .02	1 .08 .00	35 2.79 .14	5.55
W	3 .24 .01	15 1.20 .06	23 1.83 .09	10 .80 .04	3 .24 .01	1 .08 .00	55 4.39 .22	4.00
WNW	0 0.00 0.00	13 1.04 .05	12 .96 .05	20 1.59 .08	7 .56 .03	2 .16 .01	54 4.31 .22	5.43
NW	1 .08 .00	21 1.67 .09	12 .96 .05	35 2.79 .14	26 2.07 .11	11 .88 .04	106 8.45 .43	6.37
NNW	1 .08 .00	5 .40 .02	15 1.20 .06	48 3.83 .20	29 2.31 .12	4 .32 .02	102 8.13 .42	6.63
N	1 .08 .00	14 1.12 .06	23 1.83 .09	37 2.95 .15	16 1.28 .07	4 .32 .02	95 7.58 .39	5.61
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	17 1.36 .07	189 15.07 .77	345 27.51 1.41	422 33.65 1.73	206 16.43 .84	75 5.98 .31	1254 100.00 5.13	5.67

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. THREE YEARS COMBINED

STABILITY CLASS. PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	14	25	26	21	2	89	5.65
	.07	.94	1.68	1.74	1.41	.13	5.97	
	.00	.06	.10	.11	.09	.01	.36	
NE	2	22	19	13	2	0	58	3.90
	.13	1.47	1.27	.87	.13	0.00	3.89	
	.01	.09	.08	.05	.01	0.00	.24	
ENE	1	10	16	9	2	0	38	4.25
	.07	.67	1.07	.60	.13	0.00	2.55	
	.00	.04	.07	.04	.01	0.00	.16	
E	4	5	14	7	0	1	31	4.40
	.27	.34	.94	.47	0.00	.07	2.08	
	.02	.02	.06	.03	0.00	.00	.13	
ESE	0	5	23	11	0	1	40	4.51
	0.00	.34	1.54	.74	0.00	.07	2.68	
	0.00	.02	.09	.04	0.00	.00	.16	
SE	2	7	24	15	4	1	53	4.73
	.13	.47	1.61	1.01	.27	.07	3.55	
	.01	.03	.10	.06	.02	.00	.22	
SSE	1	18	33	31	12	2	97	5.04
	.07	1.21	2.21	2.08	.80	.13	6.50	
	.00	.07	.13	.13	.05	.01	.40	
S	2	19	71	86	49	12	239	5.96
	.13	1.27	4.76	5.76	3.28	.80	16.02	
	.01	.08	.29	.35	.20	.05	.98	
SSW	1	17	48	93	37	19	215	6.21
	.07	1.14	3.22	6.23	2.48	1.27	14.41	
	.00	.07	.20	.38	.15	.08	.88	
SW	2	8	14	31	5	5	65	5.71
	.13	.54	.94	2.08	.34	.34	4.36	
	.01	.03	.06	.13	.02	.02	.27	
WSW	2	12	19	10	1	3	47	4.44
	.13	.80	1.27	.67	.07	.20	3.15	
	.01	.05	.08	.04	.00	.01	.19	
W	1	13	31	12	2	1	60	4.30
	.07	.87	2.08	.80	.13	.07	4.02	
	.00	.05	.13	.05	.01	.00	.25	
WNW	3	12	21	25	7	1	69	5.10
	.20	.80	1.41	1.68	.47	.07	4.62	
	.01	.05	.09	.10	.03	.00	.28	
NW	2	7	23	47	21	15	115	6.69
	.13	.47	1.54	3.15	1.41	1.01	7.71	
	.01	.03	.09	.19	.09	.06	.47	
NNW	2	12	31	57	32	5	139	6.03
	.13	.80	2.08	3.82	2.14	.34	9.32	
	.01	.05	.13	.23	.13	.02	.57	
N	0	7	34	50	36	10	137	6.53
	0.00	.47	2.28	3.35	2.41	.67	9.18	
	0.00	.03	.14	.20	.15	.04	.56	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	26	188	446	523	231	78	1492	5.63
	1.74	12.60	29.89	35.05	15.48	5.23	100.00	
	.11	.77	1.82	2.14	.94	.32	6.10	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	18	99	206	168	79	17	587	5.06
	.24	1.31	2.72	2.22	1.04	.22	7.75	
	.07	.40	.84	.69	.32	.07	2.40	
NE	16	102	177	91	18	3	407	4.15
	.21	1.35	2.34	1.20	.24	.04	5.37	
	.07	.42	.72	.37	.07	.01	1.66	
ENE	18	78	145	75	19	1	336	4.19
	.24	1.03	1.91	.99	.25	.01	4.44	
	.07	.32	.59	.31	.08	.00	1.37	
E	22	84	161	77	14	4	362	4.10
	.29	1.11	2.13	1.02	.18	.05	4.78	
	.09	.34	.66	.31	.06	.02	1.48	
ESE	7	71	139	83	23	14	337	4.78
	.09	.94	1.83	1.10	.30	.18	4.45	
	.03	.29	.57	.34	.09	.06	1.38	
SE	12	71	136	77	33	9	338	4.70
	.16	.94	1.80	1.02	.44	.12	4.46	
	.05	.29	.56	.31	.13	.04	1.38	
SSE	11	91	199	125	41	21	488	4.92
	.15	1.20	2.63	1.65	.54	.28	6.44	
	.04	.37	.81	.51	.17	.09	2.00	
S	17	118	344	390	270	86	1225	6.12
	.22	1.56	4.54	5.15	3.56	1.14	16.17	
	.07	.48	1.41	1.60	1.10	.35	5.01	
SSW	10	67	169	249	123	53	671	6.03
	.13	.88	2.23	3.29	1.62	.70	8.86	
	.04	.27	.69	1.02	.50	.22	2.74	
SW	17	57	92	59	34	8	267	4.76
	.22	.75	1.21	.78	.45	.11	3.52	
	.07	.23	.38	.24	.14	.03	1.09	
WSW	18	45	59	30	24	3	179	4.40
	.24	.59	.78	.40	.32	.04	2.36	
	.07	.18	.24	.12	.10	.01	.73	
W	15	55	87	58	27	11	253	4.77
	.20	.73	1.15	.77	.36	.15	3.34	
	.06	.22	.36	.24	.11	.04	1.03	
WNW	11	46	79	102	31	19	288	5.41
	.15	.61	1.04	1.35	.41	.25	3.80	
	.04	.19	.32	.42	.13	.08	1.18	
NW	9	52	103	180	95	38	477	6.15
	.12	.69	1.36	2.38	1.25	.50	6.30	
	.04	.21	.42	.74	.39	.16	1.95	
NNW	13	61	160	242	137	45	658	6.07
	.17	.81	2.11	3.19	1.81	.59	8.69	
	.05	.25	.65	.99	.56	.18	2.69	
N	18	78	239	224	111	28	698	5.48
	.24	1.03	3.15	2.96	1.47	.37	9.21	
	.07	.32	.98	.92	.45	.11	2.86	
CALM	5						5	CALM
	.07						.07	
	.02						.02	
TOTAL	237	1175	2495	2230	1079	360	7576	5.32
	3.13	15.51	32.93	29.44	14.24	4.75	100.00	
	.97	4.81	10.21	9.12	4.41	1.47	30.99	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	11	59	79	39	6	7	201	4.18
	.19	1.01	1.35	.67	.10	.12	3.44	
	.04	.24	.32	.16	.02	.03	.32	
NE	16	104	72	16	1	0	209	3.04
	.27	1.78	1.23	.27	.02	0.00	3.57	
	.07	.43	.29	.07	.00	0.00	.85	
ENE	17	87	83	28	3	0	218	3.40
	.29	1.49	1.42	.48	.05	0.00	3.73	
	.07	.36	.34	.11	.01	0.00	.89	
E	12	74	106	70	8	3	273	4.19
	.21	1.27	1.81	1.20	.14	.05	4.67	
	.05	.30	.43	.29	.03	.01	1.12	
ESE	13	85	125	61	11	1	296	4.02
	.22	1.45	2.14	1.04	.19	.02	5.06	
	.05	.35	.51	.25	.04	.00	1.21	
SE	19	126	146	65	20	2	378	3.91
	.32	2.15	2.50	1.11	.34	.03	6.46	
	.08	.52	.60	.27	.08	.01	1.55	
SSE	16	184	379	205	25	4	813	4.27
	.27	3.15	6.48	3.51	.43	.07	13.90	
	.07	.75	1.55	.84	.10	.02	3.33	
S	25	199	523	486	177	63	1473	5.34
	.43	3.40	8.94	8.31	3.03	1.08	25.19	
	.10	.81	2.14	1.99	.72	.26	6.03	
SSW	16	85	190	188	65	22	566	5.20
	.27	1.45	3.25	3.21	1.11	.38	9.68	
	.07	.35	.78	.77	.27	.09	2.32	
SW	7	70	80	39	6	1	203	3.85
	.12	1.20	1.37	.67	.10	.02	3.47	
	.03	.29	.33	.16	.02	.00	.83	
WSW	8	33	40	21	2	0	104	3.54
	.14	.56	.68	.36	.03	0.00	1.78	
	.03	.13	.16	.09	.01	0.00	.43	
W	13	59	53	27	3	0	155	3.49
	.22	1.01	.91	.46	.05	0.00	2.65	
	.05	.24	.22	.11	.01	0.00	.63	
WNW	9	58	94	33	2	0	196	3.69
	.15	.99	1.61	.56	.03	0.00	3.35	
	.04	.24	.38	.13	.01	0.00	.80	
NW	13	68	121	47	7	2	258	3.95
	.22	1.16	2.07	.80	.12	.03	4.41	
	.05	.28	.49	.19	.03	.01	1.06	
NNW	12	58	102	78	9	0	259	4.22
	.21	.99	1.74	1.33	.15	0.00	4.43	
	.05	.24	.42	.32	.04	0.00	1.06	
N	14	66	99	54	11	1	245	4.07
	.24	1.13	1.69	.92	.19	.02	4.19	
	.06	.27	.40	.22	.04	.00	1.00	
CALM	1						1	CALM
	.02						.02	
	.00						.00	
TOTAL	222	1415	2292	1457	356	106	5848	4.42
	3.80	24.20	39.19	24.91	6.09	1.81	100.00	
	.91	5.79	9.37	5.96	1.46	.43	23.92	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	6	67	56	1	0	0	130	2.84
	.18	2.04	1.71	.03	0.00	0.00	3.96	
	.02	.27	.23	.00	0.00	0.00	.53	
NE	16	76	32	0	1	0	125	2.53
	.49	2.32	.98	0.00	.03	0.00	3.81	
	.07	.31	.13	0.00	.00	0.00	.51	
ENE	14	71	62	0	0	0	147	2.75
	.43	2.16	1.89	0.00	0.00	0.00	4.48	
	.06	.29	.25	0.00	0.00	0.00	.60	
E	13	83	76	9	0	0	181	3.03
	.40	2.53	2.32	.27	0.00	0.00	5.52	
	.05	.34	.31	.04	0.00	0.00	.74	
ESE	17	92	71	8	0	0	188	2.97
	.52	2.80	2.16	.24	0.00	0.00	5.73	
	.07	.38	.29	.03	0.00	0.00	.77	
SE	19	213	96	12	0	0	340	2.78
	.58	6.49	2.93	.37	0.00	0.00	10.37	
	.08	.87	.39	.05	0.00	0.00	1.39	
SSE	17	309	235	20	0	0	581	3.05
	.52	9.42	7.16	.61	0.00	0.00	17.71	
	.07	1.26	.96	.08	0.00	0.00	2.38	
S	19	144	257	23	0	0	443	3.32
	.58	4.39	7.84	.70	0.00	0.00	13.51	
	.08	.59	1.05	.09	0.00	0.00	1.81	
SSW	21	94	112	21	2	0	250	3.22
	.64	2.87	3.41	.64	.06	0.00	7.62	
	.09	.38	.46	.09	.01	0.00	1.02	
SW	13	57	37	1	0	0	108	2.68
	.40	1.74	1.13	.03	0.00	0.00	3.29	
	.05	.23	.15	.00	0.00	0.00	.44	
WSW	19	56	24	2	0	0	101	2.45
	.58	1.71	.73	.06	0.00	0.00	3.08	
	.08	.23	.10	.01	0.00	0.00	.41	
W	18	49	33	3	0	0	103	2.63
	.55	1.49	1.01	.09	0.00	0.00	3.14	
	.07	.20	.13	.01	0.00	0.00	.42	
WNW	14	61	67	1	0	0	143	2.86
	43	1.86	2.04	.03	0.00	0.00	4.36	
	.06	.25	.27	.00	0.00	0.00	.58	
NW	15	101	51	2	0	0	169	2.66
	.46	3.08	1.55	.06	0.00	0.00	5.15	
	.06	.41	.21	.01	0.00	0.00	.69	
NNW	15	67	39	4	0	0	125	2.74
	.46	2.04	1.19	.12	0.00	0.00	3.81	
	.06	.27	.16	.02	0.00	0.00	.51	
N	8	65	60	9	0	0	142	3.04
	.24	1.98	1.83	.27	0.00	0.00	4.33	
	.03	.27	.25	.04	0.00	0.00	.58	
CALM	4						4	CALM
	.12						.12	
	.02						.02	
TOTAL	248	1605	1308	116	3	0	3280	2.93
	7.56	48.93	39.88	3.54	.09	0.00	100.00	
	1.01	6.56	5.35	.47	.01	0.00	13.42	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	14	105	57	1	0	0	177	2.75
	.63	4.69	2.55	.04	0.00	0.00	7.91	
	.06	.43	.23	.00	0.00	0.00	.72	
NE	17	64	28	1	0	0	110	2.54
	.76	2.86	1.25	.04	0.00	0.00	4.92	
	.07	.26	.11	.00	0.00	0.00	.45	
ENE	11	38	34	3	0	0	86	2.86
	.49	1.70	1.52	.13	0.00	0.00	3.84	
	.04	.16	.14	.01	0.00	0.00	.35	
E	12	75	64	1	0	0	152	2.86
	.54	3.35	2.86	.04	0.00	0.00	6.79	
	.05	.31	.26	.00	0.00	0.00	.62	
ESE	7	85	40	0	0	0	132	2.58
	.31	3.80	1.79	0.00	0.00	0.00	5.90	
	.03	.35	.16	0.00	0.00	0.00	.54	
SE	29	162	72	1	0	0	264	2.56
	1.30	7.24	3.22	.04	0.00	0.00	11.80	
	.12	.66	.29	.00	0.00	0.00	1.08	
SSE	23	193	112	4	0	0	332	2.74
	1.03	8.63	5.01	.18	0.00	0.00	14.84	
	.09	.79	.46	.02	0.00	0.00	1.36	
S	25	134	84	4	0	0	247	2.71
	1.12	5.99	3.76	.18	0.00	0.00	11.04	
	.10	.55	.34	.02	0.00	0.00	1.01	
SSW	26	45	28	3	0	0	102	2.43
	1.16	2.01	1.25	.13	0.00	0.00	4.56	
	.11	.18	.11	.01	0.00	0.00	.42	
SW	12	24	5	0	0	0	41	2.07
	.54	1.07	.22	0.00	0.00	0.00	1.83	
	.05	.10	.02	0.00	0.00	0.00	.17	
WSW	21	39	4	0	0	0	64	1.89
	.94	1.74	.18	0.00	0.00	0.00	2.86	
	.09	.16	.02	0.00	0.00	0.00	.26	
W	26	44	12	0	0	0	82	2.01
	1.16	1.97	.54	0.00	0.00	0.00	3.67	
	.11	.18	.05	0.00	0.00	0.00	.34	
WNW	26	70	11	0	0	0	107	2.06
	1.16	3.13	.49	0.00	0.00	0.00	4.78	
	.11	.29	.04	0.00	0.00	0.00	.44	
NW	29	87	13	0	0	0	129	2.08
	1.30	3.89	.58	0.00	0.00	0.00	5.77	
	.12	.36	.05	0.00	0.00	0.00	.53	
NNW	14	56	26	1	0	0	97	2.53
	.63	2.50	1.16	.04	0.00	0.00	4.34	
	.06	.23	.11	.00	0.00	0.00	.40	
N	16	66	28	1	0	0	111	2.58
	.72	2.95	1.25	.04	0.00	0.00	4.96	
	.07	.27	.11	.00	0.00	0.00	.45	
CALM	4						4	CALM
	.18						.18	
	.02						.02	
TOTAL	312	1287	618	20	0	0	2237	2.54
	13.95	57.53	27.63	.89	0.00	0.00	100.00	
	1.28	5.26	2.53	.08	0.00	0.00	9.15	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	55	378	494	311	132	30	1400	4.48
	.22	1.55	2.02	1.27	.54	.12	5.73	
NE	71	409	392	145	28	3	1048	3.53
	.29	1.67	1.60	.59	.11	.01	4.29	
ENE	64	301	384	138	26	1	914	3.65
	.26	1.23	1.57	.56	.11	.00	3.74	
E	66	332	454	176	26	11	1065	3.81
	.27	1.36	1.86	.72	.11	.04	4.36	
ESE	46	381	446	199	43	24	1139	4.01
	.19	1.56	1.82	.81	.18	.10	4.66	
SE	87	616	534	217	63	14	1531	3.68
	.36	2.52	2.18	.89	.26	.06	6.26	
SSE	69	825	1060	472	111	35	2572	4.06
	.28	3.37	4.34	1.93	.45	.14	10.52	
S	93	658	1446	1285	686	229	4397	5.46
	.38	2.69	5.91	5.26	2.81	.94	17.99	
SSW	82	338	683	822	367	186	2478	5.64
	.34	1.38	2.79	3.36	1.50	.76	10.14	
SW	55	254	288	198	94	48	937	4.67
	.22	1.04	1.18	.81	.38	.20	3.83	
WSW	75	212	168	90	44	12	601	3.78
	.31	.87	.69	.37	.18	.05	2.46	
W	78	258	266	137	43	14	796	3.87
	.32	1.06	1.09	.56	.18	.06	3.26	
WNW	67	274	302	206	58	30	937	4.31
	.27	1.12	1.24	.84	.24	.12	3.83	
NW	73	343	347	367	187	82	1399	5.08
	.30	1.40	1.42	1.50	.76	.34	5.72	
NNW	59	267	407	525	284	61	1603	5.43
	.24	1.09	1.66	2.15	1.16	.25	6.56	
N	60	310	527	457	206	54	1614	5.01
	.25	1.27	2.16	1.87	.84	.22	6.60	
CALM	17						17	CALM
	.07						.07	
TOTAL	1117	6156	8198	5745	2398	834	24448	4.65
	4.57	25.18	33.53	23.50	9.81	3.41	100.00	

NUMBER OF VALID OBSERVATIONS 24448 92.94 PCT
NUMBER OF INVALID OBSERVATIONS 1856 7.06 PCT.
TOTAL NUMBER OF OBSERVATIONS 26304 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	2	7	8	14	1	0	32	4.49
	.23	.81	.92	1.62	.12	0.00	3.70	
	.02	.08	.10	.17	.01	0.00	.38	
NE	1	5	7	6	0	0	19	3.91
	.12	.58	.81	.69	0.00	0.00	2.20	
	.01	.06	.08	.07	0.00	0.00	.23	
ENE	1	0	14	4	0	0	19	4.42
	.12	0.00	1.62	.46	0.00	0.00	2.20	
	.01	0.00	.17	.05	0.00	0.00	.23	
E	0	2	4	3	1	0	10	4.99
	0.00	.23	.46	.35	.12	0.00	1.16	
	0.00	.02	.05	.04	.01	0.00	.12	
ESE	0	6	4	8	4	3	25	5.90
	0.00	.69	.46	.92	.46	.35	2.89	
	0.00	.07	.05	.10	.05	.04	.30	
SE	0	4	4	15	3	2	28	5.99
	0.00	.46	.46	1.73	.35	.23	3.24	
	0.00	.05	.05	.18	.04	.02	.33	
SSE	0	6	26	27	9	2	70	5.47
	0.00	.69	3.01	3.12	1.04	.23	8.09	
	0.00	.07	.31	.32	.11	.02	.83	
S	0	6	36	84	77	31	234	7.45
	0.00	.69	4.16	9.71	8.90	3.58	27.05	
	0.00	.07	.43	1.00	.92	.37	2.79	
SSW	1	3	21	49	40	27	141	7.78
	.12	.35	2.43	5.66	4.62	3.12	16.30	
	.01	.04	.25	.58	.48	.32	1.68	
SW	1	7	12	14	14	15	63	7.19
	.12	.81	1.39	1.62	1.62	1.73	7.28	
	.01	.08	.14	.17	.17	.18	.75	
WSW	0	7	3	2	6	1	19	5.67
	0.00	.81	.35	.23	.69	.12	2.20	
	0.00	.08	.04	.02	.07	.01	.23	
W	0	4	8	3	5	0	20	5.02
	0.00	.46	.92	.35	.58	0.00	2.31	
	0.00	.05	.10	.04	.06	0.00	.24	
WNW	0	5	7	6	3	0	21	5.08
	0.00	.58	.81	.69	.35	0.00	2.43	
	0.00	.06	.08	.07	.04	0.00	.25	
NW	1	1	16	20	11	14	63	7.23
	.12	.12	1.85	2.31	1.27	1.62	7.28	
	.01	.01	.19	.24	.13	.17	.75	
NNW	1	1	5	32	14	1	54	6.56
	.12	.12	.58	3.70	1.62	.12	6.24	
	.01	.01	.06	.38	.17	.01	.64	
N	1	3	6	30	7	0	47	5.91
	.12	.35	.69	3.47	.81	0.00	5.43	
	.01	.04	.07	.36	.08	0.00	.56	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	9	67	181	317	195	96	865	6.64
	1.04	7.75	20.92	36.65	22.54	11.10	100.00	
	.11	.80	2.16	3.78	2.33	1.15	10.32	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	3	11	2	1	1	18	4.47
	0.00	.58	2.13	.39	.19	.19	3.48	
	0.00	.04	.13	.02	.01	.01	.21	
NE	1	14	16	4	0	0	35	3.43
	.19	2.71	3.09	.77	0.00	0.00	6.77	
	.01	.17	.19	.05	0.00	0.00	.42	
ENE	0	4	7	3	1	0	15	4.22
	0.00	.77	1.35	.58	.19	0.00	2.90	
	0.00	.05	.08	.04	.01	0.00	.18	
E	1	1	3	1	0	3	9	6.28
	.19	.19	.58	.19	0.00	.58	1.74	
	.01	.01	.04	.01	0.00	.04	.11	
ESE	0	6	4	4	2	1	17	4.79
	0.00	1.16	.77	.77	.39	.19	3.29	
	0.00	.07	.05	.05	.02	.01	.20	
SE	0	6	11	4	1	0	22	4.10
	0.00	1.16	2.13	.77	.19	0.00	4.26	
	0.00	.07	.13	.05	.01	0.00	.26	
SSE	0	5	12	13	1	2	33	5.31
	0.00	.97	2.32	2.51	.19	.39	6.38	
	0.00	.06	.14	.16	.01	.02	.39	
S	0	5	27	41	17	9	99	6.37
	0.00	.97	5.22	7.93	3.29	1.74	19.15	
	0.00	.06	.32	.49	.20	.11	1.18	
SSW	0	2	20	22	11	8	63	6.57
	0.00	.39	3.87	4.26	2.13	1.55	12.19	
	0.00	.02	.24	.26	.13	.10	.75	
SW	0	2	8	15	3	3	31	6.23
	0.00	.39	1.55	2.90	.58	.58	6.00	
	0.00	.02	.10	.18	.04	.04	.37	
WSW	0	3	3	5	2	0	13	5.08
	0.00	.58	.58	.97	.39	0.00	2.51	
	0.00	.04	.04	.06	.02	0.00	.16	
W	1	8	8	3	1	0	21	3.63
	.19	1.55	1.55	.58	.19	0.00	4.06	
	.01	.10	.10	.04	.01	0.00	.25	
WNW	0	7	7	7	1	0	22	4.50
	0.00	1.35	1.35	1.35	.19	0.00	4.26	
	0.00	.08	.08	.08	.01	0.00	.26	
NW	0	7	4	18	9	5	43	6.53
	0.00	1.35	.77	3.48	1.74	.97	8.32	
	0.00	.08	.05	.21	.11	.06	.51	
NNW	0	2	6	25	11	2	46	6.69
	0.00	.39	1.16	4.84	2.13	.39	8.90	
	0.00	.02	.07	.30	.13	.02	.55	
N	0	5	7	13	5	0	30	5.43
	0.00	.97	1.35	2.51	.97	0.00	5.80	
	0.00	.06	.08	16	.06	0.00	.36	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	80	154	180	66	34	517	5.60
	.58	15.47	29.79	34.82	12.77	6.58	100.00	
	.04	.95	1.84	2.15	.79	.41	6.17	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00 0.00	4 69 .05	14 2.42 .17	8 1.38 .10	7 1.21 .08	2 .35 .02	35 6.04 .42	5.64
NE	1 17 .01	9 1.55 .11	6 1.04 .07	5 .86 .06	0 0.00 0.00	0 0.00 0.00	21 3.63 .25	3.74
ENE	0 0.00 0.00	4 69 05	6 1.04 .07	1 .17 .01	2 .35 .02	0 0.00 0.00	13 2.25 .16	4.45
E	0 0.00 0.00	2 .35 .02	2 .35 .02	2 .35 .02	0 0.00 0.00	0 0.00 0.00	6 1.04 .07	4.82
ESE	0 0.00 0.00	3 52 .04	7 1.21 .08	6 1.04 .07	0 0.00 0.00	0 0.00 0.00	16 2.76 .19	4.46
SE	2 .35 .02	5 .86 .06	12 2.07 .14	4 .69 .05	1 .17 .01	0 0.00 0.00	24 4.15 .29	3.96
SSE	0 0.00 0.00	7 1.21 .08	17 2.94 .20	12 2.07 .14	7 1.21 .08	1 .17 .01	44 7.60 .52	5.32
S	2 .35 .02	12 2.07 .14	29 5.01 .35	33 5.70 .39	24 4.15 .29	5 .86 .06	105 18.13 1.25	5.95
SSW	1 .17 .01	5 .86 .06	21 3.63 .25	32 5.53 .38	11 1.90 .13	9 1.55 .11	79 13.64 .94	6.19
SW	1 .17 .01	2 .35 .02	9 1.55 .11	18 3.11 .21	3 .52 .04	3 .52 .04	36 6.22 .43	5.97
WSW	0 0.00 0.00	6 1.04 .07	13 2.25 .16	4 .69 .05	0 0.00 0.00	2 .35 .02	25 4.32 .30	4.32
W	1 .17 .01	3 .52 .04	9 1.55 .11	5 .86 .06	0 0.00 0.00	0 0.00 0.00	18 3.11 .21	4.04
WNW	0 0.00 0.00	4 .69 .05	5 .86 .06	12 2.07 .14	1 .17 .01	0 0.00 0.00	22 3.80 .26	5.03
NW	1 .17 .01	1 .17 .01	17 2.94 .20	16 2.76 .19	4 .69 .05	4 .69 .05	43 7.43 .51	6.04
NNW	0 0.00 0.00	2 .35 .02	14 2.42 .17	29 5.01 .35	5 .86 .06	1 .17 .01	51 8.81 .61	5.84
N	0 0.00 0.00	3 .52 .04	12 2.07 .14	17 2.94 .20	4 .69 .05	5 .86 .06	41 7.08 .49	6.14
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	9 1.55 .11	72 12.44 .86	193 33.33 2.30	204 35.23 2.43	69 11.92 .82	32 5.53 .38	579 100.00 6.91	5.51

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	8 .32 .10	42 1.67 .50	76 3.03 .91	34 1.35 .41	36 1.43 .43	9 .36 .11	205 8.17 2.45	5.01
NE	9 .36 .11	34 1.35 .41	53 2.11 .63	26 1.04 .31	3 .12 .04	1 .04 .01	126 5.02 1.50	3.94
ENE	2 .08 .02	28 1.12 .33	31 1.24 .37	27 1.08 .32	9 .36 .11	1 .04 .01	98 3.90 1.17	4.52
E	6 .24 .07	35 1.39 .42	34 1.35 .41	21 .84 .25	6 .24 .07	1 .04 .01	103 4.10 1.23	4.00
ESE	4 .16 .05	21 .84 .25	46 1.83 .55	20 .80 .24	2 .08 .02	0 0.00 0.00	93 3.71 1.11	4.07
SE	0 0.00 0.00	21 .84 .25	53 2.11 .63	11 .44 .13	8 .32 .10	1 .04 .01	94 3.75 1.12	4.36
SSE	2 .08 .02	32 1.27 .38	69 2.75 .82	35 1.39 .42	15 .60 .18	15 .60 .18	168 6.69 2.00	5.40
S	3 .12 .04	39 1.55 .47	95 3.78 1.13	165 6.57 1.97	83 3.31 .99	44 1.75 .52	429 17.09 5.12	6.46
SSW	2 .08 .02	16 .64 .19	55 2.19 .66	71 2.83 .85	29 1.16 .35	16 .64 .19	189 7.53 2.25	6.03
SW	3 .12 .04	16 .64 .19	33 1.31 .39	27 1.08 .32	15 .60 .18	0 0.00 0.00	94 3.75 1.12	5.00
WSW	4 .16 .05	14 .56 .17	23 .92 .27	15 .60 .18	7 .28 .08	1 .04 .01	64 2.55 .76	4.61
W	2 .08 .02	18 .72 .21	20 .80 .24	11 .44 .13	4 .16 .05	0 0.00 0.00	55 2.19 .66	4.09
WNW	2 .08 .02	18 .72 .21	32 1.27 .38	31 1.24 .37	8 .32 .10	11 .44 .13	102 4.06 1.22	5.45
NW	4 .16 .05	22 .88 .26	42 1.67 .50	61 2.43 .73	44 1.75 .52	28 1.12 .33	201 8.01 2.40	6.61
NNW	6 .24 .07	28 1.12 .33	74 2.95 .88	93 3.71 1.11	48 1.91 .57	17 .68 .20	266 10.60 3.17	5.86
N	6 .24 .07	32 1.27 .38	88 3.51 1.05	57 2.27 .68	30 1.20 .36	5 .20 .06	218 8.69 2.60	5.03
CALM	5 .20 .06						5 .20 .06	CALM
TOTAL	68 2.71 .81	416 16.57 4.96	824 32.83 9.83	705 28.09 8.41	347 13.82 4.14	150 5.98 1.79	2510 100.00 29.94	5.38

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3	27	21	10	0	0	61	3.44
	.15	1.33	1.03	.49	0.00	0.00	3.00	
	04	.32	.25	.12	0.00	0.00	.73	
NE	5	36	23	5	0	0	69	2.98
	.25	1.77	1.13	.25	0.00	0.00	3.40	
	.06	.43	.27	.06	0.00	0.00	.82	
ENE	8	23	31	15	0	0	77	3.57
	.39	1.13	1.53	.74	0.00	0.00	3.79	
	.10	.27	.37	.18	0.00	0.00	.92	
E	4	30	19	26	1	1	81	4.09
	.20	1.48	.94	1.28	.05	.05	3.99	
	.05	.36	.23	.31	.01	.01	.97	
ESE	4	36	43	14	3	0	100	3.71
	.20	1.77	2.12	.69	.15	0.00	4.92	
	.05	.43	.51	.17	.04	0.00	1.19	
SE	8	45	55	22	4	0	134	3.70
	.39	2.21	2.71	1.08	.20	0.00	6.59	
	10	.54	.65	.26	.05	0.00	1.60	
SSE	5	75	144	76	17	3	320	4.40
	25	3.69	7.09	3.74	.84	.15	15.75	
	.06	.89	1.72	.91	.20	.04	3.82	
S	10	56	204	205	53	10	538	5.26
	.49	2.76	10.04	10.09	2.61	.49	26.48	
	.12	.67	2.43	2.45	.63	.12	6.42	
SSW	6	31	61	57	23	8	186	5.17
	.30	1.53	3.00	2.81	1.13	.39	9.15	
	.07	.37	.73	.68	.27	.10	2.22	
SW	2	25	31	18	3	0	79	4.04
	.10	1.23	1.53	.89	.15	0.00	3.89	
	.02	.30	.37	.21	.04	0.00	.94	
WSW	5	11	11	1	1	0	29	2.81
	.25	.54	.54	.05	.05	0.00	1.43	
	.06	.13	.13	.01	.01	0.00	.35	
W	2	19	14	3	0	0	38	3.09
	.10	.94	.69	.15	0.00	0.00	1.87	
	.02	.23	.17	.04	0.00	0.00	.45	
WNW	4	20	35	5	1	0	65	3.52
	.20	.98	1.72	.25	.05	0.00	3.20	
	.05	.24	.42	.06	.01	0.00	.78	
NW	7	26	40	18	2	2	95	3.97
	.34	1.28	1.97	.89	.10	.10	4.68	
	.03	.31	.48	.21	.02	.02	1.13	
NNW	6	22	30	20	2	0	80	3.92
	.30	1.08	1.48	.98	.10	0.00	3.94	
	.07	.26	.36	.24	.02	0.00	.95	
N	10	23	29	15	2	0	79	3.53
	.49	1.13	1.43	.74	.10	0.00	3.89	
	.12	.27	.35	.18	.02	0.00	.94	
CALM	1						1	CALM
	.05						.05	
	.01						.01	
TOTAL	90	505	791	510	112	24	2032	4.33
	4.43	24.85	38.93	25.10	5.51	1.18	100.00	
	1.07	6.02	9.43	6.08	1.34	.29	24.24	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3	18	14	0	0	0	35	2.66
	.28	1.67	1.30	0.00	0.00	0.00	3.26	
	.04	.21	.17	0.00	0.00	0.00	.42	
NE	7	28	18	0	0	0	53	2.55
	.65	2.60	1.67	0.00	0.00	0.00	4.93	
	.08	.33	.21	0.00	0.00	0.00	.63	
ENE	5	21	24	0	0	0	50	2.80
	.47	1.95	2.23	0.00	0.00	0.00	4.65	
	.06	.25	.29	0.00	0.00	0.00	.60	
E	5	27	17	1	0	0	50	2.70
	.47	2.51	1.58	.09	0.00	0.00	4.65	
	.06	.32	.20	.01	0.00	0.00	.60	
ESE	1	34	19	2	0	0	56	3.02
	.07	3.16	1.77	.19	0.00	0.00	5.21	
	.01	.41	.23	.02	0.00	0.00	.67	
SE	3	67	47	4	0	0	121	2.97
	.28	6.23	4.37	.37	0.00	0.00	11.26	
	.04	.80	.56	.05	0.00	0.00	1.44	
SSE	5	105	80	10	0	0	200	3.11
	.47	9.77	7.44	.93	0.00	0.00	18.60	
	.06	1.25	.95	.12	0.00	0.00	2.39	
S	5	47	100	10	0	0	162	3.44
	.47	4.37	9.30	.93	0.00	0.00	15.07	
	.06	.56	1.19	.12	0.00	0.00	1.93	
SSW	10	35	22	7	2	0	76	3.08
	.93	3.26	2.05	.65	.19	0.00	7.07	
	.12	.42	.26	.08	.02	0.00	.91	
SW	6	16	8	0	0	0	30	2.56
	.56	1.49	.74	0.00	0.00	0.00	2.79	
	.07	.19	.10	0.00	0.00	0.00	.36	
WSW	10	12	4	2	0	0	28	2.27
	.93	1.12	.37	.19	0.00	0.00	2.60	
	.12	.14	.05	.02	0.00	0.00	.33	
W	6	7	7	0	0	0	20	2.23
	.56	.65	.65	0.00	0.00	0.00	1.86	
	.07	.08	.08	0.00	0.00	0.00	.24	
WNW	5	20	24	1	0	0	50	2.92
	.47	1.86	2.23	.09	0.00	0.00	4.65	
	.06	.24	.29	.01	0.00	0.00	.60	
NW	7	32	14	2	0	0	55	2.67
	.65	2.98	1.30	.19	0.00	0.00	5.12	
	.08	.38	.17	.02	0.00	0.00	.66	
NNW	8	22	13	1	0	0	44	2.57
	.74	2.05	1.21	.09	0.00	0.00	4.09	
	10	.26	.16	.01	0.00	0.00	.52	
N	3	17	21	2	0	0	43	3.04
	.28	1.58	1.95	.19	0.00	0.00	4.00	
	.04	.20	.25	.02	0.00	0.00	.51	
CALM	2						2	CALM
	.19						.19	
	.02						.02	
TOTAL	91	508	432	42	2	0	1075	2.95
	8.47	47.26	40.19	3.91	.19	0.00	100.00	
	1.07	6.06	5.15	.50	.02	0.00	12.82	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (1 0 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	10 1.24 .12	56 6.95 .67	23 2.85 .27	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	89 11.04 1.06	2.57
NE	8 .99 .10	11 1.36 .13	4 .50 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	23 2.85 .27	2.17
ENE	2 .25 .02	12 1.49 .14	7 .87 .08	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	21 2.61 .25	2.81
E	5 .62 .06	20 2.48 .24	14 1.74 .17	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	39 4.84 .47	2.72
ESE	3 37 .04	17 2.11 .20	17 2.11 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	37 4.59 .44	2.78
SE	7 .87 .08	47 5.83 .56	25 3.10 .30	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	79 9.80 .94	2.68
SSE	6 .74 .07	85 10.55 1.01	54 6.70 .64	2 .25 .02	0 0.00 0.00	0 0.00 0.00	147 18.24 1.75	2.85
S	5 .62 .06	68 8.44 .81	35 4.34 .42	4 .50 .05	0 0.00 0.00	0 0.00 0.00	112 13.90 1.34	2.85
SSW	6 .74 .07	22 2.73 .26	10 1.24 .12	3 .37 .04	0 0.00 0.00	0 0.00 0.00	41 5.09 .49	2.68
SW	6 .74 .07	12 1.49 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	18 2.23 .21	1.89
WSW	8 .99 10	17 2.11 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	25 3.10 .30	1.78
W	11 1.36 .13	21 2.61 .25	3 .37 .04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 4.34 .42	2.01
WNW	5 .62 .06	28 3.47 .33	5 .62 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	38 4.71 .45	2.24
NW	10 1.24 .12	26 3.23 .31	4 .50 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	40 4.96 .48	1.94
NNW	2 .25 .02	17 2.11 .20	9 1.12 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	28 3.47 .33	2.61
N	6 .74 .07	19 2.36 .23	6 .74 .07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	31 3.85 .37	2.39
CALM	3 .37 .04						3 .37 .04	CALM
TOTAL	103 12.78 1.23	478 59.31 5.70	216 26.80 2.58	9 1.12 .11	0 0.00 0.00	0 0.00 0.00	806 100.00 9.61	2.56

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	26 31	157 1.87	167 1.99	68 .81	45 .54	12 .14	475 5.67	4.17
NE	32 .38	137 1.63	127 1.51	46 .55	3 .04	1 .01	346 4.13	3.35
ENE	18 .21	92 1.10	120 1.43	50 .60	12 .14	1 .01	293 3.49	3.83
E	21 .25	117 1.40	93 1.11	54 .64	8 .10	5 .06	298 3.55	3.76
ESE	12 .14	123 1.47	140 1.67	54 .64	11 .13	4 .05	344 4.10	3.84
SE	20 .24	195 2.33	207 2.47	60 .72	17 .20	3 .04	502 5.99	3.64
SSE	18 .21	315 3.76	402 4.79	175 2.09	49 .58	23 .27	982 11.71	4.23
S	25 .30	233 2.78	526 6.27	542 6.46	254 3.03	99 1.18	1679 20.03	5.64
SSW	26 .31	114 1.36	210 2.50	241 2.87	116 1.38	68 .81	775 9.24	5.74
SW	19 .23	80 .95	101 1.20	92 1.10	38 .45	21 .25	351 4.19	5.02
WSW	27 .32	70 .83	57 .68	29 .35	16 .19	4 .05	203 2.42	3.78
W	23 27	80 .95	69 .82	25 .30	10 .12	0 0.00	207 2.47	3 42
WNW	16 .19	102 1.22	115 1.37	62 .74	14 .17	11 .13	320 3.82	4.16
NW	30 .36	115 1.37	137 1.63	135 1.61	70 .83	53 .63	540 6.44	5.42
NNW	23 .27	94 1.12	151 1.80	200 2.39	80 .95	21 .25	569 6.79	5.31
N	26 .31	102 1.22	169 2.02	134 1.60	48 .57	10 .12	489 5.83	4 65
CALM	11 .13						11 .13	CALM
TOTAL	373 4.45	2126 25.36	2791 33.29	1967 23.46	791 9.43	336 4.01	8384 100.00	4 70

NUMBER OF VALID OBSERVATIONS 8384 95.71 PCT.
NUMBER OF INVALID OBSERVATIONS 376 4.29 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	15	35	39	7	0	98	4.89
	.13	.94	2.20	2.46	.44	0.00	6.17	
	.02	.18	.41	.46	.08	0.00	1.14	
NE	1	11	27	7	0	0	46	4.02
	.06	.69	1.70	.44	0.00	0.00	2.90	
	.01	.13	.32	.08	0.00	0.00	.54	
ENE	1	7	19	10	0	0	37	4.16
	.06	.44	1.20	.63	0.00	0.00	2.33	
	.01	.08	.22	.12	0.00	0.00	.43	
E	1	8	17	4	2	0	32	4.13
	.06	.50	1.07	.25	.13	0.00	2.02	
	.01	.09	.20	.05	.02	0.00	.37	
ESE	2	24	26	17	2	0	71	4.10
	.13	1.51	1.64	1.07	.13	0.00	4.47	
	.02	.28	.30	.20	.02	0.00	.83	
SE	6	20	26	18	1	0	71	3.84
	.38	1.26	1.64	1.13	.06	0.00	4.47	
	.07	.23	.30	.21	.01	0.00	.83	
SSE	1	15	46	40	19	4	125	5.44
	.06	.94	2.90	2.52	1.20	.25	7.87	
	.01	.18	.54	.47	.22	.05	1.46	
S	3	22	57	110	57	18	267	6.28
	.19	1.39	3.59	6.93	3.59	1.13	16.81	
	.04	.26	.67	1.29	.67	.21	3.12	
SSW	4	18	62	107	57	51	299	6.82
	.25	1.13	3.90	6.74	3.59	3.21	18.83	
	.05	.21	.72	1.25	.67	.60	3.49	
SW	1	16	28	22	18	14	99	6.10
	.06	1.01	1.76	1.39	1.13	.88	6.23	
	.01	.19	.33	.26	.21	.16	1.16	
WSW	5	10	13	9	5	4	46	4.89
	.31	.63	.82	.57	.31	.25	2.90	
	.06	.12	.15	.11	.06	.05	.54	
W	2	14	12	24	3	1	56	4.94
	.13	.88	.76	1.51	.19	.06	3.53	
	.02	.16	.14	.28	.04	.01	.65	
WNW	4	8	10	13	6	8	49	6.40
	.25	.50	.63	.82	.38	.50	3.09	
	.05	.09	.12	.15	.07	.09	.57	
NW	3	5	8	35	25	1	77	6.42
	.19	.31	.50	2.20	1.57	.06	4.85	
	.04	.06	.09	.41	.29	.01	.90	
NNW	1	2	18	54	46	5	126	7.01
	.06	.13	1.13	3.40	2.90	.31	7.93	
	.01	.02	.21	.63	.54	.06	1.47	
N	1	8	32	33	11	1	86	5.40
	.06	.50	2.02	2.08	.69	.06	5.42	
	.01	.09	.37	.39	.13	.01	1.00	
CALM	3						3	CALM
	.19						.19	
	.04						.04	
TOTAL	41	203	436	542	259	107	1588	5.77
	2.59	12.78	27.46	34.13	16.31	6.74	100.00	
	.48	2.37	5.09	6.33	3.03	1.25	18.55	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	5	7	6	7	2	28	5.71
	.23	1.14	1.59	1.37	1.59	.46	6.38	
	.01	.06	.08	.07	.08	.02	.33	
NE	1	9	4	3	0	0	17	3.31
	.23	2.05	.91	.68	0.00	0.00	3.87	
	.01	.11	.05	.04	0.00	0.00	.20	
ENE	1	4	1	4	1	0	11	4.31
	.23	.91	.23	.91	.23	0.00	2.51	
	.01	.05	.01	.05	.01	0.00	.13	
E	1	0	6	0	0	0	7	3.73
	.23	0.00	1.37	0.00	0.00	0.00	1.59	
	.01	0.00	.07	0.00	0.00	0.00	.08	
ESE	0	6	6	5	1	4	22	5.44
	0.00	1.37	1.37	1.14	.23	.91	5.01	
	0.00	.07	.07	.06	.01	.05	.26	
SE	0	7	7	3	0	0	17	3.65
	0.00	1.59	1.59	.68	0.00	0.00	3.87	
	0.00	.08	.08	.04	0.00	0.00	.20	
SSE	0	3	6	6	3	0	18	5.45
	0.00	.68	1.37	1.37	.68	0.00	4.10	
	0.00	.04	.07	.07	.04	0.00	.21	
S	1	5	12	30	12	8	68	6.51
	.23	1.14	2.73	6.83	2.73	1.82	15.49	
	.01	.06	.14	.35	.14	.09	.79	
SSW	2	0	12	11	12	6	43	6.92
	.46	0.00	2.73	2.51	2.73	1.37	9.79	
	.02	0.00	.14	.13	.14	.07	.50	
SW	0	7	3	7	2	2	21	5.07
	0.00	1.59	.68	1.59	.46	.46	4.78	
	0.00	.08	.04	.08	.02	.02	.25	
WSW	1	1	0	9	3	1	15	6.37
	.23	.23	0.00	2.05	.68	.23	3.42	
	.01	.01	0.00	.11	.04	.01	.18	
W	2	4	4	4	1	1	16	4.37
	.46	.91	.91	.91	.23	.23	3.64	
	.02	.05	.05	.05	.01	.01	.19	
WNW	0	5	2	8	6	2	23	6.65
	0.00	1.14	.46	1.82	1.37	.46	5.24	
	0.00	.06	.02	.09	.07	.02	.27	
NW	1	9	7	14	13	6	50	6.45
	.23	2.05	1.59	3.19	2.96	1.37	11.39	
	.01	.11	.08	.16	.15	.07	.58	
NNW	1	3	4	19	15	1	43	6.68
	.23	.68	.91	4.33	3.42	.23	9.79	
	.01	.04	.05	.22	.18	.01	.50	
N	1	4	7	17	8	3	40	6.20
	.23	.91	1.59	3.87	1.82	.68	9.11	
	.01	.05	.08	.20	.09	.04	.47	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	13	72	88	146	84	36	439	5.91
	2.96	16.40	20.05	33.26	19.13	8.20	100.00	
	.15	.84	1.03	1.71	.98	.42	5.13	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1	8	5	13	8	0	35	5.52
	19	1.55	97	2.52	1.55	0.00	6.80	
	.01	.09	.06	.15	.09	0.00	.41	
NE	1	13	9	4	1	0	28	3.57
	19	2.52	1.75	.78	.19	0.00	5.44	
	.01	.15	.11	.05	.01	0.00	33	
ENE	1	4	8	3	0	0	16	3.56
	.19	.78	1.55	58	0.00	0.00	3.11	
	.01	.05	09	.04	0.00	0.00	.19	
E	2	2	5	3	0	1	13	4.62
	.39	.39	.97	.58	0.00	.19	2.52	
	.02	.02	.06	.04	0.00	.01	.15	
ESE	0	2	5	4	0	1	12	4.82
	0.00	.39	97	.78	0.00	19	2.33	
	0.00	.02	.06	.05	0.00	.01	.14	
SE	0	0	7	8	0	1	16	5.54
	0.00	0.00	1.36	1.55	0.00	.19	3.11	
	0.00	0.00	.08	.09	0.00	.01	.19	
SSE	1	4	8	12	4	0	29	5.14
	.19	78	1.55	2.33	.78	0.00	5.63	
	.01	.05	09	.14	.05	0.00	.34	
S	0	4	17	29	10	5	65	6.12
	0.00	.78	3.30	5.63	1.94	.97	12.62	
	0.00	05	.20	.34	.12	.06	.76	
SSW	0	6	12	22	14	7	61	6.46
	0.00	1.17	2.33	4.27	2.72	1.36	11.84	
	0.00	.07	.14	.26	.16	.08	.71	
SW	1	2	2	7	1	2	15	5.63
	.19	.39	.39	1.36	.19	.39	2.91	
	.01	02	.02	.08	.01	.02	.18	
WSW	2	1	3	2	0	1	9	4.51
	.39	.19	.58	.39	0.00	.19	1.75	
	.02	.01	.04	.02	0.00	.01	.11	
W	0	6	11	1	0	1	19	4.01
	0.00	1.17	2.14	.19	0.00	.19	3.69	
	0.00	.07	.13	.01	0.00	.01	.22	
WNW	2	5	6	12	5	1	31	5.77
	.39	97	1.17	2.33	.97	.19	6.02	
	.02	.06	.07	.14	.06	.01	.36	
NW	1	4	2	22	15	9	53	7.45
	.19	.78	.39	4.27	2.91	1.75	10.29	
	.01	.05	.02	.26	.18	.11	.62	
NNW	1	3	6	17	21	3	51	6.79
	.19	.58	1.17	3.30	4.08	.58	9.90	
	.01	.04	.07	.20	.25	.04	.60	
N	0	2	12	23	22	3	62	6.95
	0.00	.39	2.33	4.47	4.27	.58	12.04	
	0.00	.02	.14	.27	.26	.04	.72	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	13	66	118	182	101	35	515	5.92
	2.52	12.82	22.91	35.34	19.61	6.80	100.00	
	.15	.77	1.38	2.13	1.18	.41	6.02	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	8	26	64	72	29	0	199	5.16
	.34	1.10	2.70	3.03	1.22	0.00	8.39	
	.09	.30	.75	.84	.34	0.00	2.33	
NE	4	22	44	22	0	0	92	3.96
	.17	.93	1.85	.93	0.00	0.00	3.88	
	.05	.26	.51	.26	0.00	0.00	1.07	
ENE	7	13	46	19	3	0	88	4.18
	.29	.55	1.94	.80	.13	0.00	3.71	
	.03	.15	.54	.22	.04	0.00	1.03	
E	10	21	53	24	5	3	116	4.28
	.42	.88	2.23	1.01	.21	.13	4.89	
	.12	.25	.62	.28	.06	.04	1.36	
ESE	1	21	42	35	16	12	127	5.63
	.04	.88	1.77	1.47	.67	.51	5.35	
	.01	.25	.49	.41	.19	.14	1.48	
SE	9	28	33	46	9	6	131	4.90
	.38	1.18	1.39	1.94	.38	.25	5.52	
	.11	.33	.39	.54	.11	.07	1.53	
SSE	8	31	51	51	10	3	154	4.62
	.34	1.31	2.15	2.15	.42	.13	6.49	
	.09	.36	.60	60	.12	.04	1.80	
S	6	36	120	120	98	14	394	5.95
	.25	1.52	5.06	5.06	4.13	.59	16.60	
	.07	.42	1.40	1.40	1.14	.16	4.60	
SSW	4	20	43	67	45	12	191	6.08
	.17	.84	1.81	2.82	1.90	.51	8.05	
	.05	.23	.50	.78	.53	.14	2.23	
SW	8	17	21	7	8	4	65	4.51
	.34	.72	.88	.29	.34	.17	2.74	
	.09	.20	.25	.08	.09	.05	.76	
WSW	8	15	14	6	4	2	49	3.98
	.34	.63	.59	.25	.17	.08	2.06	
	.09	.18	.16	.07	.05	.02	.57	
W	6	14	24	10	6	11	71	5.35
	.25	.59	1.01	.42	.25	.46	2.99	
	.07	.16	.28	.12	.07	.13	.83	
WNW	6	16	24	38	14	8	106	5.64
	.25	.67	1.01	1.60	.59	.34	4.47	
	.07	.19	.28	.44	.16	.09	1.24	
NW	2	15	38	80	29	4	168	5.85
	.08	.63	1.60	3.37	1.22	.17	7.08	
	.02	.18	.44	.93	.34	.05	1.96	
NNW	4	21	41	75	54	14	209	6.27
	.17	.88	1.73	3.16	2.28	.59	8.81	
	.05	.25	.48	.88	.63	.16	2.44	
N	7	19	64	76	38	9	213	5.75
	.29	.80	2.70	3.20	1.60	.38	8.98	
	.03	.22	.75	.89	.44	.11	2.49	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	98	335	722	748	368	102	2373	5.40
	4.13	14.12	30.43	31.52	15.51	4.30	100.00	
	1.14	3.91	8.44	8.74	4.30	1.19	27.73	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	5	20	21	8	0	1	55	3.64
	.28	1.11	1.17	.45	0.00	.06	3.06	
	.06	.23	.25	.09	0.00	.01	.64	
NE	8	31	20	6	0	0	65	2.89
	.45	1.73	1.11	.33	0.00	0.00	3.62	
	.09	.36	.23	.07	0.00	0.00	.76	
ENE	5	29	24	9	2	0	69	3.48
	.28	1.61	1.34	.50	.11	0.00	3.84	
	.06	.34	.28	.11	.02	0.00	.81	
E	3	15	39	18	3	1	79	4.36
	.17	.83	2.17	1.00	.17	.06	4.40	
	.04	.18	.46	.21	.04	.01	.92	
ESE	6	17	39	34	6	0	102	4.56
	.33	.95	2.17	1.89	.33	0.00	5.68	
	.07	.20	.46	.40	.07	0.00	1.19	
SE	4	36	49	21	4	1	115	3.97
	.22	2.00	2.73	1.17	.22	.06	6.40	
	.05	.42	.57	.25	.05	.01	1.34	
SSE	6	66	114	81	5	1	273	4.31
	.33	3.67	6.34	4.51	.28	.06	15.19	
	.07	.77	1.33	.95	.06	.01	3.19	
S	11	68	130	115	39	5	368	4.91
	.61	3.78	7.23	6.40	2.17	.28	20.48	
	.13	.79	1.52	1.34	.46	.06	4.30	
SSW	7	33	48	61	16	0	165	4.81
	.39	1.84	2.67	3.39	.89	0.00	9.18	
	.08	.39	.56	.71	.19	0.00	1.93	
SW	3	26	27	7	2	0	65	3.47
	.17	1.45	1.50	.39	.11	0.00	3.62	
	.04	.30	.32	.08	.02	0.00	.76	
WSW	1	10	14	9	1	0	35	3.88
	.06	.56	.78	.50	.06	0.00	1.95	
	.01	.12	.16	.11	.01	0.00	.41	
W	7	23	21	14	2	0	67	3.58
	.39	1.28	1.17	.78	.11	0.00	3.73	
	.08	.27	.25	.16	.02	0.00	.78	
WNW	2	23	38	14	0	0	77	3.69
	.11	1.28	2.11	.78	0.00	0.00	4.28	
	.02	.27	.44	.16	0.00	0.00	.90	
NW	4	26	54	18	1	0	103	3.87
	.22	1.45	3.01	1.00	.06	0.00	5.73	
	.05	.30	.63	.21	.01	0.00	1.20	
NNW	3	19	34	19	1	0	76	4.04
	.17	1.06	1.89	1.06	.06	0.00	4.23	
	.04	.22	.40	.22	.01	0.00	.89	
N	3	19	36	22	2	1	83	4.34
	.17	1.06	2.00	1.22	.11	.06	4.62	
	.04	.22	.42	.26	.02	.01	.97	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	78	461	708	456	84	10	1797	4.24
	4.34	25.65	39.40	25.38	4.67	.56	100.00	
	.91	5.39	8.27	5.33	.98	.12	21.00	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	20	25	1	0	0	47	3.07
	.09	1.72	2.15	.09	0.00	0.00	4.05	
	.01	.23	.29	.01	0.00	0.00	.55	
NE	6	26	8	0	1	0	41	2.61
	.52	2.24	.69	0.00	.09	0.00	3.53	
	.07	.30	.09	0.00	.01	0.00	.48	
ENE	4	17	20	0	0	0	41	2.95
	.34	1.46	1.72	0.00	0.00	0.00	3.53	
	.05	.20	.23	0.00	0.00	0.00	.48	
E	3	30	35	7	0	0	75	3.32
	.26	2.58	3.01	.60	0.00	0.00	6.46	
	.04	.35	.41	.08	0.00	0.00	.88	
ESE	3	25	25	6	0	0	59	3.36
	.26	2.15	2.15	.52	0.00	0.00	5.08	
	.04	.29	.29	.07	0.00	0.00	.69	
SE	6	63	35	7	0	0	111	3.07
	.52	5.43	3.01	.60	0.00	0.00	9.56	
	.07	.74	.41	.08	0.00	0.00	1.30	
SSE	4	99	97	8	0	0	208	3.21
	.34	8.53	8.35	.69	0.00	0.00	17.92	
	.05	1.16	1.13	.09	0.00	0.00	2.43	
S	7	45	96	9	0	0	157	3.39
	.60	3.88	8.27	.78	0.00	0.00	13.52	
	.08	.53	1.12	.11	0.00	0.00	1.83	
SSW	7	42	64	5	0	0	118	3.18
	.60	3.62	5.51	.43	0.00	0.00	10.16	
	.08	.49	.75	.06	0.00	0.00	1.38	
SW	3	28	20	1	0	0	52	2.79
	.26	2.41	1.72	.09	0.00	0.00	4.48	
	.04	.33	.23	.01	0.00	0.00	.61	
WSW	5	12	8	0	0	0	25	2.41
	.43	1.03	.69	0.00	0.00	0.00	2.15	
	.06	.14	.09	0.00	0.00	0.00	.29	
W	4	21	13	1	0	0	39	2.77
	.34	1.81	1.12	.09	0.00	0.00	3.36	
	.05	.25	.15	.01	0.00	0.00	.46	
WNW	5	13	29	0	0	0	47	3.06
	.43	1.12	2.50	0.00	0.00	0.00	4.05	
	.06	.15	.34	0.00	0.00	0.00	.55	
NW	6	24	14	0	0	0	44	2.65
	.52	2.07	1.21	0.00	0.00	0.00	3.79	
	.07	.28	.16	0.00	0.00	0.00	.51	
NNW	3	26	11	1	0	0	41	2.78
	.26	2.24	.95	.09	0.00	0.00	3.53	
	.04	.30	.13	.01	0.00	0.00	.48	
N	2	26	23	5	0	0	56	3.14
	.17	2.24	1.98	.43	0.00	0.00	4.82	
	.02	.30	.27	.06	0.00	0.00	.65	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	69	517	523	51	1	0	1161	3.10
	5.94	44.53	45.05	4.39	.09	0.00	100.00	
	.81	6.04	6.11	.60	.01	0.00	13.56	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED. 11/04/81. 13 19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	4 .58 .05	21 3.06 .25	19 2.77 .22	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	44 6.41 .51	2.95
NE	4 .58 .05	21 3.06 .25	6 .87 .07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	31 4.52 .36	2.55
ENE	3 .44 .04	18 2.62 .21	19 2.77 .22	3 .44 .04	0 0.00 0.00	0 0.00 0.00	43 6.27 .50	3.15
E	4 .58 .05	20 2.92 .23	26 3.79 .30	1 .15 .01	0 0.00 0.00	0 0.00 0.00	51 7.43 .60	3.03
ESE	1 .15 .01	24 3.50 .28	11 1.60 .13	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	36 5.25 .42	2.65
SE	6 .87 .07	57 8.31 .67	39 5.69 .46	1 .15 .01	0 0.00 0.00	0 0.00 0.00	103 15.01 1.20	2.84
SSE	5 .73 .06	60 8.75 .70	41 5.98 .48	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	106 15.45 1.24	2.80
S	5 73 .06	27 3.94 .32	28 4.08 .33	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	60 8.75 .70	2.76
SSW	7 1.02 .08	16 2.33 .19	9 1.31 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	32 4.66 .37	2.44
SW	2 .29 .02	4 .58 .05	2 .29 .02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 1.17 .09	2.25
WSW	4 .58 .05	12 1.75 .14	3 .44 .04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	19 2.77 .22	2.13
W	1 .15 .01	9 1.31 .11	5 .73 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 2.19 .18	2.39
WNW	8 1.17 .09	11 1.60 .13	3 .44 .04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 3.21 .26	1.97
NW	7 1.02 .08	21 3.06 .25	7 1.02 .08	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 5.10 .41	2.34
NNW	8 1.17 .09	21 3.06 .25	9 1.31 .11	1 .15 .01	0 0.00 0.00	0 0.00 0.00	39 5.69 .46	2.53
N	5 .73 .06	17 2.48 .20	19 2.77 .22	1 .15 .01	0 0.00 0.00	0 0.00 0.00	42 6.12 .49	2.97
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	74 10.79 .86	359 52.33 4.19	246 35.86 2.87	7 1.02 .08	0 0.00 0.00	0 0.00 0.00	686 100.00 8.01	2.73

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	22 .26	115 1.34	176 2.06	139 1.62	51 .60	3 .04	506 5.91	4.61
NE	25 .29	133 1.55	118 1.38	42 .49	2 .02	0 0.00	320 3.74	3.37
ENE	22 .26	92 1.07	137 1.60	48 .56	6 .07	0 0.00	305 3.56	3.68
E	24 .28	96 1.12	181 2.11	57 .67	10 .12	5 .06	373 4.36	3.92
ESE	13 .15	119 1.39	154 1.80	101 1.18	25 .29	17 .20	429 5.01	4.53
SE	31 .36	211 2.47	196 2.29	104 1.22	14 .16	8 .09	564 6.59	3.82
SSE	25 .29	278 3.25	363 4.24	198 2.31	41 .48	8 .09	913 10.67	4.14
S	33 .39	207 2.42	460 5.37	413 4.83	216 2.52	50 .58	1379 16.11	5.34
SSW	31 .36	135 1.58	250 2.92	273 3.19	144 1.68	76 .89	909 10.62	5.65
SW	18 .21	100 1.17	103 1.20	51 .60	31 .36	22 .26	325 3.80	4.54
WSW	26 .30	61 .71	55 .64	35 .41	13 .15	8 .09	198 2.31	4.00
W	22 .26	91 1.06	90 1.05	54 .63	12 .14	14 .16	283 3.31	4.19
WNW	27 .32	81 .95	112 1.31	85 .99	31 .36	19 .22	355 4.15	4.83
NW	24 .28	104 1.22	130 1.52	169 1.97	83 .97	20 .23	530 6.19	5.27
NNW	21 .25	95 1.11	123 1.44	186 2.17	137 1.60	23 .27	585 6.83	5.72
N	19 .22	95 1.11	193 2.25	177 2.07	81 .95	17 .20	582 6.80	5.20
CALM	3 .04						3 .04	CALM
TOTAL	386 4.51	2013 23.52	2841 33.19	2132 24.91	897 10.48	290 3.39	8559 100.00	4.76

NUMBER OF VALID OBSERVATIONS	8559	97.71 PCT.
NUMBER OF INVALID OBSERVATIONS	201	2.29 PCT.
TOTAL NUMBER OF OBSERVATIONS	8760	100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .65 .03	4 1.30 .05	9 2.92 .12	6 1.95 .08	0 0.00 0.00	21 6.82 .28	6.21
NE	0 0.00 0.00	1 .32 .01	1 .32 .01	2 .65 .03	5 1.62 .07	0 0.00 0.00	9 2.92 .12	6.80
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	0 0.00 0.00	2 .65 .03	3 .97 .04	0 0.00 0.00	0 0.00 0.00	5 1.62 .07	5.66
ESE	0 0.00 0.00	0 0.00 0.00	4 1.30 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.30 .05	4.52
SE	0 0.00 0.00	0 0.00 0.00	8 2.60 .11	4 1.30 .05	0 0.00 0.00	0 0.00 0.00	12 3.90 .16	4.48
SSE	0 0.00 0.00	1 .32 .01	6 1.95 .08	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 2.27 .09	4.07
S	0 0.00 0.00	3 .97 .04	13 4.22 .17	13 4.22 .17	11 3.57 .15	0 0.00 0.00	40 12.99 .53	5.85
SSW	1 .32 .01	1 .32 .01	9 2.92 .12	49 15.91 .65	10 3.25 .13	0 0.00 0.00	70 22.73 .93	6.14
SW	2 .65 .03	0 0.00 0.00	4 1.30 .05	3 .97 .04	2 .65 .03	0 0.00 0.00	11 3.57 .15	4.82
WSW	1 .32 .01	4 1.30 .05	1 .32 .01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 1.95 .08	2.33
W	0 0.00 0.00	5 1.62 .07	7 2.27 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 3.90 .16	3.41
WNW	0 0.00 0.00	1 .32 .01	1 .32 .01	6 1.95 .08	2 .65 .03	0 0.00 0.00	10 3.25 .13	6.17
NW	0 0.00 0.00	1 .32 .01	0 0.00 0.00	1 .32 .01	2 .65 .03	1 .32 .01	5 1.62 .07	7.60
NNW	0 0.00 0.00	5 1.62 .07	11 3.57 .15	9 2.92 .12	17 5.52 .23	1 .32 .01	43 13.96 .57	6.35
N	1 .32 .01	3 .97 .04	6 1.95 .08	19 6.17 .25	14 4.55 .19	10 3.25 .13	53 17.21 .71	7.07
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	5 1.62 .07	27 8.77 .36	77 25.00 1.03	118 38.31 1.57	69 22.40 .92	12 3.90 .16	308 100.00 4.10	5.97

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .67 .03	6 2.01 .08	6 2.01 .08	4 1.34 .05	1 .34 .01	19 6.38 .25	5.82
NE	0 0.00 0.00	1 .34 .01	9 3.02 .12	2 .67 .03	1 .34 .01	0 0.00 0.00	13 4.36 .17	4.62
ENE	0 0.00 0.00	2 .67 .03	3 1.01 .04	2 .67 .03	0 0.00 0.00	0 0.00 0.00	7 2.35 .09	4.20
E	0 0.00 0.00	0 0.00 0.00	1 .34 .01	1 .34 .01	1 .34 .01	0 0.00 0.00	3 1.01 .04	5.90
ESE	0 0.00 0.00	1 .34 .01	4 1.34 .05	2 .67 .03	0 0.00 0.00	0 0.00 0.00	7 2.35 .09	4.39
SE	0 0.00 0.00	0 0.00 0.00	4 1.34 .05	3 1.01 .04	1 .34 .01	0 0.00 0.00	8 2.68 .11	5.61
SSE	0 0.00 0.00	0 0.00 0.00	6 2.01 .08	1 .34 .01	1 .34 .01	0 0.00 0.00	8 2.68 .11	4.82
S	1 .34 .01	3 1.01 .04	22 7.38 .29	18 6.04 .24	16 5.37 .21	2 .67 .03	62 20.81 .83	5.89
SSW	0 0.00 0.00	6 2.01 .08	12 4.03 .16	30 10.07 .40	10 3.36 .13	0 0.00 0.00	58 19.46 .77	5.85
SW	0 0.00 0.00	6 2.01 .08	5 1.68 .07	7 2.35 .09	10 3.36 .13	0 0.00 0.00	28 9.40 .37	5.96
WSW	0 0.00 0.00	2 .67 .03	2 .67 .03	2 .67 .03	1 .34 .01	0 0.00 0.00	7 2.35 .09	4.64
W	0 0.00 0.00	3 1.01 .04	11 3.69 .15	3 1.01 .04	1 .34 .01	0 0.00 0.00	18 6.04 .24	4.09
WNW	0 0.00 0.00	1 .34 .01	3 1.01 .04	5 1.68 .07	0 0.00 0.00	0 0.00 0.00	9 3.02 .12	4.60
NW	0 0.00 0.00	5 1.68 .07	1 .34 .01	3 1.01 .04	4 1.34 .05	0 0.00 0.00	13 4.36 .17	5.48
NNW	0 0.00 0.00	0 0.00 0.00	5 1.68 .07	4 1.34 .05	3 1.01 .04	1 .34 .01	13 4.36 .17	6.28
N	0 0.00 0.00	5 1.68 .07	9 3.02 .12	7 2.35 .09	3 1.01 .04	1 .34 .01	25 8.39 .33	4.88
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .34 .01	37 12.42 .49	103 34.56 1.37	96 32.21 1.28	56 18.79 .75	5 1.68 .07	298 100.00 3.97	5.45

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .50 .03	6 1.51 .08	5 1.26 .07	6 1.51 .08	0 0.00 0.00	19 4.77 .25	5.89
NE	0 0.00 0.00	0 0.00 0.00	4 1.01 .05	4 1.01 .05	1 .25 .01	0 0.00 0.00	9 2.26 .12	5.27
ENE	0 0.00 0.00	2 50 .03	2 .50 03	5 1.26 .07	0 0.00 0.00	0 0.00 0.00	9 2.26 .12	5.18
E	2 .50 .03	1 .25 .01	7 1.76 .09	2 .50 .03	0 0.00 0.00	0 0.00 0.00	12 3.02 .16	3.94
ESE	0 0.00 0.00	0 0.00 0.00	11 2.76 .15	1 .25 .01	0 0.00 0.00	0 0.00 0.00	12 3.02 .16	4.27
SE	0 0.00 0.00	2 .50 .03	5 1.26 .07	3 .75 .04	3 .75 .04	0 0.00 0.00	13 3.27 .17	5.18
SSE	0 0.00 0.00	7 1.76 .09	8 2.01 .11	7 1.76 .09	1 .25 .01	1 .25 .01	24 6.03 .32	4.42
S	0 0.00 0.00	3 .75 .04	25 6.28 .33	24 6.03 .32	15 3.77 .20	2 .50 .03	69 17.34 .92	5.81
SSW	0 0.00 0.00	6 1.51 .08	15 3.77 .20	39 9.80 .52	12 3.02 .16	3 .75 .04	75 18.84 1.00	6.03
SW	0 0.00 0.00	4 1.01 .05	3 .75 .04	6 1.51 .08	1 .25 .01	0 0.00 0.00	14 3.52 .19	5.13
WSW	0 0.00 0.00	5 1.26 .07	3 .75 .04	4 1.01 .05	1 .25 .01	0 0.00 0.00	13 3.27 .17	4.63
W	0 0.00 0.00	4 1.01 .05	11 2.76 .15	6 1.51 .08	2 .50 .03	0 0.00 0.00	23 5.78 .31	4.75
WNW	1 .25 .01	3 .75 .04	10 2.51 .13	1 .25 .01	1 .25 .01	0 0.00 0.00	16 4.02 .21	3.91
NW	0 0.00 0.00	2 .50 .03	4 1.01 .05	9 2.26 .12	2 .50 .03	2 .50 .03	19 4.77 .25	6.08
NNW	1 25 .01	7 1.76 .09	11 2.76 .15	11 2.76 .15	6 1.51 .08	1 .25 .01	37 9.30 .49	5.25
N	0 0.00 0.00	2 .50 .03	10 2.51 .13	10 2.51 .13	10 2.51 .13	2 .50 .03	34 8.54 .45	6.23
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 1.01 .05	50 12.56 .67	135 33.92 1 80	137 34.42 1.83	61 15.33 .81	11 2.76 15	398 100.00 5.30	5.42

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42 25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .07 .03	31 1.15 .41	66 2.45 .88	62 2.30 83	14 .52 .19	8 .30 .11	183 6 80 2.44	5.02
NE	3 .11 .04	46 1.71 .61	80 2.97 1.07	43 1.60 .57	15 .56 .20	2 .07 .03	189 7.02 2.52	4.38
ENE	9 .33 .12	37 1.37 .49	68 2.53 .91	29 1.08 .39	7 .26 .09	0 0.00 0.00	150 5 57 2.00	3.97
E	6 .22 .03	28 1.04 .37	74 2.75 .99	32 1.19 .43	3 .11 .04	0 0.00 0.00	143 5.31 1.91	4.02
ESE	2 .07 .03	29 1.08 .39	51 1.89 .68	28 1.04 .37	5 .19 .07	2 .07 .03	117 4.34 1.56	4.42
SE	3 .11 .04	22 .82 .29	50 1.36 .67	20 .74 .27	16 .59 .21	2 .07 .03	113 4.20 1.51	4.76
SSE	1 .04 .01	28 1.04 .37	79 2.93 1.05	39 1.45 .52	16 .59 .21	3 .11 .04	166 6.16 2 21	4.71
S	8 .30 .11	43 1.60 .57	129 4.79 1.72	105 3.90 1.40	89 3.30 1.19	28 1.04 .37	402 14.93 5.36	5.92
SSW	4 .15 .05	31 1.15 .41	71 2.64 .95	111 4.12 1.48	49 1.82 .65	25 .93 .33	291 10.81 3.88	6.00
SW	6 .22 .03	24 .89 .32	38 1.41 .51	25 .93 .33	11 .41 .15	4 .15 .05	108 4.01 1.44	4.70
WSW	6 .22 .03	16 .59 .21	22 .82 .29	9 .33 .12	13 .48 .17	0 0.00 0.00	66 2.45 .88	4.51
W	7 .26 .09	23 .85 .31	43 1.60 .57	37 1.37 49	17 .63 .23	0 0.00 0.00	127 4.72 1.69	4.74
WNW	3 .11 .04	12 .45 .16	23 .85 .31	33 1.23 .44	9 .33 .12	0 0.00 0.00	80 2.97 1.07	5.05
NW	3 .11 .04	15 .56 .20	23 .85 .31	39 1.45 .52	22 .82 .29	6 .22 .08	108 4.01 1.44	5.75
NNW	3 .11 .04	12 .45 .16	45 1.67 .60	74 2.75 .99	35 1.30 .47	14 .52 .19	183 6.80 2.44	6.15
N	5 19 .07	27 1.00 .36	87 3.23 1 16	91 3.38 1.21	43 1.60 .57	14 .52 .19	267 9.91 3.56	5.64
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	71 2.64 95	424 15 74 5.65	949 35.24 12.64	777 28 85 10.35	364 13.52 4 85	108 4.01 1.44	2693 100 00 35 88	5.18

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED. 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3	12	37	21	6	6	85	5.05
	.15	.59	1.83	1.04	.30	.30	4.21	
	.04	.16	.49	.28	.08	.08	1.13	
NE	3	37	29	5	1	0	75	3.21
	.15	1.83	1.44	.25	.05	0.00	3.71	
	.04	.49	.39	.07	.01	0.00	1.00	
ENE	4	35	28	4	1	0	72	3.13
	.20	1.73	1.39	.20	.05	0.00	3.57	
	.05	.47	.37	.05	.01	0.00	.96	
E	5	29	48	26	4	1	113	4.14
	.25	1.44	2.38	1.29	.20	.05	5.60	
	.07	.39	.64	.35	.05	.01	1.51	
ESE	3	32	43	13	2	1	94	3.76
	.15	1.58	2.13	.64	.10	.05	4.66	
	.04	.43	.57	.17	.03	.01	1.25	
SE	7	45	42	22	12	1	129	4.08
	.35	2.23	2.08	1.09	.59	.05	6.39	
	.09	.60	.56	.29	.16	.01	1.72	
SSE	5	43	121	48	3	0	220	4.02
	.25	2.13	5.99	2.38	.15	0.00	10.90	
	.07	.57	1.61	.64	.04	0.00	2.93	
S	4	75	189	166	85	48	567	5.71
	.20	3.71	9.36	8.22	4.21	2.38	28.08	
	.05	1.00	2.52	2.21	1.13	.64	7.55	
SSW	3	21	81	70	26	14	215	5.52
	.15	1.04	4.01	3.47	1.29	.69	10.65	
	.04	.28	1.08	.93	.35	.19	2.86	
SW	2	19	22	14	1	1	59	4.01
	.10	.94	1.09	.69	.05	.05	2.92	
	.03	.25	.29	.19	.01	.01	.79	
WSW	2	12	15	11	0	0	40	3.76
	.10	.59	.74	.54	0.00	0.00	1.98	
	.03	.16	.20	.15	0.00	0.00	.53	
W	4	17	18	10	1	0	50	3.68
	.20	.84	.89	.50	.05	0.00	2.48	
	.05	.23	.24	.13	.01	0.00	.67	
WNW	3	15	21	14	1	0	54	3.87
	.15	.74	1.04	.69	.05	0.00	2.67	
	.04	.20	.28	.19	.01	0.00	.72	
NW	2	16	27	11	4	0	60	4.06
	.10	.79	1.34	.54	.20	0.00	2.97	
	.03	.21	.36	.15	.05	0.00	.80	
NNW	3	17	38	39	6	0	103	4.60
	.15	.84	1.88	1.93	.30	0.00	5.10	
	.04	.23	.51	.52	.08	0.00	1.37	
N	1	24	34	17	7	0	83	4.30
	.05	1.19	1.68	.84	.35	0.00	4.11	
	.01	.32	.45	.23	.09	0.00	1.11	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	54	449	793	491	160	72	2019	4.66
	2.67	22.24	39.28	24.32	7.92	3.57	100.00	
	.72	5.98	10.57	6.54	2.13	.96	26.90	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	29	17	0	0	0	48	2.74
	.19	2.78	1.63	0.00	0.00	0.00	4.60	
	.03	.39	.23	0.00	0.00	0.00	.64	
NE	3	22	6	0	0	0	31	2.37
	.29	2.11	.57	0.00	0.00	0.00	2.97	
	.04	.29	.08	0.00	0.00	0.00	.41	
ENE	5	33	18	0	0	0	56	2.55
	.48	3.16	1.72	0.00	0.00	0.00	5.36	
	.07	.44	.24	0.00	0.00	0.00	.75	
E	5	26	24	1	0	0	56	2.94
	.48	2.49	2.30	.10	0.00	0.00	5.36	
	.07	.35	.32	.01	0.00	0.00	.75	
ESE	13	33	27	0	0	0	73	2.61
	1.25	3.16	2.59	0.00	0.00	0.00	6.99	
	.17	.44	.36	0.00	0.00	0.00	.97	
SE	10	83	14	1	0	0	108	2.28
	.96	7.95	1.34	.10	0.00	0.00	10.34	
	.13	1.11	.19	.01	0.00	0.00	1.44	
SSE	8	105	58	2	0	0	173	2.78
	.77	10.06	5.56	.19	0.00	0.00	16.57	
	.11	1.40	.77	.03	0.00	0.00	2.31	
S	7	52	61	4	0	0	124	3.08
	.67	4.98	5.84	.38	0.00	0.00	11.88	
	.09	.69	.81	.05	0.00	0.00	1.65	
SSW	4	17	26	9	0	0	56	3.49
	.38	1.63	2.49	.86	0.00	0.00	5.36	
	.05	.23	.35	.12	0.00	0.00	.75	
SW	4	13	9	0	0	0	26	2.60
	.38	1.25	.86	0.00	0.00	0.00	2.49	
	.05	.17	.12	0.00	0.00	0.00	.35	
WSW	4	32	12	0	0	0	48	2.57
	.38	3.07	1.15	0.00	0.00	0.00	4.60	
	.05	.43	.16	0.00	0.00	0.00	.64	
W	8	21	13	2	0	0	44	2.68
	.77	2.01	1.25	.19	0.00	0.00	4.21	
	.11	.28	.17	.03	0.00	0.00	.59	
WNW	4	28	14	0	0	0	46	2.60
	.38	2.68	1.34	0.00	0.00	0.00	4.41	
	.05	.37	.19	0.00	0.00	0.00	.61	
NW	2	45	23	0	0	0	70	2.66
	.19	4.31	2.20	0.00	0.00	0.00	6.70	
	.03	.60	.31	0.00	0.00	0.00	.93	
NNW	4	19	15	2	0	0	40	2.89
	.38	1.82	1.44	.19	0.00	0.00	3.83	
	.05	.25	.20	.03	0.00	0.00	.53	
N	3	22	16	2	0	0	43	2.91
	.29	2.11	1.53	.19	0.00	0.00	4.12	
	.04	.29	.21	.03	0.00	0.00	.57	
CALM	2						2	CALM
	.19						.19	
	.03						.03	
TOTAL	88	580	353	23	0	0	1044	2.74
	8.43	55.56	33.81	2.20	0.00	0.00	100.00	
	1.17	7.73	4.70	.31	0.00	0.00	13.91	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-29

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (10 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS. PASQUILL G
DATA SOURCE ON-SITE
WIND SENSOR HEIGHT. 10.00 METERS
TABLE GENERATED. 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	28 3.76 .37	15 2.01 .20	1 .13 .01	0 0.00 0.00	0 0.00 0.00	44 5.91 .59	2.93
NE	5 .67 .07	32 4.30 .43	18 2.42 .24	1 .13 .01	0 0.00 0.00	0 0.00 0.00	56 7.52 .75	2.69
ENE	6 .81 .08	8 1.07 .11	8 1.07 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 2.95 .29	2.31
E	3 .40 .04	35 4.70 .47	24 3.22 .32	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	62 8.32 .83	2.81
ESE	3 .40 .04	44 5.91 .59	12 1.61 .16	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	59 7.92 .79	2.42
SE	16 2.15 .21	58 7.79 .77	8 1.07 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	82 11.01 1.09	2.10
SSE	12 1.61 .16	48 6.44 .64	17 2.28 .23	2 .27 .03	0 0.00 0.00	0 0.00 0.00	79 10.60 1.05	2.45
S	15 2.01 .20	39 5.23 .52	21 2.82 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	75 10.07 1.00	2.44
SSW	13 1.74 .17	7 .94 .09	9 1.21 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	29 3.89 .39	2.05
SW	4 .54 .05	8 1.07 .11	3 .40 .04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 2.01 .20	2.18
WSW	9 1.21 .12	10 1.34 .13	1 .13 .01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 2.68 .27	1.80
W	14 1.88 .19	14 1.88 .19	4 .54 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	32 4.30 .43	1.83
WNW	13 1.74 .17	31 4.16 .41	3 .40 .04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	47 6.31 .63	1.96
NW	12 1.61 .16	40 5.37 .53	2 .27 .03	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	54 7.25 .72	2.02
NNW	4 .54 .05	18 2.42 .24	8 1.07 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	30 4.03 .40	2.47
N	5 .67 .07	30 4.03 .40	3 .40 .04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	38 5.10 .51	2.31
CALM	1 .13 .01						1 .13 .01	CALM
TOTAL	135 18.12 1.80	450 60.40 6.00	156 20.94 2.08	4 .54 .05	0 0.00 0.00	0 0.00 0.00	745 100.00 9.93	2.34

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. MARCH 5, 1979 THROUGH MARCH 4, 1980

ALL CLASSES
DATA SOURCE. ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	7 .09	106 1.41	151 2.01	104 1.39	36 .48	15 .20	419 5.58	4.68
NE	14 .19	139 1.85	147 1.96	57 .76	23 .31	2 .03	382 5.09	3.83
ENE	24 .32	117 1.56	127 1.69	40 .53	8 .11	0 0.00	316 4.21	3.45
E	21 .28	119 1.59	180 2.40	65 .87	8 .11	1 .01	394 5.25	3.74
ESE	21 .28	139 1.85	152 2.03	44 .59	7 .09	3 .04	366 4.88	3.56
SE	36 .48	210 2.80	131 1.75	53 .71	32 .43	3 .04	465 6.20	3.55
SSE	26 .35	232 3.09	295 3.93	99 1.32	21 .28	4 .05	677 9.02	3.71
S	35 .47	218 2.90	460 6.13	330 4.40	216 2.88	80 1.07	1339 17.84	5.36
SSW	25 .33	89 1.19	223 2.97	308 4.10	107 1.43	42 .56	794 10.58	5.55
SW	18 .24	74 .99	84 1.12	55 .73	25 .33	5 .07	261 3.48	4.35
WSW	22 .29	81 1.08	56 .75	26 .35	15 .20	0 0.00	200 2.66	3.57
W	33 .44	87 1.16	107 1.43	58 .77	21 .28	0 0.00	306 4.08	3.88
WNW	24 .32	91 1.21	75 1.00	59 .79	13 .17	0 0.00	262 3.49	3.78
NW	19 .25	124 1.65	80 1.07	63 .84	34 .45	9 .12	329 4.38	4.21
NNW	15 .20	78 1.04	133 1.77	139 1.85	67 .89	17 .23	449 5.98	5.21
N	15 .20	113 1.51	165 2.20	146 1.95	77 1.03	27 .36	543 7.24	5.13
CALM	3 .04						3 .04	CALM
TOTAL	359 4.77	2017 26.88	2566 34.19	1646 21.93	710 9.46	208 2.77	7505 100.00	4.47

NUMBER OF VALID OBSERVATIONS 7505 85.44 PCT.
NUMBER OF INVALID OBSERVATIONS 1279 14.56 PCT.
TOTAL NUMBER OF OBSERVATIONS 8784 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-29a

INVALID DATA PERIODS 24-HOURS OR GREATER
MARCH 5, 1979 - MARCH 4, 1980

10 M DEWPOINT	REASONS FOR VALIDATION
March 5, 1979 0100 to March 22, 1979 1500	Sensor not installed
April 3, 1979 0900 to April 4, 1979 1200	Excessive dewpoint oscillation
June 25, 1979 0900 to June 26, 1979 1100	Calibration
June 30, 1979 0600 to July 2, 1979 1600	Excessive dewpoint oscillation
September 15, 1979 0300 to September 16, 1979 0700	Excessive dewpoint oscillation
October 19, 1979 1400 to October 21, 1979 0400	Excessive dewpoint oscillation
October 22, 1979 0600 to October 24, 1979 1500	Excessive dewpoint oscillation
85-10 M DELTA TEMPERATURE	
March 13, 1979 1500 to March 28, 1979 1000	Data inconsistent with existing conditions
April 3, 1979 1100 to April 4, 1979 1100	Corroded resistance thermal detector connector
December 27, 1979 0900 to January 24, 1980 1600	Aspiration failure
60-10 M DELTA TEMPERATURE	
March 13, 1979 1500 to March 28, 1979 1000	Data inconsistent with existing conditions
April 3, 1979 1100 to April 4, 1979 1100	Corroded resistance thermal detector connector
July 6, 1979 0700 to July 7, 1979 0600	Data inconsistent with existing conditions
December 19, 1979 1600 to December 28, 1979 1400	Aspiration failure

TABLE 2.3-29a (continued)

35-10 M DELTA TEMPERATURE	REASONS FOR VALIDATION
April 3, 1979 1100 to April 4, 1979 1100	Corroded resistance thermal detector connector
35 M WIND DIRECTION	
September 7, 1979 1700 to September 10, 1979 0800	Ink pen failure
February 15, 1980 1000 to February 20, 1980 1600	Sensor frozen by ice storm
60 M SIGMA	
January 1, 1980 0100 to January 2, 1980 1100	Chart jam
60 M WIND SPEED	
January 19, 1980 2100 to January 21, 1980 1100	Frozen sensor
January 30, 1980 0900 to January 31, 1980 1300	Frozen sensor
February 15, 1980 0300 to February 18, 1980 0900	Sensor frozen by ice storm
35 M WIND SPEED	
January 19, 1980 2100 to January 21, 1980 1000	Frozen sensor
February 15, 1980 0700 to February 18, 1980 0200	Sensor frozen by ice storm
35 M SIGMA	
February 15, 1980 1000 to February 18, 1980 0600	Sensor frozen by ice storm
10 M WIND SPEED	
February 15, 1980 0400 to February 18, 1980 0600	Sensor frozen by ice storm

WOLF CREEK

TABLE 2.3-29b

DATA RECOVERY STATISTICS

Data recovery statistics for the 15 monitored parameters from March 5, 1980 to March 4, 1981 are as follows:

Parameter	Data Recovery (%)
60m wind direction	97.9
60m wind speed	97.7
60m sigma	97.2
35m wind direction	99.6
35m wind speed	99.6
35m sigma	98.5
10m wind direction	99.0
10m wind speed	95.6
10m sigma	99.1
10m temperature	99.4
10m dewpoint	99.6
85-10m delta temperature	99.4
60-10m delta temperature	99.2
35-10m delta temperature	99.4
1.3 m precipitation	99.6

WOLF CREEK

TABLE 2.3-29c

CASES TO BE INVESTIGATED TO ASSESS EFFECTS OF COOLING LAKE ON ATMOSPHERIC TRANSPORT AND DIFFUSION

CASE	STABILITY	T water - T Land	RELEASE
1	Stable	+	Ground
2	Stable	+	Elevated
3	Stable	-	Ground
4	Stable	-	Elevated
5	Unstable	+	Ground
6	Unstable	+	Elevated
7	Unstable	-	Ground
8	Unstable	-	Elevated

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	3 .11 .01	[illegible] .26 .03	33 1.20 .14	62 2.26 .26	28 1.02 .12	8 .29 .03	141 5.14 .60	6.19
NE	3 .11 .01	12 .44 .05	42 1.53 .18	25 .91 .11	4 .15 .02	1 .04 .00	87 3.17 .37	4.60
ENE	2 .07 .01	7 .26 .03	21 .77 .09	26 .95 .11	8 .29 .03	1 .04 .00	65 2.37 .27	5.35
E	1 .04 .00	7 .26 .03	17 .62 .07	16 .58 .07	7 .26 .03	0 0.00 0.00	48 1.75 .20	5.08
ESE	3 .11 .01	19 .69 .08	35 1.28 .15	23 .84 .10	10 .36 .04	2 .07 .01	92 3.35 .39	4.82
SE	3 .11 .01	19 .69 .08	31 1.13 .13	36 1.31 .15	13 .47 .05	11 .40 .05	113 4.12 .48	5.61
SSE	2 .07 .01	15 .55 .06	52 1.89 .22	68 2.48 .29	43 1.57 .18	34 1.24 .14	214 7.80 .90	6.83
S	2 .07 .01	14 .51 .06	55 2.00 .23	161 5.87 .68	153 5.57 .65	135 4.92 .57	520 18.94 2.20	8.24
SSW	3 .11 .01	13 .47 .05	57 2.08 .24	152 5.54 .64	139 5.06 .59	157 5.72 .66	521 18.98 2.20	8.44
SW	2 .07 .01	20 .73 .08	36 1.31 .15	41 1.49 .17	32 1.17 .14	37 1.35 .16	168 6.12 .71	7.16
WSW	1 .04 .00	15 .55 .06	11 .40 .05	10 .36 .04	8 .29 .03	14 .51 .06	59 2.15 .25	6.56
W	2 .07 .01	14 .51 .06	32 1.17 .14	21 .77 .09	21 .77 .09	3 .11 .01	93 3.39 .39	5.43
WNW	2 .07 .01	9 .33 .04	16 .58 .07	18 .66 .08	16 .58 .07	14 .51 .06	75 2.73 .32	7.44
NW	3 .11 .01	6 .22 .03	19 .69 .08	31 1.13 .13	36 1.31 .15	44 1.60 .19	139 5.06 .59	8.24
NNW	1 .04 .00	8 .29 .03	18 .66 .08	66 2.40 .28	57 2.08 .24	49 1.79 .21	199 7.25 .84	8.06
N	2 .07 .01	9 .33 .04	20 .73 .08	77 2.81 .33	62 2.26 .26	40 1.46 .17	210 7.65 .89	7.62
CALM	1 .04 .00						1 .04 .00	CALM
TOTAL	36 1.31 .15	194 7.07 .82	495 18.03 2.09	833 30.35 3.52	637 23.21 2.69	550 20.04 2.32	2745 100.00 11.59	7.32

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .08 .00	6 .49 .03	13 1.06 .05	18 1.47 .08	18 1.47 .08	13 1.06 .05	69 5.65 .29	7.14
NE	2 .16 .01	15 1.23 .06	15 1.23 .06	3 .25 .01	3 .25 .01	0 0.00 0.00	38 3.11 .16	3.69
ENE	0 0.00 0.00	12 .98 .05	22 1.80 .09	17 1.39 .07	8 .66 .03	0 0.00 0.00	59 4.83 .25	4.86
E	0 0.00 0.00	3 .25 .01	5 .41 .02	8 .66 .03	3 .25 .01	2 .16 .01	21 1.72 .09	6.13
ESE	0 0.00 0.00	4 .33 .02	11 .90 .05	13 1.06 .05	2 .16 .01	7 .57 .03	37 3.03 .16	6.39
SE	0 0.00 0.00	10 .82 .04	15 1.23 .06	17 1.39 .07	9 .74 .04	4 .33 .02	55 4.50 .23	5.71
SSE	1 .08 .00	5 .41 .02	18 1.47 .08	20 1.64 .08	12 .98 .05	9 .74 .04	65 5.32 .27	6.75
S	1 .08 .00	5 .41 .02	31 2.54 .13	61 5.00 .26	56 4.59 .24	54 4.42 .23	208 17.04 .88	8.03
SSW	2 .16 .01	2 .16 .01	25 2.05 .11	44 3.60 .19	52 4.26 .22	31 2.54 .13	156 12.78 .66	7.79
SW	0 0.00 0.00	4 .33 .02	20 1.64 .08	25 2.05 .11	21 1.72 .09	16 1.31 .07	86 7.04 .36	7.38
WSW	0 0.00 0.00	7 .57 .03	6 .49 .03	10 .82 .04	5 .41 .02	7 .57 .03	35 2.87 .15	6.51
W	2 .16 .01	8 .66 .03	20 1.64 .08	18 1.47 .08	6 .49 .03	2 .16 .01	56 4.59 .24	5.23
WNW	1 .08 .00	6 .49 .03	9 .74 .04	10 .82 .04	9 .74 .04	4 .33 .02	39 3.19 .16	6.14
NW	0 0.00 0.00	12 .98 .05	17 1.39 .07	21 1.72 .09	22 1.80 .09	24 1.97 .10	96 7.86 .41	7.73
NNW	1 .08 .00	3 .25 .01	11 .90 .05	23 1.88 .10	38 3.11 .16	24 1.97 .10	100 8.19 .42	8.13
N	1 .08 .00	4 .33 .02	12 .98 .05	27 2.21 .11	34 2.78 .14	23 1.88 .10	101 8.27 .43	7.92
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	12 .98 .05	106 8.68 .45	250 20.48 1.06	335 27.44 1.41	298 24.41 1.26	220 18.02 .93	1221 100.00 5.16	7.10

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD THREE YEARS COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1	5	15	28	26	27	102	7.96
	.07	.34	1.03	1.93	1.79	1.86	7.02	
	.00	.02	.06	.12	.11	.11	.43	
NE	2	8	19	13	4	0	46	4.61
	.14	.55	1.31	.90	.28	0.00	3.17	
	.01	.03	.08	.05	.02	0.00	.19	
ENE	1	9	12	11	6	3	42	5.41
	.07	.62	.83	.76	.41	.21	2.89	
	.00	.04	.05	.05	.03	.01	.18	
E	1	2	6	12	6	1	28	5.88
	.07	.14	.41	.83	.41	.07	1.93	
	.00	.01	.03	.05	.03	.00	.12	
ESE	0	6	13	12	5	1	37	5.21
	0.00	.41	.90	.83	.34	.07	2.55	
	0.00	.03	.05	.05	.02	.00	.16	
SE	2	6	15	17	9	4	53	5.78
	.14	.41	1.03	1.17	.62	.28	3.65	
	.01	.03	.06	.07	.04	.02	.22	
SSE	2	4	18	45	21	10	100	6.75
	.14	.28	1.24	3.10	1.45	.69	6.89	
	.01	.02	.08	.19	.09	.04	.42	
S	1	8	38	72	53	54	226	7.77
	.07	.55	2.62	4.96	3.65	3.72	15.56	
	.00	.03	.16	.30	.22	.23	.95	
SSW	2	7	21	62	66	41	199	7.87
	.14	.48	1.45	4.27	4.55	2.82	13.71	
	.01	.03	.09	.26	.28	.17	.84	
SW	3	5	18	24	17	12	79	6.78
	.21	.34	1.24	1.65	1.17	.83	5.44	
	.01	.02	.08	.10	.07	.05	.33	
WSW	1	4	9	12	8	4	38	6.34
	.07	.28	.62	.83	.55	.28	2.62	
	.00	.02	.04	.05	.03	.02	.16	
W	0	14	17	14	9	1	55	5.12
	0.00	.96	1.17	.96	.62	.07	3.79	
	0.00	.06	.07	.06	.04	.00	.23	
WNW	1	5	10	11	13	6	46	6.73
	.07	.34	.69	.76	.90	.41	3.17	
	.00	.02	.04	.05	.05	.03	.19	
NW	1	7	15	38	38	22	121	7.84
	.07	.48	1.03	2.62	2.62	1.52	8.33	
	.00	.03	.06	.16	.16	.09	.51	
NNW	2	5	12	45	40	29	133	7.80
	.14	.34	.83	3.10	2.75	2.00	9.16	
	.01	.02	.05	.19	.17	.12	.56	
N	2	6	18	35	46	39	146	8.06
	.14	.41	1.24	2.41	3.17	2.69	10.06	
	.01	.03	.08	.15	.19	.16	.62	
CALM	1						1	CALM
	.07						.07	
	.00						.00	
TOTAL	23	101	256	451	367	254	1452	7.19
	1.58	6.96	17.63	31.06	25.28	17.49	100.00	
	.10	.43	1.08	1.90	1.55	1.07	6.13	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	4	33	111	185	138	93	564	7.11
	.06	.46	1.55	2.58	1.92	1.30	7.86	
	.02	.14	.47	.78	.58	.39	2.38	
NE	3	49	123	137	44	10	366	5.33
	.04	.68	1.71	1.91	.61	.14	5.10	
	.01	.21	.52	.58	.19	.04	1.55	
ENE	0	44	98	124	58	15	339	5.75
	0.00	.61	1.36	1.73	.81	.21	4.72	
	0.00	.19	.41	.52	.24	.06	1.43	
E	10	38	96	132	51	19	346	5.69
	.14	.53	1.34	1.84	.71	.26	4.82	
	.04	.16	.41	.56	.22	.08	1.46	
ESE	7	31	93	108	51	28	318	6.04
	.10	.43	1.30	1.50	.71	.39	4.43	
	.03	.13	.39	.46	.22	.12	1.34	
SE	5	28	81	121	70	56	361	6.74
	.07	.39	1.13	1.69	.97	.78	5.03	
	.02	.12	.34	.51	.30	.24	1.52	
SSE	3	30	85	141	95	82	436	7.26
	.04	.42	1.18	1.96	1.32	1.14	6.07	
	.01	.13	.36	.60	.40	.35	1.84	
S	8	34	133	328	305	351	1159	8.37
	.11	.47	1.85	4.57	4.25	4.89	16.14	
	.03	.14	.56	1.39	1.29	1.48	4.90	
SSW	5	35	91	215	195	155	696	7.76
	.07	.49	1.27	2.99	2.72	2.16	9.69	
	.02	.15	.38	.91	.82	.65	2.94	
SW	6	23	56	74	50	47	256	6.87
	.08	.32	.78	1.03	.70	.65	3.57	
	.03	.10	.24	.31	.21	.20	1.08	
WSW	5	26	38	48	30	21	168	6.00
	.07	.36	.53	.67	.42	.29	2.34	
	.02	.11	.16	.20	.13	.09	.71	
W	9	23	57	56	50	34	229	6.58
	.13	.32	.79	.78	.70	.47	3.19	
	.04	.10	.24	.24	.21	.14	.97	
WNW	3	19	37	55	62	62	238	7.76
	.04	.26	.52	.77	.86	.86	3.31	
	.01	.08	.16	.23	.26	.26	1.01	
NW	2	14	44	97	122	120	399	8.49
	.03	.19	.61	1.35	1.70	1.67	5.56	
	.01	.06	.19	.41	.52	.51	1.69	
NNW	4	19	55	184	192	152	606	8.27
	.06	.26	.77	2.56	2.67	2.12	8.44	
	.02	.08	.23	.78	.81	.64	2.56	
N	6	22	86	210	170	203	697	8.25
	.08	.31	1.20	2.92	2.37	2.83	9.71	
	.03	.09	.36	.89	.72	.86	2.94	
CALM	2						2	CALM
	.03						.03	
	.01						.01	
TOTAL	82	468	1284	2215	1683	1448	7180	7.35
	1.14	6.52	17.88	30.85	23.44	20.17	100.00	
	.35	1.98	5.42	9.36	7.11	6.12	30.33	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	2	13	40	64	39	23	181	6.65
	.04	.23	.70	1.13	.69	.41	3.19	
	.01	.05	.17	.27	.16	.10	.76	
NE	3	31	69	57	9	2	171	4.72
	.05	.55	1.22	1.00	.16	.04	3.01	
	.01	.13	.29	.24	.04	.01	.72	
ENE	2	15	58	80	34	12	201	6.03
	.04	.26	1.02	1.41	.60	.21	3.54	
	.01	.06	.24	.34	.14	.05	.85	
E	0	14	47	107	76	16	260	6.71
	0.00	.25	.83	1.88	1.34	.28	4.58	
	0.00	.06	.20	.45	.32	.07	1.10	
ESE	1	18	33	87	77	25	241	7.02
	.02	.32	.58	1.53	1.36	.44	4.24	
	.00	.08	.14	.37	.33	.11	1.02	
SE	4	21	59	133	103	46	366	7.00
	.07	.37	1.04	2.34	1.81	.81	6.45	
	.02	.09	.25	.56	.44	.19	1.55	
SSE	2	18	79	189	240	130	658	7.93
	.04	.32	1.39	3.33	4.23	2.29	11.59	
	.01	.08	.33	.80	1.01	.55	2.78	
S	4	25	72	391	557	429	1478	8.70
	.07	.44	1.27	6.89	9.81	7.56	26.03	
	.02	.11	.30	1.65	2.35	1.81	6.24	
SSW	1	13	75	233	240	114	676	7.85
	.02	.23	1.32	4.10	4.23	2.01	11.91	
	.00	.05	.32	.98	1.01	.48	2.86	
SW	0	14	62	95	64	20	255	6.55
	0.00	.25	1.09	1.67	1.13	.35	4.49	
	0.00	.06	.26	.40	.27	.08	1.08	
WSW	0	8	33	56	29	3	129	6.03
	0.00	.14	.58	.99	.51	.05	2.27	
	0.00	.03	.14	.24	.12	.01	.54	
W	5	9	32	38	28	8	120	6.05
	.09	.16	.56	.67	.49	.14	2.11	
	.02	.04	.14	.16	.12	.03	.51	
WNW	0	12	31	89	64	9	205	6.69
	0.00	.21	.55	1.57	1.13	.16	3.61	
	0.00	.05	.13	.38	.27	.04	.87	
NW	6	7	40	86	66	13	218	6.71
	.11	.12	.70	1.51	1.16	.23	3.84	
	.03	.03	.17	.36	.28	.05	.92	
NNW	2	5	30	103	87	22	249	7.21
	.04	.09	.53	1.81	1.53	.39	4.39	
	.01	.02	.13	.44	.37	.09	1.05	
N	6	10	27	91	95	39	268	7.50
	.11	.18	.48	1.60	1.67	.69	4.72	
	.03	.04	.11	.38	.40	.16	1.13	
CALM	2						2	CALM
	.04						.04	
	.01						.01	
TOTAL	40	233	787	1899	1808	911	5678	7.47
	.70	4.10	13.86	33.44	31.84	16.04	100.00	
	.17	.98	3.32	8.02	7.64	3.85	23.98	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	3	35	48	31	14	131	6.73
	0.00	.09	1.09	1.50	.97	.44	4.09	
	0.00	.01	.15	.20	.13	.06	.55	
NE	4	10	40	30	4	0	88	4.54
	.12	.31	1.25	.94	.12	0.00	2.75	
	.02	.04	.17	.13	.02	0.00	.37	
ENE	3	10	21	39	33	8	114	6.35
	.09	.31	.66	1.22	1.03	.25	3.56	
	.01	.04	.09	.16	.14	.03	.48	
E	4	7	20	76	48	3	158	6.46
	.12	.22	.62	2.37	1.50	.09	4.93	
	.02	.03	.08	.32	.20	.01	.67	
ESE	1	9	29	74	43	5	161	6.44
	.03	.28	.91	2.31	1.34	.16	5.03	
	.00	.04	.12	.31	.18	.02	.68	
SE	1	5	38	128	68	6	246	6.64
	.03	.16	1.19	4.00	2.12	.19	7.68	
	.00	.02	.16	.54	.29	.03	1.04	
SSE	2	9	37	147	135	26	356	7.20
	.06	.28	1.16	4.59	4.21	.81	11.11	
	.01	.04	.16	.62	.57	.11	1.50	
S	1	19	56	267	210	44	597	7.20
	.03	.59	1.75	8.34	6.56	1.37	18.64	
	.00	.08	.24	1.13	.89	.19	2.52	
SSW	3	8	36	148	106	34	335	7.20
	.09	.25	1.12	4.62	3.31	1.06	10.46	
	.01	.03	.15	.63	.45	.14	1.41	
SW	4	13	42	115	54	4	232	6.21
	.12	.41	1.31	3.59	1.69	.12	7.24	
	.02	.05	.18	.49	.23	.02	.98	
WSW	1	12	40	56	16	0	125	5.37
	.03	.37	1.25	1.75	.50	0.00	3.90	
	.00	.05	.17	.24	.07	0.00	.53	
W	0	7	29	74	11	2	123	5.84
	0.00	.22	.91	2.31	.34	.06	3.84	
	0.00	.03	.12	.31	.05	.01	.52	
WNW	2	6	22	53	54	0	137	6.61
	.06	.19	.69	1.65	1.69	0.00	4.28	
	.01	.03	.09	.22	.23	0.00	.58	
NW	1	7	23	56	39	3	129	6.61
	.03	.22	.72	1.75	1.22	.09	4.03	
	.00	.03	.10	.24	.16	.01	.54	
NNW	3	5	16	54	32	1	111	6.27
	.09	.16	.50	1.69	1.00	.03	3.47	
	.01	.02	.07	.23	.14	.00	.47	
N	0	8	27	61	45	16	157	6.85
	0.00	.25	.84	1.90	1.40	.50	4.90	
	0.00	.03	.11	.26	.19	.07	.66	
CALM	3						3	CALM
	.09						.09	
	.01						.01	
TOTAL	33	138	511	1426	929	166	3203	6.66
	1.03	4.31	15.95	44.52	29.00	5.18	100.00	
	.14	.58	2.16	6.02	3.92	.70	13.53	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .09 .01	8 .36 .03	19 .87 .08	51 2.32 .22	26 1.18 .11	7 .32 .03	113 5.15 .48	6.36
NE	2 .09 .01	10 .46 .04	56 2.55 .24	48 2.19 .20	2 .09 .01	1 .05 .00	119 5.42 .50	4.90
ENE	2 .09 .01	4 .18 .02	25 1.14 .11	37 1.68 .16	17 .77 .07	2 .09 .01	87 3.96 .37	5.90
E	0 0.00 0.00	10 .46 .04	25 1.14 .11	47 2.14 .20	38 1.73 .16	0 0.00 0.00	120 5.46 .51	6.17
ESE	2 .09 .01	7 .32 .03	29 1.32 .12	59 2.69 .25	29 1.32 .12	3 .14 .01	129 5.87 .54	6.20
SE	3 .14 .01	6 .27 .03	28 1.28 .12	90 4.10 .38	55 2.50 .23	7 .32 .03	189 8.61 .80	6.59
SSE	4 .18 .02	7 .32 .03	36 1.64 .15	94 4.28 .40	72 3.28 .30	9 .41 .04	222 10.11 .94	6.71
S	0 0.00 0.00	6 .27 .03	26 1.18 .11	152 6.92 .64	114 5.19 .48	21 .96 .09	319 14.53 1.35	7.31
SSW	6 .27 .03	6 .27 .03	30 1.37 .13	100 4.55 .42	70 3.19 .30	20 .91 .08	232 10.56 .98	6.95
SW	2 .09 .01	11 .50 .05	27 1.23 .11	63 2.87 .27	26 1.18 .11	4 .18 .02	133 6.06 .56	6.06
WSW	2 .09 .01	7 .32 .03	32 1.46 .14	34 1.55 .14	10 .46 .04	0 0.00 0.00	85 3.87 .36	5.20
W	7 .32 .03	10 .46 .04	31 1.41 .13	32 1.46 .14	6 .27 .03	0 0.00 0.00	86 3.92 .36	4.74
WNW	1 .05 .00	5 .23 .02	21 .96 .09	46 2.09 .19	16 .73 .07	0 0.00 0.00	89 4.05 .38	5.87
NW	2 .09 .01	0 0.00 0.00	24 1.09 .10	34 1.55 .14	28 1.28 .12	1 .05 .00	89 4.05 .38	6.17
NNW	2 .09 .01	2 .09 .01	14 .64 .06	38 1.73 .16	15 .68 .06	0 0.00 0.00	71 3.23 .30	5.99
N	3 .14 .01	8 .36 .03	16 .73 .07	37 1.68 .16	46 2.09 .19	2 .09 .01	112 5.10 .47	6.66
CALM	1 .05 .00						1 .05 .00	CALM
TOTAL	41 1.87 .17	107 4.87 .45	439 19.99 1.85	962 43.81 4.06	570 25.96 2.41	77 3.51 .33	2196 100.00 9.28	6.34

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: THREE YEARS COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENFRATED: 11/05/81. 13.14.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	13 .05	75 .32	266 1.12	456 1.93	306 1.29	185 .78	1301 5.50	6.91
NE	19 .08	135 .57	364 1.54	313 1.32	70 .30	14 .06	915 3.86	4.91
ENE	10 .04	101 .43	257 1.09	334 1.41	164 .69	41 .17	907 3.83	5.80
E	16 .07	81 .34	216 .91	398 1.68	229 .97	41 .17	981 4.14	6.13
ESE	14 .06	94 .40	243 1.03	376 1.59	217 .92	71 .30	1015 4.29	6.23
SE	18 .08	95 .40	267 1.13	542 2.29	327 1.38	134 .57	1383 5.84	6.60
SSE	16 .07	88 .37	325 1.37	704 2.97	618 2.61	300 1.27	2051 8.66	7.32
S	17 .07	111 .47	411 1.74	1432 6.05	1448 6.12	1088 4.60	4507 19.04	8.19
SSW	22 .09	84 .35	335 1.41	954 4.03	868 3.67	552 2.33	2815 11.89	7.78
SW	17 .07	90 .38	261 1.10	437 1.85	264 1.12	140 .59	1209 5.11	6.66
WSW	10 .04	79 .33	169 .71	226 .95	106 .45	49 .21	639 2.70	5.88
W	25 .11	85 .36	218 .92	253 1.07	131 .55	50 .21	762 3.22	5.82
WNW	10 .04	62 .26	146 .62	282 1.19	234 .99	95 .40	829 3.50	6.94
NW	15 .06	53 .22	182 .77	363 1.53	351 1.48	227 .96	1191 5.03	7.63
NNW	15 .06	47 .20	156 .66	513 2.17	461 1.95	277 1.17	1469 6.20	7.75
N	20 .08	67 .28	206 .87	538 2.27	498 2.10	362 1.53	1691 7.14	7.78
CALM	10 .04						10 .04	CALM
TOTAL	267 1.13	1347 5.69	4022 16.99	8121 34.30	6292 26.58	3626 15.32	23675 100.00	7.17

NUMBER OF VALID OBSERVATIONS 23675 90.01 PCT.
NUMBER OF INVALID OBSERVATIONS 2629 9.99 PCT.
TOTAL NUMBER OF OBSERVATIONS 26304 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS. PASQUILL A
DATA SOURCE. ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .12 .01	1 .12 .01	10 1.17 .13	14 1.64 .18	8 .94 .10	1 .12 .01	35 4.10 .44	5.91
NE	2 .23 .03	2 .23 .03	7 .82 .09	7 .82 .09	2 .23 .03	0 0.00 0.00	20 2.34 .25	4.78
ENE	0 0.00 0.00	2 .23 .03	3 .35 .04	14 1.64 .18	5 .59 .06	1 .12 .01	25 2.93 .31	6.30
E	0 0.00 0.00	2 .23 .03	2 .23 .03	3 .35 .04	2 .23 .03	0 0.00 0.00	9 1.05 .11	5.31
ESE	0 0.00 0.00	3 .35 .04	6 .70 .08	5 .59 .06	4 .47 .05	1 .12 .01	19 2.22 .24	5.98
SE	1 .12 .01	2 .23 .03	4 .47 .05	16 1.87 .20	5 .59 .06	9 1.05 .11	37 4.33 .46	7.26
SSE	0 0.00 0.00	5 .59 .06	6 .70 .08	21 2.46 .26	16 1.87 .20	14 1.64 .18	62 7.26 .78	7.66
S	0 0.00 0.00	1 .12 .01	5 .59 .06	57 6.67 .71	62 7.26 .78	66 7.73 .83	191 22.37 2.39	9.27
SSW	0 0.00 0.00	1 .12 .01	7 .82 .09	34 3.98 .43	63 7.38 .79	81 9.48 1.02	186 21.78 2.33	9.78
SW	0 0.00 0.00	1 .12 .01	8 .94 .10	11 1.29 .14	19 2.22 .24	15 1.76 .19	54 6.32 .68	8.72
WSW	0 0.00 0.00	3 .35 .04	2 .23 .03	0 0.00 0.00	3 .35 .04	10 1.17 .13	18 2.11 .23	8.61
W	1 .12 .01	5 .59 .06	9 1.05 .11	2 .23 .03	4 .47 .05	1 .12 .01	22 2.58 .28	4.99
WNW	0 0.00 0.00	2 .23 .03	6 .70 .08	7 .82 .09	4 .47 .05	1 .12 .01	20 2.34 .25	6.15
NW	0 0.00 0.00	0 0.00 0.00	10 1.17 .13	19 2.22 .24	9 1.05 .11	25 2.93 .31	63 7.38 .79	8.87
NNW	0 0.00 0.00	2 .23 .03	3 .35 .04	17 1.99 .21	16 1.87 .20	5 .59 .06	43 5.04 .54	7.69
N	0 0.00 0.00	2 .23 .03	5 .59 .06	23 2.69 .29	15 1.76 .19	4 .47 .05	49 5.74 .61	7.08
CALM	1 .12 .01						1 .12 .01	CALM
TOTAL	6 .70 .08	34 3.98 .43	93 10.89 1.17	250 29.27 3.13	237 27.75 2.97	234 27.40 2.93	854 100.00 10.71	8.25

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .20 .01	6 1.22 .08	4 .81 .05	8 1.62 .10	3 .61 .04	22 4.46 .28	7.34
NE	0 0.00 0.00	8 1.62 .10	5 1.01 .06	2 .41 .03	1 .20 .01	0 0.00 0.00	16 3.25 .20	3.74
ENE	0 0.00 0.00	4 .81 .05	12 2.43 .15	14 2.84 .18	1 .20 .01	0 0.00 0.00	31 6.29 .39	4.84
E	0 0.00 0.00	2 .41 .03	1 .20 .01	3 .61 .04	1 .20 .01	2 .41 .03	9 1.83 .11	6.94
ESE	0 0.00 0.00	0 0.00 0.00	4 .81 .05	4 .81 .05	1 .20 .01	2 .41 .03	11 2.23 .14	6.75
SE	0 0.00 0.00	4 .81 .05	8 1.62 .10	8 1.62 .10	2 .41 .03	3 .61 .04	25 5.07 .31	5.87
SSE	1 .20 .01	3 .61 .04	8 1.62 .10	8 1.62 .10	10 2.03 .13	5 1.01 .06	35 7.10 .44	7.27
S	0 0.00 0.00	1 .20 .01	7 1.42 .09	24 4.87 .30	30 6.09 .38	22 4.46 .28	84 17.04 1.05	8.50
SSW	0 0.00 0.00	0 0.00 0.00	8 1.62 .10	15 3.04 .19	20 4.06 .25	17 3.45 .21	60 12.17 .75	8.64
SW	0 0.00 0.00	1 .20 .01	7 1.42 .09	15 3.04 .19	12 2.43 .15	5 1.01 .06	40 8.11 .50	7.39
WSW	0 0.00 0.00	3 .61 .04	2 .41 .03	1 .20 .01	2 .41 .03	2 .41 .03	10 2.03 .13	6.04
W	1 .20 .01	2 .41 .03	10 2.03 .13	5 1.01 .06	2 .41 .03	1 .20 .01	21 4.26 .26	5.03
WNW	0 0.00 0.00	3 .61 .04	4 .81 .05	4 .81 .05	3 .61 .04	0 0.00 0.00	14 2.84 .18	5.28
NW	0 0.00 0.00	3 .61 .04	10 2.03 .13	12 2.43 .15	8 1.62 .10	10 2.03 .13	43 8.72 .54	7.50
NNW	0 0.00 0.00	2 .41 .03	2 .41 .03	6 1.22 .08	21 4.26 .26	6 1.22 .08	37 7.51 .46	8.10
N	0 0.00 0.00	1 .20 .01	2 .41 .03	12 2.43 .15	13 2.64 .16	7 1.42 .09	35 7.10 .44	8.11
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 .41 .03	38 7.71 .48	96 19.47 1.20	137 27.79 1.72	135 27.38 1.69	85 17.24 1.07	493 100.00 6.18	7.27

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS. PASQUILL C
DATA SOURCE. ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	2 .36 .03	5 .91 .05	14 2.54 .18	10 1.81 .13	14 2.54 .18	45 8.15 .56	8.54
NE	0 0.00 0.00	0 0.00 0.00	10 1.81 .13	7 1.27 .09	1 .18 .01	0 0.00 0.00	18 3.26 .23	4.91
ENE	0 0.00 0.00	4 .72 .05	4 .72 .05	3 .54 .04	3 .54 .04	2 .36 .03	16 2.90 .20	5.83
E	0 0.00 0.00	0 0.00 0.00	1 .18 .01	2 .36 .03	4 .72 .05	0 0.00 0.00	7 1.27 .09	6.63
ESE	0 0.00 0.00	2 .36 .03	6 1.09 .08	3 .54 .04	3 .54 .04	0 0.00 0.00	14 2.54 .18	5.21
SE	1 .18 .01	3 .54 .04	5 .91 .06	8 1.45 .10	0 0.00 0.00	1 .18 .01	18 3.26 .23	5.15
SSE	1 .18 .01	1 .18 .01	2 .36 .03	21 3.80 .26	8 1.45 .10	6 1.09 .08	39 7.07 .49	7.45
S	1 .18 .01	3 .54 .04	13 2.36 .16	25 4.53 .31	30 5.43 .38	24 4.35 .30	96 17.39 1.20	8.09
SSW	1 .18 .01	0 0.00 0.00	4 .72 .05	17 3.08 .21	34 6.16 .43	20 3.62 .25	76 13.77 .95	8.71
SW	1 .18 .01	2 .36 .03	12 2.17 .15	10 1.81 .13	10 1.81 .13	7 1.27 .09	42 7.61 .53	6.92
WSW	0 0.00 0.00	3 .54 .04	5 .91 .06	5 .91 .06	2 .36 .03	2 .36 .03	17 3.08 .21	6.11
W	0 0.00 0.00	6 1.09 .08	3 .54 .04	5 .91 .06	2 .36 .03	0 0.00 0.00	16 2.90 .20	4.88
WNW	0 0.00 0.00	0 0.00 0.00	1 .18 .01	6 1.09 .08	4 .72 .05	0 0.00 0.00	11 1.99 .14	7.00
NW	0 0.00 0.00	3 .54 .04	5 .91 .06	24 4.35 .30	13 2.36 .16	4 .72 .05	49 8.88 .61	7.01
NNW	1 .18 .01	1 .18 .01	3 .54 .04	17 3.08 .21	17 3.08 .21	5 .91 .06	44 7.97 .55	7.54
N	0 0.00 0.00	3 .54 .04	4 .72 .05	20 3.62 .25	9 1.63 .11	7 1.27 .09	43 7.79 .54	7.22
CALM	1 .18 .01						1 .18 .01	CALM
TOTAL	7 1.27 .09	33 5.98 .41	83 15.04 1.04	187 33.88 2.34	150 27.17 1.88	92 16.67 1.15	552 100.00 6.92	7.32

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	4 .17 .05	9 .38 .11	35 1.48 .44	65 2.75 .82	38 1.61 .48	40 1.69 .50	191 8.07 2.39	7.32
NE	3 .13 .04	22 .93 .28	43 1.82 .54	46 1.94 .58	16 .68 .20	1 .04 .01	131 5.54 1.64	5.02
ENE	0 0.00 0.00	13 .55 .16	24 1.01 .30	32 1.35 .40	17 .72 .21	11 .46 .14	97 4.10 1.22	6.17
E	5 .21 .06	10 .42 .13	29 1.23 .36	53 2.24 .66	19 .80 .24	7 .30 .09	123 5.20 1.54	5.85
ESE	2 .08 .03	5 .21 .06	31 1.31 .39	38 1.61 .48	12 .51 .15	3 .13 .04	91 3.85 1.14	5.77
SE	3 .13 .04	2 .08 .03	13 .55 .16	49 2.07 .61	12 .51 .15	11 .46 .14	90 3.80 1.13	6.66
SSE	0 0.00 0.00	1 .04 .01	23 .97 .29	38 1.61 .48	27 1.14 .34	38 1.61 .48	127 5.37 1.59	8.60
S	0 0.00 0.00	1 .04 .01	37 1.56 .46	86 3.63 1.08	112 4.73 1.40	133 5.62 1.67	369 15.60 4.63	9.05
SSW	0 0.00 0.00	7 .30 .09	18 .76 .23	64 2.70 .80	81 3.42 1.02	53 2.24 .66	223 9.43 2.80	8.26
SW	3 .13 .04	4 .17 .05	11 .46 .14	31 1.31 .39	27 1.14 .34	15 .63 .19	91 3.85 1.14	7.31
WSW	2 .08 .03	5 .21 .06	11 .46 .14	22 .93 .28	15 .63 .19	3 .13 .04	58 2.45 .73	6.26
W	0 0.00 0.00	8 .34 .10	11 .46 .14	14 .59 .18	9 .38 .11	4 .17 .05	46 1.94 .58	6.11
WNW	0 0.00 0.00	7 .30 .09	12 .51 .15	20 .85 .25	25 1.06 .31	11 .46 .14	75 3.17 .94	7.19
NW	1 .04 .01	4 .17 .05	20 .85 .25	40 1.69 .50	46 1.94 .58	56 2.37 .70	167 7.06 2.09	8.87
NNW	1 .04 .01	10 .42 .13	25 1.06 .31	82 3.47 1.03	60 2.54 .75	42 1.78 .53	220 9.30 2.76	7.82
N	3 .13 .04	11 .46 .14	33 1.39 .41	67 2.83 .84	61 2.58 .76	90 3.80 1.13	265 11.20 3.32	8.44
CALM	2 .08 .03						2 .08 .03	CALM
TOTAL	29 1.23 .35	119 5.03 1.49	376 15.89 4.71	747 31.57 9.37	577 24.39 7.24	518 21.89 6.50	2366 100.00 29.67	7.63

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1	3	12	16	8	3	43	6.26
	.05	.16	.63	.04	.42	.16	2.25	
	.01	.04	.15	.20	.10	.04	.54	
NE	1	9	25	23	2	1	61	4.75
	.05	.47	1.31	1.20	.10	.05	3.19	
	.01	.11	.31	.29	.03	.01	.76	
ENE	1	4	15	14	17	6	57	6.73
	.05	.21	.78	.73	.89	.31	2.98	
	.01	.05	.19	.18	.21	.08	.71	
E	0	4	20	36	36	2	98	6.59
	0.00	.21	1.05	1.88	1.88	.10	5.13	
	0.00	.05	.25	.45	.45	.03	1.23	
ESE	1	8	5	27	19	7	67	6.69
	.05	.42	.26	1.41	.99	.37	3.51	
	.01	.10	.06	.34	.24	.09	.84	
SE	0	9	17	46	37	12	121	7.10
	0.00	.47	.89	2.41	1.94	.63	6.33	
	0.00	.11	.21	.58	.46	.15	1.52	
SSE	2	5	27	60	82	51	227	8.22
	.10	.26	1.41	3.14	4.29	2.67	11.88	
	.03	.06	.34	.75	1.03	.64	2.85	
S	1	6	23	106	228	179	543	8.94
	.05	.31	1.20	5.55	11.93	9.37	28.41	
	.01	.08	.29	1.33	2.86	2.24	6.81	
SSW	0	2	14	60	97	45	218	8.42
	0.00	.10	.73	3.14	5.08	2.35	11.41	
	0.00	.03	.18	.75	1.22	.56	2.73	
SW	0	2	18	37	32	12	101	7.21
	0.00	.10	.94	1.94	1.67	.63	5.29	
	0.00	.03	.23	.46	.40	.15	1.27	
WSW	0	3	10	15	9	0	37	5.84
	0.00	.16	.52	.78	.47	0.00	1.94	
	0.00	.04	.13	.19	.11	0.00	.46	
W	2	4	8	15	6	0	35	5.55
	.10	.21	.42	.78	.31	0.00	1.83	
	.03	.05	.10	.19	.08	0.00	.44	
WNW	0	2	7	36	16	2	63	6.71
	0.00	.10	.37	1.88	.84	.10	3.30	
	0.00	.03	.09	.45	.20	.03	.79	
NW	3	4	17	37	18	5	84	6.43
	.16	.21	.89	1.94	.94	.26	4.40	
	.04	.05	.21	.46	.23	.06	1.05	
NNW	1	1	11	34	25	6	78	7.11
	.05	.05	.58	1.78	1.31	.31	4.08	
	.01	.01	.14	.43	.31	.08	.98	
N	4	5	7	26	26	9	77	7.11
	.21	.26	.37	1.36	1.36	.47	4.03	
	.05	.06	.09	.33	.33	.11	.97	
CALM	1						1	CALM
	.05						.05	
	.01						.01	
TOTAL	18	71	236	588	658	340	1911	7.67
	.94	3.72	12.35	30.77	34.43	17.79	100.00	
	.23	.89	2.96	7.37	8.25	4.26	23.96	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	1	12	13	7	12	45	7.38
	0.00	.10	1.17	1.27	.68	1.17	4.40	
	0.00	.01	.15	.16	.09	.15	.56	
NE	1	0	5	15	1	0	22	5.20
	.10	0.00	.49	1.47	.10	0.00	2.15	
	.01	0.00	.06	.19	.01	0.00	.28	
ENE	1	4	7	17	18	6	53	6.87
	.10	.39	.68	1.66	1.76	.59	5.19	
	.01	.05	.09	.21	.23	.08	.66	
E	2	4	6	25	14	1	52	6.31
	.20	.39	.59	2.45	1.37	.10	5.09	
	.03	.05	.08	.31	.18	.01	.65	
ESE	0	2	8	15	7	4	36	6.63
	0.00	.20	.78	1.47	.68	.39	3.52	
	0.00	.03	.10	.19	.09	.05	.45	
SE	0	2	5	29	25	1	62	7.19
	0.00	.20	.49	2.84	2.45	.10	6.07	
	0.00	.03	.06	.36	.31	.01	.78	
SSE	0	3	9	30	53	15	110	7.79
	0.00	.29	.88	2.94	5.19	1.47	10.76	
	0.00	.04	.11	.38	.66	.19	1.38	
S	1	9	14	64	89	27	204	7.76
	.10	.88	1.37	6.26	8.71	2.64	19.96	
	.01	.11	.18	.80	1.12	.34	2.56	
SSW	1	4	17	49	40	15	126	7.21
	.10	.39	1.66	4.79	3.91	1.47	12.33	
	.01	.05	.21	.61	.50	.19	1.58	
SW	0	2	12	40	28	4	86	6.88
	0.00	.20	1.17	3.91	2.74	.39	8.41	
	0.00	.03	.15	.50	.35	.05	1.08	
WSW	0	4	14	12	3	0	33	5.05
	0.00	.39	1.37	1.17	.29	0.00	3.23	
	0.00	.05	.18	.15	.04	0.00	.41	
W	0	0	9	22	0	1	32	6.07
	0.00	0.00	.88	2.15	0.00	.10	3.13	
	0.00	0.00	.11	.28	0.00	.01	.40	
WNW	0	2	9	16	15	0	42	6.51
	0.00	.20	.88	1.57	1.47	0.00	4.11	
	0.00	.03	.11	.20	.19	0.00	.53	
NW	0	2	4	17	6	2	31	6.88
	0.00	.20	.39	1.66	.59	.20	3.03	
	0.00	.03	.05	.21	.08	.03	.39	
NNW	1	2	5	21	10	0	39	6.16
	.10	.20	.49	2.05	.98	0.00	3.82	
	.01	.03	.06	.26	.13	0.00	.49	
N	0	3	10	15	12	7	47	7.02
	0.00	.29	.98	1.47	1.17	.68	4.60	
	0.00	.04	.13	.19	.15	.09	.59	
CALM	2						2	CALM
	.20						.20	
	.03						.03	
TOTAL	9	44	146	400	328	95	1022	7.03
	.89	4.31	14.29	39.14	32.09	9.30	100.00	
	.11	.55	1.83	5.02	4.11	1.19	12.82	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD JUNE 1, 1973 THROUGH MAY 31, 1974

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .13 .01	5 .64 .06	22 2.83 .28	11 1.42 .14	5 .64 .06	44 5.66 .55	7.07
NE	0 0.00 0.00	2 .26 .03	12 1.54 .15	23 2.96 .29	0 0.00 0.00	0 0.00 0.00	37 4.76 .46	5.54
ENE	0 0.00 0.00	1 .13 .01	13 1.67 .16	11 1.42 .14	6 .77 .08	1 .13 .01	32 4.12 .40	5.95
E	0 0.00 0.00	6 .77 .08	9 1.16 .11	18 2.32 .23	8 1.03 .10	0 0.00 0.00	41 5.28 .51	5.66
ESE	1 .13 .01	3 .39 .04	14 1.80 .18	6 .77 .08	5 .64 .06	2 .26 .03	31 3.99 .39	5.57
SE	2 .26 .03	1 .13 .01	8 1.03 .10	20 2.57 .25	16 2.06 .20	5 .64 .06	52 6.69 .65	6.87
SSE	3 .39 .04	2 .26 .03	4 .51 .05	19 2.45 .24	25 3.22 .31	3 .39 .04	56 7.21 .70	7.07
S	0 0.00 0.00	2 .26 .03	8 1.03 .10	50 6.44 .63	53 6.82 .66	20 2.57 .25	133 17.12 1.67	7.97
SSW	4 .51 .05	2 .26 .03	9 1.16 .11	40 5.15 .50	39 5.02 .49	19 2.45 .24	113 14.54 1.42	7.67
SW	0 0.00 0.00	3 .39 .04	12 1.54 .15	32 4.12 .40	14 1.80 .18	4 .51 .05	65 8.37 .82	6.49
WSW	1 .13 .01	3 .39 .04	17 2.19 .21	15 1.93 .19	2 .26 .03	0 0.00 0.00	38 4.89 .48	4.89
W	3 .39 .04	2 .26 .03	13 1.67 .16	12 1.54 .15	2 .26 .03	0 0.00 0.00	32 4.12 .40	4.86
WNW	0 0.00 0.00	1 .13 .01	8 1.03 .10	19 2.45 .24	7 .90 .09	0 0.00 0.00	35 4.50 .44	6.12
NW	2 .26 .03	0 0.00 0.00	5 .64 .06	10 1.29 .13	6 .77 .08	0 0.00 0.00	23 2.96 .29	5.69
NNW	2 .26 .03	0 0.00 0.00	2 .26 .03	12 1.54 .15	3 .39 .04	0 0.00 0.00	19 2.45 .24	6.03
N	1 .13 .01	1 .13 .01	1 .13 .01	13 1.67 .16	9 1.16 .11	1 .13 .01	26 3.35 .33	7.02
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	19 2.45 .24	30 3.86 .38	140 18.02 1.76	322 41.44 4.04	206 26.51 2.58	60 7.72 .75	777 100.00 9.74	6.69

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1973 THROUGH MAY 31, 1974

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 11.55.32.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	6 .08	18 .23	85 1.07	148 1.86	90 1.13	78 .98	425 5.33	7.21
NE	7 .09	43 .54	107 1.34	123 1.54	23 .29	2 .03	305 3.82	4.95
ENE	2 .03	32 .40	78 .98	105 1.32	67 .84	27 .34	311 3.90	6.23
E	7 .09	28 .35	68 .85	140 1.76	84 1.05	12 .15	339 4.25	6.14
ESE	4 .05	23 .29	74 .93	98 1.23	51 .64	19 .24	269 3.37	6.12
SE	7 .09	23 .29	60 .75	176 2.21	97 1.22	42 .53	405 5.08	6.84
SSE	7 .09	20 .25	79 .99	197 2.47	221 2.77	132 1.66	656 8.23	7.97
S	3 .04	23 .29	107 1.34	412 5.17	604 7.57	471 5.91	1620 20.31	8.70
SSW	6 .08	16 .20	77 .97	279 3.50	374 4.69	250 3.13	1002 12.56	8.43
SW	4 .05	15 .19	80 1.00	176 2.21	142 1.78	62 .78	479 6.01	7.23
WSW	3 .04	24 .30	61 .76	70 .88	36 .45	17 .21	211 2.65	5.93
W	7 .09	27 .34	63 .79	75 .94	25 .31	7 .09	204 2.56	5.48
WNW	0 0.00	17 .21	47 .59	108 1.35	74 .93	14 .18	260 3.26	6.63
NW	6 .08	16 .20	71 .89	159 1.99	106 1.33	102 1.28	460 5.77	7.80
NNW	6 .08	18 .23	51 .64	189 2.37	152 1.91	64 .80	480 6.02	7.48
N	8 .10	26 .33	62 .78	176 2.21	145 1.82	125 1.57	542 6.80	7.82
CALM	7 .09						7 .09	CALM
TOTAL	90 1.13	369 4.63	1170 14.67	2631 32.99	2291 28.73	1424 17.86	7975 100.00	7.49

NUMBER OF VALID OBSERVATIONS 7975 91.04 PCT.
NUMBER OF INVALID OBSERVATIONS 785 8.96 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	6	22	45	12	4	90	6.03
	.06	.38	1.39	2.84	.76	.25	5.67	
	.01	.07	.26	.54	.14	.05	1.08	
NE	1	10	33	13	2	1	60	4.39
	.06	.63	2.08	.82	.13	.06	3.78	
	.01	.12	.39	.16	.02	.01	.72	
ENE	2	5	18	12	3	0	40	4.75
	.13	.32	1.13	.76	.19	0.00	2.52	
	.02	.06	.22	.14	.04	0.00	.48	
E	1	5	15	11	2	0	34	4.69
	.06	.32	.95	.69	.13	0.00	2.14	
	.01	.06	.18	.13	.02	0.00	.41	
ESE	3	16	29	12	6	1	67	4.37
	.19	1.01	1.83	.76	.38	.06	4.22	
	.04	.19	.35	.14	.07	.01	.80	
SE	2	17	19	14	8	2	62	4.77
	.13	1.07	1.20	.88	.50	.13	3.91	
	.02	.20	.23	.17	.10	.02	.74	
SSE	2	10	42	43	27	18	142	6.51
	.13	.63	2.65	2.71	1.70	1.13	8.95	
	.02	.12	.50	.51	.32	.22	1.70	
S	2	13	40	89	82	64	290	7.73
	.13	.82	2.52	5.61	5.17	4.03	18.27	
	.02	.16	.48	1.07	.98	.77	3.47	
SSW	3	12	46	80	60	71	272	7.78
	.19	.76	2.90	5.04	3.78	4.47	17.14	
	.04	.14	.55	.96	.72	.85	3.26	
SW	2	13	27	27	9	21	99	6.61
	.13	.82	1.70	1.70	.57	1.32	6.24	
	.02	.16	.32	.32	.11	.25	1.18	
WSW	1	9	9	10	5	4	38	5.92
	.06	.57	.57	.63	.32	.25	2.39	
	.01	.11	.11	.12	.06	.05	.45	
W	1	9	14	17	13	2	56	5.59
	.06	.57	.83	1.07	.82	.13	3.53	
	.01	.11	.17	.20	.16	.02	.67	
WNW	2	5	10	11	10	10	48	7.84
	.13	.32	.63	.69	.63	.63	3.02	
	.02	.06	.12	.13	.12	.12	.57	
NW	3	4	9	11	22	14	63	7.38
	.19	.25	.57	.69	1.39	.88	3.97	
	.04	.05	.11	.13	.26	.17	.75	
NNW	1	4	11	38	38	26	118	7.97
	.06	.25	.69	2.39	2.39	1.64	7.44	
	.01	.05	.13	.45	.45	.31	1.41	
N	1	5	14	44	26	18	108	7.26
	.06	.32	.88	2.77	1.64	1.13	6.81	
	.01	.06	.17	.53	.31	.22	1.29	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	28	143	358	477	325	256	1587	6.80
	1.76	9.01	22.56	30.06	20.48	16.13	100.00	
	.34	1.71	4.28	5.71	3.89	3.06	18.99	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	5	3	8	6	8	31	7.06
	.23	1.14	.68	1.82	1.37	1.82	7.06	
	.01	.06	.04	.10	.07	.10	.37	
NE	2	6	4	0	2	0	14	3.36
	.46	1.37	.91	0.00	.46	0.00	3.19	
	.02	.07	.05	0.00	.02	0.00	.17	
ENE	0	8	5	3	5	0	21	4.87
	0.00	1.82	1.14	.68	1.14	0.00	4.78	
	0.00	.10	.06	.04	.06	0.00	.25	
E	0	1	3	2	0	0	6	4.53
	0.00	.23	.68	.46	0.00	0.00	1.37	
	0.00	.01	.04	.02	0.00	0.00	.07	
ESE	0	4	6	3	1	5	19	6.39
	0.00	.91	1.37	.68	.23	1.14	4.33	
	0.00	.05	.07	.04	.01	.06	.23	
SE	0	6	6	4	4	0	20	4.91
	0.00	1.37	1.37	.91	.91	0.00	4.56	
	0.00	.07	.07	.05	.05	0.00	.24	
SSE	0	1	7	7	2	4	21	6.61
	0.00	.23	1.59	1.59	.46	.91	4.78	
	0.00	.01	.08	.08	.02	.05	.25	
S	1	3	9	19	14	19	65	8.15
	.23	.68	2.05	4.33	3.19	4.33	14.81	
	.01	.04	.11	.23	.17	.23	.78	
SSW	2	0	11	10	11	10	44	7.34
	.46	0.00	2.51	2.28	2.51	2.28	10.02	
	.02	0.00	.13	.12	.13	.12	.53	
SW	0	1	5	4	1	6	17	7.75
	0.00	.23	1.14	.91	.23	1.37	3.87	
	0.00	.01	.06	.05	.01	.07	.20	
WSW	0	3	1	8	2	3	17	6.79
	0.00	.68	.23	1.82	.46	.68	3.87	
	0.00	.04	.01	.10	.02	.04	.20	
W	1	4	4	4	1	1	15	5.04
	.23	.91	.91	.91	.23	.23	3.42	
	.01	.05	.05	.05	.01	.01	.18	
WNW	1	3	1	4	6	4	19	7.24
	.23	.68	.23	.91	1.37	.91	4.33	
	.01	.04	.01	.05	.07	.05	.23	
NW	0	8	6	8	11	10	43	7.65
	0.00	1.82	1.37	1.82	2.51	2.28	9.79	
	0.00	.10	.07	.10	.13	.12	.51	
NNW	1	0	6	8	15	14	44	8.54
	.23	0.00	1.37	1.82	3.42	3.19	10.02	
	.01	0.00	.07	.10	.18	.17	.53	
N	1	3	2	10	16	11	43	8.16
	.23	.68	.46	2.28	3.64	2.51	9.79	
	.01	.04	.02	.12	.19	.13	.51	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	10	56	79	102	97	95	439	7.11
	2.28	12.76	18.00	23.23	22.10	21.64	100.00	
	.12	.67	.95	1.22	1.16	1.14	5.25	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WOLF CREEK

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS)

(ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1	2	6	10	9	11	39	7.66
	.20	.39	1.17	1.96	1.76	2.15	7.63	
	.01	02	.07	.12	.11	.13	.47	
NE	2	8	6	5	2	0	23	4.09
	.39	1.57	1.17	.98	.39	0.00	4.50	
	02	.10	.07	.06	.02	0.00	.28	
ENE	1	5	8	3	2	0	19	4.34
	.20	.98	1.57	.59	.39	0.00	3.72	
	.01	.06	.10	.04	.02	0.00	.23	
E	0	1	3	3	1	1	9	6.20
	0.00	.20	.59	.59	.20	.20	1.76	
	0.00	.01	.04	.04	.01	.01	.11	
ESE	0	2	3	5	1	1	12	5.69
	0.00	.39	.59	.98	.20	.20	2.35	
	0.00	.02	.04	.06	.01	.01	.14	
SE	0	1	5	5	6	1	18	6.48
	0.00	.20	.98	.98	1.17	.20	3.52	
	0.00	.01	.06	.06	.07	.01	.22	
SSE	1	2	6	8	7	4	28	6.72
	.20	.39	1.17	1.57	1.37	.78	5.48	
	.01	.02	.07	.10	.08	.05	.34	
S	0	2	12	25	12	13	64	7.58
	0.00	.39	2.35	4.89	2.35	2.54	12.52	
	0.00	.02	.14	.30	.14	.16	.77	
SSW	1	4	11	19	13	12	60	7.36
	.20	.78	2.15	3.72	2.54	2.35	11.74	
	.01	.05	.13	.23	.16	.14	.72	
SW	2	1	2	7	4	4	20	7.06
	.39	.20	.39	1.37	.78	.78	3.91	
	.02	.01	.02	.08	.05	.05	.24	
WSW	1	1	0	5	1	1	9	6.23
	.20	.20	0.00	.98	.20	.20	1.76	
	.01	.01	0.00	.06	.01	.01	.11	
W	0	6	6	4	0	1	17	4.32
	0.00	1.17	1.17	.78	0.00	.20	3.33	
	0.00	.07	.07	.05	0.00	.01	.20	
WNW	1	3	2	4	8	6	24	7.65
	.20	.59	.39	.78	1.57	1.17	4.70	
	.01	.04	.02	.05	.10	.07	.29	
NW	0	3	7	9	18	14	51	8.68
	0.00	.59	1.37	1.76	3.52	2.74	9.98	
	0.00	.04	.08	.11	.22	.17	.61	
NNW	0	2	3	16	17	18	56	8.45
	0.00	.39	.59	3.13	3.33	3.52	10.96	
	0.00	.02	.04	.19	.20	.22	.67	
N	1	0	6	11	21	23	62	8.98
	.20	0.00	1.17	2.15	4.11	4.50	12.13	
	.01	0.00	.07	.13	.25	.28	.74	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	11	43	86	139	122	110	511	7.35
	2.15	8.41	16.83	27.20	23.87	21.53	100.00	
	.13	.51	1.03	1.66	1.46	1.32	6.12	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED. 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	6	26	56	59	26	173	7.45
	0.00	.27	1.18	2.55	2.68	1.18	7.86	
	0.00	.07	.31	.67	.71	.31	2.07	
NE	0	11	24	38	8	2	83	5.38
	0.00	.50	1.09	1.73	.36	.09	3.77	
	0.00	.13	.29	.45	.10	.02	.99	
ENE	0	10	32	33	12	0	87	5.38
	0.00	.45	1.45	1.50	.55	0.00	3.95	
	0.00	.12	.38	.39	.14	0.00	1.04	
E	4	11	20	27	16	9	87	6.16
	.18	.50	.91	1.23	.73	.41	3.95	
	.05	.13	.24	.32	.19	.11	1.04	
ESE	3	11	26	47	17	18	122	6.54
	.14	.50	1.18	2.14	.77	.82	5.55	
	.04	.13	.31	.56	.20	.22	1.46	
SE	1	13	29	31	38	27	139	7.17
	.05	.59	1.32	1.41	1.73	1.23	6.32	
	.01	.16	.35	.37	.45	.32	1.66	
SSE	3	10	31	42	36	14	136	6.57
	.14	.45	1.41	1.91	1.64	.64	6.18	
	.04	.12	.37	.50	.43	.17	1.63	
S	5	14	54	112	106	104	395	7.92
	.23	.64	2.45	5.09	4.82	4.73	17.95	
	.06	.17	.65	1.34	1.27	1.24	4.73	
SSW	4	11	33	64	59	44	220	7.52
	.18	.50	1.73	2.91	2.68	2.00	10.00	
	.05	.13	.45	.77	.71	.53	2.63	
SW	2	5	15	19	4	12	57	6.38
	.09	.23	.68	.86	.18	.55	2.59	
	.02	.06	.18	.23	.05	.14	.68	
WSW	2	15	8	10	2	5	42	4.91
	.09	.68	.36	.45	.09	.23	1.91	
	.02	.18	.10	.12	.02	.06	.50	
W	6	1	17	7	6	11	48	6.91
	.27	.05	.77	.32	.27	.50	2.18	
	.07	.01	.20	.08	.07	.13	.57	
WNW	2	4	16	18	19	35	94	8.45
	.09	.18	.73	.82	.86	1.59	4.27	
	.02	.05	.19	.22	.23	.42	1.13	
NW	1	4	16	35	53	33	142	7.95
	.05	.18	.73	1.59	2.41	1.50	6.45	
	.01	.05	.19	.42	.63	.39	1.70	
NNW	0	5	13	43	72	52	135	8.63
	0.00	.23	.59	1.95	3.27	2.36	8.41	
	0.00	.06	.16	.51	.86	.62	2.21	
N	3	6	22	59	43	57	190	8.22
	.14	.27	1.00	2.68	1.95	2.59	8.64	
	.04	.07	26	.71	.51	.68	2.27	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	36	137	387	641	550	449	2200	7.36
	1.64	6.23	17.59	29.14	25.00	20.41	100.00	
	.43	1.64	4.63	7.67	6.58	5.37	26.33	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 13 19 37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	6	14	22	14	8	64	6.46
	0.00	.34	.79	1.23	.79	.45	3.59	
	0.00	.07	.17	.26	.17	.10	.77	
NE	0	8	23	11	0	1	43	4.47
	0.00	.45	1.29	.62	0.00	.06	2.41	
	0.00	.10	.28	.13	0.00	.01	.51	
ENE	1	6	20	33	9	0	69	5.59
	.06	.34	1.12	1.85	.50	0.00	3.87	
	.01	.07	.24	.39	.11	0.00	.83	
E	0	4	8	34	8	5	59	6.52
	0.00	.22	.45	1.91	.45	.28	3.31	
	0.00	.05	.10	.41	.10	.06	.71	
ESE	0	6	15	33	33	10	97	7.17
	0.00	.34	.84	1.85	1.85	.56	5.44	
	0.00	.07	.18	.39	.39	.12	1.16	
SE	4	7	17	37	37	16	118	6.99
	.22	.39	.95	2.08	2.08	.90	6.62	
	.05	.08	.20	.44	.44	.19	1.41	
SSE	0	6	28	62	80	34	210	7.65
	0.00	.34	1.57	3.48	4.49	1.91	11.78	
	0.00	.07	.34	.74	.96	.41	2.51	
S	2	8	29	129	147	78	393	8.08
	.11	.45	1.63	7.23	8.24	4.37	22.04	
	.02	.10	.35	1.54	1.76	.93	4.70	
SSW	0	10	37	78	65	31	221	7.24
	0.00	.56	2.08	4.37	3.65	1.74	12.39	
	0.00	.12	.44	.93	.78	.37	2.65	
SW	0	7	29	27	10	2	75	5.43
	0.00	.39	1.63	1.51	.56	.11	4.21	
	0.00	.08	.35	.32	.12	.02	.90	
WSW	0	2	13	24	8	0	47	5.87
	0.00	.11	.73	1.35	.45	0.00	2.64	
	0.00	.02	.16	.29	.10	0.00	.56	
W	3	3	15	12	6	3	42	5.28
	.17	.17	.84	.67	.34	.17	2.36	
	.04	.04	.18	.14	.07	.04	.50	
WNW	0	6	16	35	28	4	89	6.57
	0.00	.34	.90	1.96	1.57	.22	4.99	
	0.00	.07	.19	.42	.34	.05	1.07	
NW	1	3	13	34	23	3	77	6.53
	.06	.17	.73	1.91	1.29	.17	4.32	
	.01	.04	.16	.41	.28	.04	.92	
NNW	0	3	12	38	29	2	84	6.83
	0.00	.17	.67	2.13	1.63	.11	4.71	
	0.00	.04	.14	.45	.35	.02	1.01	
N	2	4	11	39	27	12	95	7.14
	.11	.22	.62	2.19	1.51	.67	5.33	
	.02	.05	.13	.47	.32	.14	1.14	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	13	89	300	648	524	209	1783	7.02
	.73	4.99	16.83	36.34	29.39	11.72	100.00	
	.16	1.07	3.59	7.76	6.27	2.50	21.34	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	2	13	16	17	2	50	6.49
	0.00	.17	1.13	1.39	1.48	.17	4.35	
	0.00	.02	.16	.19	.20	.02	.60	
NE	0	7	18	7	2	0	34	4.30
	0.00	.61	1.57	.61	.17	0.00	2.96	
	0.00	.08	.22	.08	.02	0.00	.41	
ENE	1	5	10	9	8	1	34	5.69
	.09	.43	.87	.78	.70	.09	2.96	
	.01	.06	.12	.11	.10	.01	.41	
E	0	2	7	18	15	0	42	6.68
	0.00	.17	.61	1.57	1.30	0.00	3.65	
	0.00	.02	.08	.22	.18	0.00	.50	
ESE	1	4	9	30	20	1	65	6.56
	.09	.35	.78	2.61	1.74	.09	5.65	
	.01	.05	.11	.36	.24	.01	.78	
SE	0	1	15	44	18	4	82	6.72
	0.00	.09	1.30	3.83	1.57	.35	7.13	
	0.00	.01	.18	.53	.22	.05	.98	
SSE	2	4	16	64	42	7	135	6.99
	.17	.35	1.39	5.57	3.65	.61	11.74	
	.02	.05	.19	.77	.50	.08	1.62	
S	0	3	14	104	79	6	206	7.22
	0.00	.26	1.22	9.04	6.87	.52	17.91	
	0.00	.04	.17	1.24	.95	.07	2.47	
SSW	1	1	9	69	44	2	126	6.95
	.09	.09	.78	6.00	3.83	.17	10.96	
	.01	.01	.11	.83	.53	.02	1.51	
SW	2	4	19	62	19	0	106	6.04
	.17	.35	1.65	5.39	1.65	0.00	9.22	
	.02	.05	.23	.74	.23	0.00	1.27	
WSW	1	4	16	31	2	0	54	5.20
	.09	.35	1.39	2.70	.17	0.00	4.70	
	.01	.05	.19	.37	.02	0.00	.65	
W	0	4	10	19	1	0	34	5.19
	0.00	.35	.87	1.65	.09	0.00	2.96	
	0.00	.05	.12	.23	.01	0.00	.41	
WNW	1	3	12	17	20	0	53	6.34
	.09	.26	1.04	1.48	1.74	0.00	4.61	
	.01	.04	.14	.20	.24	0.00	.63	
NW	1	4	12	16	5	0	38	5.42
	.09	.35	1.04	1.39	.43	0.00	3.30	
	.01	.05	.14	.19	.06	0.00	.45	
NNW	1	2	4	16	5	0	28	5.77
	.09	17	.35	1.39	.43	0.00	2.43	
	.01	02	.05	.19	.06	0.00	.34	
N	0	3	10	29	16	5	63	6.67
	0.00	.26	.87	2.52	1.39	43	5.48	
	0.00	04	.12	.35	.19	.06	.75	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	11	53	194	551	313	28	1150	6.48
	.96	4.61	16.87	47.91	27.22	2.43	100.00	
	.13	.63	2.32	6.59	3.75	.34	13.76	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. JUNE 1, 1974 THROUGH MAY 31, 1975

STABILITY CLASS. PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 60.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .15 .01	4 .58 .05	6 .88 .07	12 1.75 .14	8 1.17 .10	1 .15 .01	32 4.67 .38	5.97
NE	2 .29 .02	5 .73 06	15 2.19 .18	8 1.17 .10	0 0.00 0.00	0 0.00 0.00	30 4.38 .36	4.19
ENE	1 15 .01	2 .29 .02	5 .73 .06	13 1.90 .16	1 .15 .01	0 0.00 0.00	22 3.21 .26	5.16
E	0 0.00 0.00	4 .58 .05	11 1.61 .13	12 1.75 .14	13 1.90 .16	0 0.00 0.00	40 5.84 .48	5.96
ESE	1 .15 .01	2 .29 .02	7 1.02 .08	26 3.80 .31	6 .88 .07	0 0.00 0.00	42 6.13 .50	5.94
SE	0 0.00 0.00	3 .44 .04	12 1.75 .14	26 3.80 .31	15 2.19 .18	2 .29 .02	58 8.47 .69	6.35
SSE	1 .15 .01	2 .29 02	15 2.19 .18	44 6.42 .53	30 4.38 .36	3 .44 .04	95 13.87 1.14	6.65
S	0 0.00 0.00	2 .29 .02	9 1.31 .11	69 10.07 .83	32 4.67 .38	0 0.00 0.00	112 16.35 1.34	6.74
SSW	2 .29 02	3 .44 .04	4 .58 .05	33 4.82 .39	12 1.75 .14	0 0.00 0.00	54 7.88 .65	6.14
SW	1 .15 .01	2 .29 .02	2 .29 .02	28 4.09 .34	6 .88 .07	0 0.00 0.00	39 5.69 .47	6.31
WSW	0 0.00 0.00	1 .15 .01	11 1.61 13	12 1.75 .14	3 .44 .04	0 0.00 0.00	27 3.94 .32	5.34
W	3 .44 .04	2 .29 .02	5 .73 .05	8 1.17 .10	0 0.00 0.00	0 0.00 0.00	18 2.63 .22	4.39
WNW	1 .15 .01	1 .15 .01	8 1.17 .10	8 1.17 .10	0 0.00 0.00	0 0.00 0.00	18 2.63 .22	4.76
NW	0 0.00 0.00	0 0.00 0.00	5 .73 .05	7 1.02 .08	6 .88 .07	0 0.00 0.00	18 2.63 .22	6.16
NNW	0 0.00 0.00	0 0.00 0.00	6 .88 .07	11 1.61 .13	5 .73 .06	0 0.00 0.00	22 3.21 .26	6.20
N	0 0.00 0.00	5 .73 .06	7 1.02 .08	17 2.48 .20	27 3.94 .32	1 .15 .01	57 8.32 .68	7.05
CALM	1 .15 .01						1 .15 .01	CALM
TOTAL	14 2.04 .17	38 5.55 .45	128 18.69 1.53	334 48.76 4.00	164 23.94 1.96	7 1.02 .08	685 100.00 8.20	6.14

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: JUNE 1, 1974 THROUGH MAY 31, 1975

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 13.19.37.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4 .05	31 .37	90 1.08	169 2.02	125 1.50	60 .72	479 5.73	6.84
NE	7 .08	55 .66	123 1.47	82 .98	16 .19	4 .05	287 3.44	4.58
ENE	6 .07	41 .49	98 1.17	106 1.27	40 .48	1 .01	292 3.49	5.26
E	5 .06	28 .34	67 .80	107 1.28	55 .66	15 .18	277 3.32	6.07
ESE	8 .10	45 .54	95 1.14	156 1.87	84 1.01	36 .43	424 5.07	6.25
SE	7 .08	48 .57	103 1.23	161 1.93	126 1.51	52 .62	497 5.95	6.54
SSE	9 .11	35 .42	145 1.74	270 3.23	224 2.68	84 1.01	767 9.18	6.94
S	10 .12	45 .54	167 2.00	547 6.55	472 5.65	284 3.40	1525 18.25	7.74
SSW	13 .16	41 .49	156 1.87	353 4.23	264 3.16	170 2.03	997 11.93	7.37
SW	9 .11	33 .39	99 1.18	174 2.08	53 .63	45 .54	413 4.94	6.26
WSW	5 .06	35 .42	58 .69	100 1.20	23 .28	13 .16	234 2.80	5.57
W	14 .17	29 .35	71 85	71 .85	27 .32	18 .22	230 2.75	5.53
WNW	8 .10	25 .30	65 .78	97 1.16	91 1.09	59 .71	345 4.13	7.24
NW	6 .07	26 .31	68 .81	120 1.44	138 1.65	74 .89	432 5.17	7.37
NNW	3 .04	16 .19	55 .66	170 2.03	181 2.17	112 1.34	537 6.43	7.93
N	8 .10	26 .31	72 .86	209 2.50	176 2.11	127 1.52	618 7.40	7.69
CALM	1 .01						1 01	CALM
TOTAL	123 1.47	559 6.69	1532 18.34	2892 34.61	2095 25.07	1154 13.81	8355 100.00	6.95

NUMBER OF VALID OBSERVATIONS 8355 95.38 PCT
NUMBER OF INVALID OBSERVATIONS 405 4.62 PCT.
TOTAL NUMBER OF OBSERVATIONS 8760 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	0	1	3	8	3	16	7.74
	.33	0.00	.33	.99	2.63	99	5.26	
	.01	0.00	.01	.04	11	.04	.22	
NE	0	0	2	5	0	0	7	5.80
	0.00	0.00	.66	1.64	0.00	0.00	2.30	
	0.00	0.00	.03	.07	0.00	0.00	.10	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	0	0	2	3	0	5	7.30
	0.00	0.00	0.00	.66	.99	0.00	1.64	
	0.00	0.00	0.00	.03	.04	0.00	.07	
ESE	0	0	0	6	0	0	6	6.15
	0.00	0.00	0.00	1.97	0.00	0.00	1.97	
	0.00	0.00	0.00	.08	0.00	0.00	.08	
SE	0	0	8	6	0	0	14	4.97
	0.00	0.00	2.63	1.97	0.00	0.00	4.61	
	0.00	0.00	.11	.08	0.00	0.00	.19	
SSE	0	0	4	4	0	2	10	6.09
	0.00	0.00	1.32	1.32	0.00	.66	3.29	
	0.00	0.00	.05	.05	0.00	.03	.14	
S	0	0	10	15	9	5	39	7.00
	0.00	0.00	3.29	4.93	2.96	1.64	12.83	
	0.00	0.00	.14	.20	.12	.07	.53	
SSW	0	0	4	38	16	5	63	7.33
	0.00	0.00	1.32	12.50	5.26	1.64	20.72	
	0.00	0.00	.05	.52	.22	.07	.86	
SW	0	6	1	3	4	1	15	5.20
	0.00	1.97	.33	.99	1.32	.33	4.93	
	0.00	.08	.01	.04	.05	.01	.20	
WSW	0	3	0	0	0	0	3	2.43
	0.00	.99	0.00	0.00	0.00	0.00	99	
	0.00	.04	0.00	0.00	0.00	0.00	04	
W	0	0	9	2	4	0	15	5.50
	0.00	0.00	2.96	.66	1.32	0.00	4.93	
	0.00	0.00	.12	.03	.05	0.00	20	
WNW	0	2	0	0	2	3	7	8.36
	0.00	.66	0.00	0.00	.66	.99	2.30	
	0.00	.03	0.00	0.00	.03	.04	.10	
NW	0	2	0	1	5	5	13	9.38
	0.00	.66	0.00	.33	1.64	1.64	4.28	
	0.00	.03	0.00	.01	.07	.07	.18	
NNW	0	2	4	11	3	18	38	8.76
	0.00	.66	1.32	3.62	.99	5.92	12.50	
	0.00	.03	.05	.15	.04	.25	.52	
N	1	2	1	10	21	18	53	8.87
	.33	.66	.33	3.29	6.91	5.92	17.43	
	.01	.03	.01	.14	.29	.25	.72	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	17	44	106	75	60	304	7.41
	.66	5.59	14.47	34.87	24.67	19.74	100.00	
	.03	.23	60	1.44	1.02	.82	4.14	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	4	6	4	2	16	7.01
	0.00	0.00	1.38	2.08	1.38	.69	5.54	
	0.00	0.00	.05	.08	.05	.03	.22	
NE	0	1	6	1	0	0	8	4.17
	0.00	.35	2.08	.35	0.00	0.00	2.77	
	0.00	.01	.08	.01	0.00	0.00	.11	
ENE	0	0	5	0	2	0	7	4.96
	0.00	0.00	1.73	0.00	.69	0.00	2.42	
	0.00	0.00	.07	0.00	.03	0.00	.10	
E	0	0	1	3	2	0	6	6.52
	0.00	0.00	.35	1.04	.69	0.00	2.08	
	0.00	0.00	.01	.04	.03	0.00	.08	
ESE	0	0	1	6	0	0	7	5.84
	0.00	0.00	.35	2.08	0.00	0.00	2.42	
	0.00	0.00	.01	.08	0.00	0.00	.10	
SE	0	0	1	5	3	1	10	6.93
	0.00	0.00	.35	1.73	1.04	.35	3.46	
	0.00	0.00	.01	.07	.04	.01	.14	
SSE	0	1	3	5	0	0	9	5.07
	0.00	.35	1.04	1.73	0.00	0.00	3.11	
	0.00	.01	.04	.07	0.00	0.00	.12	
S	0	1	15	18	12	13	59	7.24
	0.00	.35	5.19	6.23	4.15	4.50	20.42	
	0.00	.01	.20	.25	.16	.18	.80	
SSW	0	2	6	19	21	4	52	7.17
	0.00	.69	2.08	6.57	7.27	1.38	17.99	
	0.00	.03	.08	.26	.29	.05	.71	
SW	0	2	8	6	8	5	29	7.14
	0.00	.69	2.77	2.08	2.77	1.73	10.03	
	0.00	.03	.11	.08	.11	.07	.39	
WSW	0	1	3	1	1	2	8	6.50
	0.00	.35	1.04	.35	.35	.69	2.77	
	0.00	.01	.04	.01	.01	.03	.11	
W	0	2	6	9	3	0	20	5.58
	0.00	.69	2.08	3.11	1.04	0.00	6.92	
	0.00	.03	.08	.12	.04	0.00	.27	
WNW	0	0	4	2	0	0	6	4.65
	0.00	0.00	1.38	.69	0.00	0.00	2.08	
	0.00	0.00	.05	.03	0.00	0.00	.08	
NW	0	1	1	1	3	4	10	9.00
	0.00	.35	.35	.35	1.04	1.38	3.46	
	0.00	.01	.01	.01	.04	.05	.14	
NNW	0	1	3	9	2	4	19	7.22
	0.00	.35	1.04	3.11	.69	1.38	6.57	
	0.00	.01	.04	.12	.03	.05	.26	
N	0	0	8	5	5	5	23	7.19
	0.00	0.00	2.77	1.73	1.73	1.73	7.96	
	0.00	0.00	.11	.07	.07	07	.31	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	12	75	96	66	40	289	6.80
	0.00	4.15	25.95	33.22	22.84	13.84	100.00	
	0.00	16	1.02	1.31	90	.54	3.93	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	1	4	4	7	2	18	7.16
	0.00	.26	1.03	1.03	1.80	.51	4.63	
	0.00	.01	.05	.05	.10	.03	.25	
NE	0	0	3	1	1	0	5	5.94
	0.00	0.00	77	.26	.26	0.00	1.29	
	0.00	0.00	.04	.01	.01	0.00	.07	
ENE	0	0	0	5	1	1	7	7.36
	0.00	0.00	0.00	1.29	.26	.26	1.80	
	0.00	0.00	0.00	.07	.01	.01	.10	
E	1	1	2	7	1	0	12	5.21
	.26	.26	.51	1.80	.26	0.00	3.08	
	.01	01	.03	.10	.01	0.00	.16	
ESE	0	2	4	4	1	0	11	4.69
	0.00	.51	1.03	1.03	.26	0.00	2.83	
	0.00	.03	.05	.05	.01	0.00	.15	
SE	1	2	5	4	3	2	17	5.71
	.26	.51	1.29	1.03	.77	.51	4.37	
	.01	.03	.07	.05	.04	.03	.23	
SSE	0	1	10	16	6	0	33	5.96
	0.00	.26	2.57	4.11	1.54	0.00	8.48	
	0.00	.01	.14	.22	.08	0.00	.45	
S	0	3	13	22	11	17	66	7.48
	0.00	.77	3.34	5.66	2.83	4.37	16.97	
	0.00	.04	.18	.30	.15	.23	.90	
SSW	0	3	6	26	19	9	63	7.34
	0.00	.77	1.54	6.68	4.88	2.31	16.20	
	0.00	.04	.08	.35	.26	.12	.86	
SW	0	2	4	7	3	1	17	6.09
	0.00	.51	1.03	1.80	.77	.26	4.37	
	0.00	.03	.05	.10	.04	.01	.23	
WSW	0	0	4	2	5	1	12	6.75
	0.00	0.00	1.03	.51	1.29	.26	3.08	
	0.00	0.00	.05	.03	.07	.01	.16	
W	0	2	8	5	7	0	22	5.91
	0.00	.51	2.06	1.29	1.80	0.00	5.66	
	0.00	.03	.11	.07	.10	0.00	.30	
WNW	0	2	7	1	1	0	11	4.45
	0.00	.51	1.80	.26	.26	0.00	2.83	
	0.00	.03	.10	.01	.01	0.00	.15	
NW	1	1	3	5	7	4	21	7.75
	.26	.26	.77	1.29	1.80	1.03	5.40	
	.01	.01	.04	.07	.10	.05	.29	
NNW	1	2	6	12	6	6	33	7.04
	.26	.51	1.54	3.08	1.54	1.54	8.48	
	.01	.03	.08	.16	.08	.08	.45	
N	1	3	8	4	16	9	41	7.56
	.26	.77	2.06	1.03	4.11	2.31	10.54	
	.01	.04	.11	.05	.22	.12	.56	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	5	25	87	125	95	52	389	6.79
	1.29	6.43	22.37	32.13	24.42	13.37	100.00	
	.07	.34	1.18	1.70	1.29	.71	5.30	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	18	50	64	41	27	200	6.63
	0.00	.69	1.91	2.45	1.57	1.03	7.65	
	0.00	.25	.68	.87	.56	.37	2.72	
NE	0	16	56	53	20	7	152	5.56
	0.00	.61	2.14	2.03	.77	.27	5.81	
	0.00	.22	.76	.72	.27	.10	2.07	
ENE	0	21	42	59	29	4	155	5.69
	0.00	.80	1.61	2.26	1.11	.15	5.93	
	0.00	.29	.57	.80	.39	.05	2.11	
E	1	17	47	52	16	3	136	5.24
	.04	.65	1.80	1.99	.61	.11	5.20	
	.01	.23	.64	.71	.22	.04	1.85	
ESE	2	15	36	23	22	7	105	5.70
	.08	.57	1.38	.88	.84	.27	4.02	
	.03	.20	.49	.31	.30	.10	1.43	
SE	1	13	39	41	20	18	132	6.33
	.04	.50	1.49	1.57	.77	.69	5.05	
	.01	.18	.53	.56	.27	.25	1.80	
SSE	0	19	31	61	32	30	173	6.81
	0.00	.73	1.19	2.33	1.22	1.15	6.62	
	0.00	.26	.42	.83	.44	.41	2.36	
S	3	19	42	130	87	114	395	8.19
	.11	.73	1.61	4.97	3.33	4.36	15.11	
	.04	.26	.57	1.77	1.18	1.55	5.38	
SSW	1	17	35	87	55	58	253	7.54
	.04	.65	1.34	3.33	2.10	2.22	9.68	
	.01	.23	.48	1.18	.75	.79	3.44	
SW	1	14	30	24	19	20	108	6.75
	.04	.54	1.15	.92	.73	.77	4.13	
	.01	.19	.41	.33	.26	.27	1.47	
WSW	1	6	19	16	13	13	68	6.46
	.04	.23	.73	.61	.50	.50	2.60	
	.01	.08	.26	.22	.18	.18	.93	
W	3	14	29	35	35	19	135	6.62
	.11	.54	1.11	1.34	1.34	.73	5.16	
	.04	.19	.39	.48	.48	.26	1.84	
WNW	1	8	9	17	18	16	69	7.45
	.04	.31	.34	.65	.69	.61	2.64	
	.01	.11	.12	.23	.25	.22	.94	
NW	0	6	8	22	23	31	90	8.65
	0.00	.23	.31	.84	.88	1.19	3.44	
	0.00	.08	.11	.30	.31	.42	1.23	
NNW	3	4	17	59	60	58	201	8.44
	.11	.15	.65	2.26	2.30	2.22	7.69	
	.04	.05	.23	.80	.82	.79	2.74	
N	0	5	31	84	66	56	242	8.08
	0.00	.19	1.19	3.21	2.52	2.14	9.26	
	0.00	.07	.42	1.14	.90	.76	3.29	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	17	212	521	827	556	481	2614	7.09
	.65	8.11	19.93	31.64	21.27	18.40	100.00	
	.23	2.89	7.09	11.26	7.57	6.55	35.59	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14 42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	4	14	26	17	12	74	7.05
	.05	.20	.71	1.31	.86	.60	3.73	
	.01	.05	.19	.35	.23	.16	1.01	
NE	2	14	21	23	7	0	67	4.85
	.10	.71	1.06	1.16	.35	0.00	3.38	
	.03	.19	.29	.31	.10	0.00	.91	
ENE	0	5	23	33	8	6	75	5.89
	0.00	.25	1.16	1.66	.40	.30	3.78	
	0.00	.07	.31	.45	.11	.08	1.02	
E	0	6	19	37	32	9	103	6.93
	0.00	.30	.96	1.86	1.61	.45	5.19	
	0.00	.08	.26	.50	.44	.12	1.40	
ESE	0	4	13	27	25	8	77	7.11
	0.00	.20	.66	1.36	1.26	.40	3.88	
	0.00	.05	.18	.37	.34	.11	1.05	
SE	0	5	25	50	29	18	127	6.91
	0.00	.25	1.26	2.52	1.46	.91	6.40	
	0.00	.07	.34	.68	.39	.25	1.73	
SSE	0	7	24	67	78	45	221	7.91
	0.00	.35	1.21	3.38	3.93	2.27	11.14	
	0.00	.10	.33	.91	1.06	.61	3.01	
S	1	11	20	156	182	172	542	8.91
	.05	.55	1.01	7.86	9.17	8.67	27.32	
	.01	.15	.27	2.12	2.48	2.34	7.38	
SSW	1	1	24	95	78	38	237	7.87
	.05	.05	1.21	4.79	3.93	1.92	11.95	
	.01	.01	.33	1.29	1.06	.52	3.23	
SW	0	5	15	31	22	6	79	6.77
	0.00	.25	.76	1.56	1.11	.30	3.98	
	0.00	.07	.20	.42	.30	.08	1.08	
WSW	0	3	10	17	12	3	45	6.35
	0.00	.15	.50	.86	.60	.15	2.27	
	0.00	.04	.14	.23	.16	.04	.61	
W	0	2	9	11	16	5	43	7.20
	0.00	.10	.45	.55	.81	.25	2.17	
	0.00	.03	.12	.15	.22	.07	.59	
WNW	0	4	8	18	20	3	53	6.87
	0.00	.20	.40	.91	1.01	.15	2.67	
	0.00	.05	.11	.25	.27	.04	.72	
NW	2	0	10	15	25	5	57	7.36
	.10	0.00	.50	.76	1.26	.25	2.87	
	.03	0.00	.14	.20	.34	.07	.78	
NNW	1	1	7	31	33	14	87	7.68
	.05	.05	.35	1.56	1.66	.71	4.39	
	.01	.01	.10	.42	.45	.19	1.18	
N	0	1	9	26	42	18	96	8.17
	0.00	.05	.45	1.31	2.12	.91	4.84	
	0.00	.01	.12	.35	.57	.25	1.31	
CALM	1						1	CALM
	.05						.05	
	.01						.01	
TOTAL	9	73	251	663	626	362	1984	7.68
	.45	3.68	12.65	33.42	31.55	18.25	100.00	
	.12	.99	3.42	9.03	8.52	4.93	27.01	

WIND SPEED CATEGORIES (METERS PER SECOND)

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14 42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	10	19	7	0	36	6.26
	0.00	0.00	.97	1.84	.68	0.00	3.49	
	0.00	0.00	.14	.26	.10	0.00	.49	
NE	3	3	17	8	1	0	32	4.33
	.29	.29	1.65	.78	.10	0.00	3.10	
	.04	.04	.23	.11	.01	0.00	.44	
ENE	1	1	4	13	7	1	27	6.16
	.10	.10	.39	1.26	.68	.10	2.62	
	.01	.01	.05	.18	.10	.01	.37	
E	2	1	7	33	19	2	64	6.44
	.19	.10	.68	3.20	1.84	.19	6.21	
	.03	.01	.10	.45	.26	.03	.87	
ESE	0	3	12	29	16	0	60	6.19
	0.00	.29	1.16	2.81	1.55	0.00	5.82	
	0.00	.04	.16	.39	.22	0.00	.82	
SE	1	2	18	55	25	1	102	6.25
	.10	.19	1.75	5.33	2.42	.10	9.89	
	.01	.03	.25	.75	.34	.01	1.39	
SSE	0	2	12	53	40	4	111	6.87
	0.00	.19	1.16	5.14	3.88	.39	10.77	
	0.00	.03	.16	.72	.54	.05	1.51	
S	0	7	28	99	42	11	187	6.56
	0.00	.68	2.72	9.60	4.07	1.07	18.14	
	0.00	.10	.38	1.35	.57	.15	2.55	
SSW	1	3	10	30	22	17	83	7.56
	.10	.29	.97	2.91	2.13	1.65	8.05	
	.01	.04	.14	.41	.30	.23	1.13	
SW	2	7	11	13	7	0	40	5.22
	.19	.68	1.07	1.26	.68	0.00	3.88	
	.03	.10	.15	.18	.10	0.00	.54	
WSW	0	4	10	13	11	0	38	5.89
	0.00	.39	.97	1.26	1.07	0.00	3.69	
	0.00	.05	.14	.18	.15	0.00	.52	
W	0	3	10	33	10	1	57	6.09
	0.00	.29	.97	3.20	.97	.10	5.53	
	0.00	.04	.14	.45	.14	.01	.78	
WNW	1	1	1	20	19	0	42	7.06
	.10	.10	.10	1.94	1.84	0.00	4.07	
	.01	.01	.01	.27	.26	0.00	.57	
NW	0	1	7	23	28	1	60	7.23
	0.00	.10	.68	2.23	2.72	.10	5.82	
	0.00	.01	.10	.31	.38	.01	.82	
NNW	1	1	7	17	17	1	44	6.68
	.10	.10	.68	1.65	1.65	.10	4.27	
	.01	.01	.10	.23	.23	.01	.60	
N	0	2	7	17	17	4	47	6.92
	0.00	.19	.68	1.65	1.65	.39	4.56	
	0.00	.03	.10	.23	.23	.05	.64	
CALM	1						1	CALM
	.10						.10	
	.01						.01	
TOTAL	13	41	171	475	288	43	1031	6.50
	1.26	3.98	16.59	46.07	27.93	4.17	100.00	
	.18	.56	2.33	6.47	3.92	.59	14.04	

WIND SPEED CATEGORIES (METERS PER SECOND)

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-30

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS (60.00 METERS) (ANNUAL)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. MARCH 5, 1979 THROUGH MARCH 4, 1980

STABILITY CLASS: PASQUILL G
DATA SOURCE. ON-SITE
WIND SENSOR HEIGHT. 60.00 METERS
TABLE GENERATED. 11/04/81. 14 42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .14 .01	3 .41 .04	8 1.09 .11	17 2.32 .23	7 .95 .10	1 .14 .01	37 5.04 .50	5.86
NE	0 0.00 0.00	3 .41 .04	29 3.95 .39	17 2.32 .23	2 .27 .03	1 .14 .01	52 7.08 .71	4.85
ENE	1 .14 .01	1 .14 .01	7 .95 .10	13 1.77 .18	10 1.36 .14	1 .14 .01	33 4.50 .45	6.36
E	0 0.00 0.00	0 0.00 0.00	5 .68 .07	17 2.32 .23	17 2.32 .23	0 0.00 0.00	39 5.31 .53	6.93
ESE	0 0.00 0.00	2 .27 .03	8 1.09 .11	27 3.68 .37	18 2.45 .25	1 .14 .01	56 7.63 .76	6.74
SE	1 .14 .01	2 .27 .03	8 1.09 .11	44 5.99 .60	24 3.27 .33	0 0.00 0.00	79 10.76 1.08	6.57
SSE	0 0.00 0.00	3 .41 .04	17 2.32 .23	31 4.22 .42	17 2.32 .23	3 .41 .04	71 9.67 .97	6.50
S	0 0.00 0.00	2 .27 .03	9 1.23 .12	33 4.50 .45	29 3.95 .39	1 .14 .01	74 10.08 1.01	6.97
SSW	0 0.00 0.00	1 .14 .01	17 2.32 .23	27 3.68 .37	19 2.59 .26	1 .14 .01	65 8.86 .88	6.37
SW	1 .14 .01	6 .82 .08	13 1.77 .18	3 .41 .04	6 .82 .08	0 0.00 0.00	29 3.95 .39	4.77
WSW	1 .14 .01	3 .41 .04	4 .54 .05	7 .95 .10	5 .68 .07	0 0.00 0.00	20 2.72 .27	5.61
W	1 .14 .01	6 .82 .08	13 1.77 .18	12 1.63 .16	4 .54 .05	0 0.00 0.00	36 4.90 .49	4.81
WNW	0 0.00 0.00	3 .41 .04	5 .69 .07	19 2.59 .26	9 1.23 .12	0 0.00 0.00	36 4.90 .49	6.17
NW	0 0.00 0.00	0 0.00 0.00	14 1.91 .19	17 2.32 .23	16 2.18 .22	1 .14 .01	48 6.54 .65	6.41
NNW	0 0.00 0.00	2 .27 .03	6 .82 .08	15 2.04 .20	7 .95 .10	0 0.00 0.00	30 4.09 .41	5.81
N	2 .27 .03	2 .27 .03	8 1.09 .11	7 .95 .10	10 1.36 .14	0 0.00 0.00	29 3.95 .39	5.57
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	8 1.09 .11	39 5.31 .53	171 23.30 2.33	306 41.69 4.17	200 27.25 2.72	10 1.36 .14	734 100.00 9.99	6.17

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: MARCH 5, 1979 THROUGH MARCH 4, 1980

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/04/81. 14.42.25.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	3 .04	26 .35	91 1.24	139 1.89	91 1.24	47 .64	397 5.41	6.69
NE	5 .07	37 .50	134 1.82	108 1.47	31 .42	8 .11	323 4.40	5.15
ENE	2 .03	28 .38	81 1.10	123 1.67	57 .78	13 .18	304 4.14	5.88
E	4 .05	25 .34	81 1.10	151 2.06	90 1.23	14 .19	365 4.97	6.16
ESE	2 .03	26 .35	74 1.01	122 1.66	82 1.12	16 .22	322 4.38	6.29
SE	4 .05	24 .33	104 1.42	205 2.79	104 1.42	40 .54	481 6.55	6.46
SSE	0 0.00	33 .45	101 1.38	237 3.23	173 2.36	84 1.14	628 8.55	7.09
S	4 .05	43 .59	137 1.87	473 6.44	372 5.06	333 4.53	1362 18.54	8.07
SSW	3 .04	27 .37	102 1.39	322 4.38	230 3.13	132 1.80	816 11.11	7.49
SW	4 .05	42 .57	82 1.12	87 1.18	69 .94	33 .45	317 4.32	6.31
WSW	2 .03	20 .27	50 .68	56 .76	47 .64	19 .26	194 2.64	6.19
W	4 .05	29 39	84 1.14	107 1.46	79 1.08	25 34	328 4.47	6.24
WNW	2 .03	20 .27	34 .46	77 1.05	69 .94	22 30	224 3.05	6.84
NW	3 .04	11 .15	43 .59	84 1.14	107 1.46	51 .69	299 4.07	7.74
NNW	6 .08	13 .18	50 .68	154 2.10	128 1.74	101 1.38	452 6.15	7.82
N	4 .05	15 20	72 .98	153 2.08	177 2.41	110 1.50	531 7.23	7.86
CALM	2 .03						2 03	CALM
TOTAL	54 .74	419 5.70	1320 17.97	2598 35.37	1906 25.95	1048 14.27	7345 100.00	7.06

NUMBER OF VALID OBSERVATIONS 7345 83.62 PCT.
NUMBER OF INVALID OBSERVATIONS 1439 16.38 PCT.
TOTAL NUMBER OF OBSERVATIONS 8784 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-31

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	2 2.90 .10	1 1.45 .05	1 1.45 .05	3 4.35 .15	0 0.00 0.00	0 0.00 0.00	7 10.14 .35	3.46
NE	0 0.00 0.00	1 1.45 .05	1 1.45 .05	2 2.90 .10	0 0.00 0.00	0 0.00 0.00	4 5.80 .20	4.17
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	4.30
ESE	0 0.00 0.00	4 5.80 .20	1 1.45 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 7.25 .25	3.02
SE	0 0.00 0.00	2 2.90 .10	1 1.45 .05	3 4.35 .15	0 0.00 0.00	0 0.00 0.00	6 8.70 .30	4.48
SSE	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	1 1.45 .05	0 0.00 0.00	0 0.00 0.00	2 2.90 .10	5.05
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 8.70 .30	0 0.00 0.00	6 8.70 .30	8.53
SSW	1 1.45 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	0 0.00 0.00	2 2.90 .10	5.35
SW	0 0.00 0.00	1 1.45 .05	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	0 0.00 0.00	2 2.90 .10	5.30
WSW	0 0.00 0.00	1 1.45 .05	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	0 0.00 0.00	2 2.90 .10	4.90
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 4.35 .15	0 0.00 0.00	0 0.00 0.00	3 4.35 .15	6.87
NW	0 0.00 0.00	0 0.00 0.00	1 1.45 .05	4 5.80 .20	3 4.35 .15	0 0.00 0.00	8 11.59 .40	7.04
NNW	0 0.00 0.00	2 2.90 .10	2 2.90 .10	2 2.90 .10	9 13.04 .45	0 0.00 0.00	15 21.74 .75	6.96
N	2 2.90 .10	0 0.00 0.00	2 2.90 .10	2 2.90 .10	0 0.00 0.00	0 0.00 0.00	6 8.70 .30	3.68
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	5 7.25 .25	12 17.39 .60	11 15.94 .55	20 28.99 1.00	21 30.43 1.05	0 0.00 0.00	69 100.00 3.45	5.55

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	1 .98 .05	3 2.94 .15	3 2.94 .15	1 .98 .05	0 0.00 0.00	8 7.84 .40	4.87
NE	0 0.00 0.00	6 5.88 .30	15 14.71 .75	4 3.92 .20	0 0.00 0.00	0 0.00 0.00	25 24.51 1.25	3.92
ENE	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	4 3.92 .20	4.77
E	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	3.95
ESE	0 0.00 0.00	0 0.00 0.00	4 3.92 .20	1 .98 .05	0 0.00 0.00	0 0.00 0.00	5 4.90 .25	4.12
SE	0 0.00 0.00	2 1.96 .10	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.92 .20	3.45
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
S	0 0.00 0.00	0 0.00 0.00	1 .98 .05	1 .98 .05	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	5.30
SSW	1 .98 .05	0 0.00 0.00	1 .98 .05	2 1.96 .10	1 .98 .05	0 0.00 0.00	5 4.90 .25	5.32
SW	0 0.00 0.00	1 .98 .05	0 0.00 0.00	1 .98 .05	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	3.75
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	0 0.00 0.00	0 0.00 0.00	1 .98 .05	5.30
W	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	1 .98 .05	1 .98 .05	0 0.00 0.00	4 3.92 .20	5.22
WNW	0 0.00 0.00	1 .98 .05	3 2.94 .15	5 4.90 .25	0 0.00 0.00	1 .98 .05	10 9.80 .50	5.67
NW	0 0.00 0.00	0 0.00 0.00	1 .98 .05	1 .98 .05	3 2.94 .15	0 0.00 0.00	5 4.90 .25	7.20
NNW	0 0.00 0.00	2 1.96 .10	1 .98 .05	9 8.82 .45	3 2.94 .15	0 0.00 0.00	15 14.71 .75	6.26
N	0 0.00 0.00	4 3.92 .20	3 2.94 .15	1 .98 .05	2 1.96 .10	0 0.00 0.00	10 9.80 .50	4.56
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .98 .05	17 16.67 .85	40 39.22 2.00	32 31.37 1.60	11 10.78 .55	1 .98 .05	102 100.00 5.10	4.92

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	8 5.84 .40	3 2.19 .15	3 2.19 .15	0 0.00 0.00	14 10.22 .70	5.57
NE	0 0.00 0.00	4 2.92 .20	2 1.46 .10	1 .73 .05	0 0.00 0.00	0 0.00 0.00	7 5.11 .35	3.37
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	0 0.00 0.00	4 2.92 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.92 .20	4.12
ESE	0 0.00 0.00	1 .73 .05	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	3.60
SE	1 .73 .05	0 0.00 0.00	0 0.00 0.00	1 .73 .05	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	3.95
SSE	0 0.00 0.00	1 .73 .05	1 .73 .05	2 1.46 .10	0 0.00 0.00	0 0.00 0.00	4 2.92 .20	4.25
S	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	4 2.92 .20	3 2.19 .15	0 0.00 0.00	9 6.57 .45	6.54
SSW	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	8 5.84 .40	1 .73 .05	3 2.19 .15	14 10.22 .70	6.99
SW	0 0.00 0.00	0 0.00 0.00	1 .73 .05	2 1.46 .10	0 0.00 0.00	0 0.00 0.00	3 2.19 .15	5.80
WSW	1 .73 .05	4 2.92 .20	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.38 .30	2.33
W	0 0.00 0.00	3 2.19 .15	5 3.65 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.84 .40	3.26
WNW	1 .73 .05	2 1.46 .10	3 2.19 .15	7 5.11 .35	1 .73 .05	0 0.00 0.00	14 10.22 .70	5.21
NW	0 0.00 0.00	0 0.00 0.00	1 .73 .05	7 5.11 .35	4 2.92 .20	3 2.19 .15	15 10.95 .75	8.05
NNW	0 0.00 0.00	0 0.00 0.00	6 4.38 .30	7 5.11 .35	3 2.19 .15	1 .73 .05	17 12.41 .85	5.92
N	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	12 8.76 .60	4 2.92 .20	0 0.00 0.00	18 13.14 .90	6.53
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 2.19 .15	15 10.95 .75	39 28.47 1.95	54 39.42 2.70	19 13.87 .95	7 5.11 .35	137 100.00 6.85	5.67

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	5 .63 .25	14 1.76 .70	31 3.90 1.55	29 3.65 1.45	10 1.26 .50	0 0.00 0.00	89 11.19 4.45	4.66
NE	3 .38 .15	12 1.51 .60	29 3.65 1.45	14 1.76 .70	9 1.13 .45	0 0.00 0.00	67 8.43 3.35	4.67
ENE	10 1.26 .50	9 1.13 .45	15 1.89 .75	4 .50 .20	0 0.00 0.00	0 0.00 0.00	38 4.78 1.90	3.04
E	6 .75 .30	8 1.01 .40	16 2.01 .80	8 1.01 .40	0 0.00 0.00	0 0.00 0.00	38 4.78 1.90	3.60
ESE	1 .13 .05	2 .25 .10	9 1.13 .45	2 .25 .10	0 0.00 0.00	0 0.00 0.00	14 1.76 .70	4.07
SE	1 .13 .05	3 .38 .15	5 .63 .25	4 .50 .20	0 0.00 0.00	0 0.00 0.00	13 1.64 .65	4.18
SSE	1 .13 .05	2 .25 .10	17 2.14 .85	10 1.26 .50	2 .25 .10	0 0.00 0.00	32 4.03 1.60	4.71
S	1 .13 .05	7 .88 .35	23 2.89 1.15	26 3.27 1.30	28 3.52 1.40	1 .13 .05	86 10.82 4.30	6.22
SSW	3 .38 .15	6 .75 .30	5 .63 .25	13 1.64 .65	9 1.13 .45	3 .38 .15	39 4.91 1.95	5.88
SW	3 .38 .15	11 1.38 .55	7 .88 .35	5 .63 .25	2 .25 .10	0 0.00 0.00	28 3.52 1.40	3.64
WSW	3 .38 .15	10 1.26 .50	15 1.89 .75	4 .50 .20	0 0.00 0.00	0 0.00 0.00	32 4.03 1.60	3.37
W	3 .38 .15	12 1.51 .60	21 2.64 1.05	7 .88 .35	0 0.00 0.00	0 0.00 0.00	43 5.41 2.15	3.57
WNW	3 .38 .15	9 1.13 .45	11 1.38 .55	19 2.39 .95	10 1.26 .50	0 0.00 0.00	52 6.54 2.60	5.34
NW	0 0.00 0.00	3 .38 .15	19 2.39 .95	25 3.14 1.25	12 1.51 .60	2 .25 .10	61 7.67 3.05	5.97
NNW	2 .25 .10	5 .63 .25	12 1.51 .60	18 2.26 .90	9 1.13 .45	3 .38 .15	49 6.16 2.45	5.79
N	4 .50 .20	16 2.01 .80	34 4.28 1.70	38 4.78 1.90	17 2.14 .85	1 .13 .05	110 13.84 5.50	5.24
CALM	4 .50 .20						4 .50 .20	CALM
TOTAL	53 6.67 2.65	129 16.23 6.45	269 33.84 13.44	226 28.43 11.29	108 13.58 5.40	10 1.26 .50	795 100.00 39.73	4.87

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	8	7	1	0	0	16	3.19
	0.00	1.66	1.45	.21	0.00	0.00	3.31	
	0.00	.40	.35	.05	0.00	0.00	.80	
NE	2	13	12	1	0	0	28	3.12
	.41	2.69	2.48	.21	0.00	0.00	5.80	
	.10	.65	.60	.05	0.00	0.00	1.40	
ENE	0	8	9	1	0	0	18	3.34
	0.00	1.66	1.86	.21	0.00	0.00	3.73	
	0.00	.40	.45	.05	0.00	0.00	.90	
E	1	6	9	6	1	0	23	4.27
	.21	1.24	1.86	1.24	.21	0.00	4.76	
	.05	.30	.45	.30	.05	0.00	1.15	
ESE	1	6	6	3	0	0	16	3.46
	.21	1.24	1.24	.62	0.00	0.00	3.31	
	.05	.30	.30	.15	0.00	0.00	.80	
SE	3	5	7	7	0	0	22	3.93
	.62	1.04	1.45	1.45	0.00	0.00	4.55	
	.15	.25	.35	.35	0.00	0.00	1.10	
SSE	1	10	26	24	1	0	62	4.67
	.21	2.07	5.38	4.97	.21	0.00	12.84	
	.05	.50	1.30	1.20	.05	0.00	3.10	
S	2	14	27	34	8	5	90	5.36
	.41	2.90	5.59	7.04	1.66	1.04	18.63	
	.10	.70	1.35	1.70	.40	.25	4.50	
SSW	0	6	9	14	9	4	42	6.15
	0.00	1.24	1.86	2.90	1.86	.83	8.70	
	0.00	.30	.45	.70	.45	.20	2.10	
SW	3	7	4	3	0	0	17	3.03
	.62	1.45	.83	.62	0.00	0.00	3.52	
	.15	.35	.20	.15	0.00	0.00	.85	
WSW	1	6	3	2	0	0	12	3.20
	.21	1.24	.62	.41	0.00	0.00	2.48	
	.05	.30	.15	.10	0.00	0.00	.60	
W	0	10	2	8	1	0	21	4.15
	0.00	2.07	.41	1.66	.21	0.00	4.35	
	0.00	.50	.10	.40	.05	0.00	1.05	
WNW	0	14	15	8	0	0	37	3.65
	0.00	2.90	3.11	1.66	0.00	0.00	7.66	
	0.00	.70	.75	.40	0.00	0.00	1.85	
NW	3	4	19	3	1	0	30	3.78
	.62	.83	3.93	.62	.21	0.00	6.21	
	.15	.20	.95	.15	.05	0.00	1.50	
NNW	0	14	7	6	0	0	27	3.64
	0.00	2.90	1.45	1.24	0.00	0.00	5.59	
	0.00	.70	.35	.30	0.00	0.00	1.35	
N	1	8	8	4	1	0	22	3.88
	.21	1.66	1.66	.83	.21	0.00	4.55	
	.05	.40	.40	.20	.05	0.00	1.10	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	18	139	170	125	22	9	483	4.30
	3.73	28.78	35.20	25.88	4.55	1.86	100.00	
	.90	6.95	8.50	6.25	1.10	.45	24.14	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	3	2	0	0	0	5	2.86
	0.00	1.11	.74	0.00	0.00	0.00	1.85	
	0.00	.15	.10	0.00	0.00	0.00	.25	
NE	2	7	3	0	0	0	12	2.30
	.74	2.58	1.11	0.00	0.00	0.00	4.43	
	.10	.35	.15	0.00	0.00	0.00	.60	
ENE	4	7	0	0	0	0	11	1.86
	1.48	2.58	0.00	0.00	0.00	0.00	4.06	
	.20	.35	0.00	0.00	0.00	0.00	.55	
E	0	6	5	2	0	0	13	3.46
	0.00	2.21	1.85	.74	0.00	0.00	4.80	
	0.00	.30	.25	.10	0.00	0.00	.65	
ESE	1	3	2	4	0	0	10	3.68
	.37	1.11	.74	1.48	0.00	0.00	3.69	
	.05	.15	.10	.20	0.00	0.00	.50	
SE	2	5	7	0	0	0	14	2.70
	.74	1.85	2.58	0.00	0.00	0.00	5.17	
	.10	.25	.35	0.00	0.00	0.00	.70	
SSE	1	9	18	1	0	0	29	3.39
	.37	3.32	6.64	.37	0.00	0.00	10.70	
	.05	.45	.90	.05	0.00	0.00	1.45	
S	0	8	27	2	0	0	37	3.68
	0.00	2.95	9.96	.74	0.00	0.00	13.65	
	0.00	.40	1.35	.10	0.00	0.00	1.85	
SSW	0	9	18	5	0	0	32	3.80
	0.00	3.32	6.64	1.85	0.00	0.00	11.81	
	0.00	.45	.90	.25	0.00	0.00	1.60	
SW	2	10	3	0	0	0	15	2.45
	.74	3.69	1.11	0.00	0.00	0.00	5.54	
	.10	.50	.15	0.00	0.00	0.00	.75	
WSW	2	4	4	0	0	0	10	2.66
	.74	1.48	1.48	0.00	0.00	0.00	3.69	
	.10	.20	.20	0.00	0.00	0.00	.50	
W	2	9	7	3	0	0	21	3.19
	.74	3.32	2.58	1.11	0.00	0.00	7.75	
	.10	.45	.35	.15	0.00	0.00	1.05	
WNW	1	11	6	0	0	0	18	2.64
	.37	4.06	2.21	0.00	0.00	0.00	6.64	
	.05	.55	.30	0.00	0.00	0.00	.90	
NW	0	17	7	0	0	0	24	2.69
	0.00	6.27	2.58	0.00	0.00	0.00	8.86	
	0.00	.85	.35	0.00	0.00	0.00	1.20	
NNW	2	4	5	0	0	0	11	2.74
	.74	1.48	1.85	0.00	0.00	0.00	4.06	
	.10	.20	.25	0.00	0.00	0.00	.55	
N	1	2	5	0	0	0	8	3.41
	.37	.74	1.85	0.00	0.00	0.00	2.95	
	.05	.10	.25	0.00	0.00	0.00	.40	
CALM	1						1	CALM
	.37						.37	
	.05						.05	
TOTAL	21	114	119	17	0	0	271	3.09
	7.75	42.07	43.91	6.27	0.00	0.00	100.00	
	1.05	5.70	5.95	.85	0.00	0.00	13.54	

KEY
XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 1.39 .10	11 7.64 .55	3 2.08 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	16 11.11 .80	2.54
NE	1 .69 .05	1 .69 .05	4 2.78 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.17 .30	3.22
ENE	1 .69 .05	1 .69 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	1.55
E	3 2.08 .15	2 1.39 .10	4 2.78 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 6.25 .45	2.37
ESE	0 0.00 0.00	4 2.78 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.78 .20	2.45
SE	3 2.08 .15	10 6.94 .50	6 4.17 .30	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	19 13.19 .95	2.51
SSE	2 1.39 .10	12 8.33 .60	8 5.56 .40	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 15.28 1.10	2.74
S	5 3.47 .25	9 6.25 .45	7 4.86 .35	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	21 14.58 1.05	2.60
SSW	2 1.39 .10	5 3.47 .25	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 6.25 .45	2.49
SW	0 0.00 0.00	1 .69 .05	1 .69 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	2.55
WSW	2 1.39 .10	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.78 .20	1.85
W	1 .69 .05	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.08 .15	2.17
WNW	3 2.03 .15	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.47 .25	1.36
NW	1 .69 .05	4 2.78 .20	1 .69 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.17 .30	2.18
NNW	0 0.00 0.00	4 2.78 .20	5 3.47 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 6.25 .45	2.93
N	1 .69 .05	5 3.47 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.17 .30	2.03
CALM	1 .69 .05						1 .69 .05	CALM
TOTAL	28 19.44 1.40	75 52.08 3.75	41 28.47 2.05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	144 100.00 7.20	2.48

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	9 .45	38 1.90	55 2.75	39 1.95	14 70	0 0.00	155 7 75	4 27
NE	8 .40	44 2.20	66 3.30	22 1.10	9 .45	0 0.00	149 7.45	3.93
ENF	15 .75	25 1.25	26 1.30	7 .35	0 0.00	0 0.00	73 3.65	2.99
E	10 .50	22 1.10	41 2.05	16 .80	1 .05	0 0.00	90 4.50	3.67
ESE	3 .15	20 1.00	23 1.15	10 .50	0 0.00	0 0.00	56 2.80	3.61
SE	10 .50	27 1.35	28 1.40	15 .75	0 0.00	0 0.00	80 4.00	3.43
SSE	5 .25	34 1.70	71 3.55	38 1.90	3 .15	0 0.00	151 7.55	4.14
S	8 .40	38 1.90	87 4.35	67 3.35	45 2.25	6 .30	251 12.54	5.30
SSW	7 .35	26 1.30	37 1.85	42 2.10	21 1.05	10 .50	143 7.15	5.36
SW	8 .40	31 1.55	16 .80	11 .55	3 .15	0 0.00	69 3.45	3.35
WSW	9 .45	27 1.35	23 1.15	7 .35	1 .05	0 0.00	67 3.35	3.12
W	6 .30	36 1.80	37 1.85	19 .95	2 .10	0 0.00	100 5.00	3.61
WNW	8 .40	39 1.95	38 1.90	42 2.10	11 .55	1 .05	139 6.95	4.44
NW	4 .20	28 1.40	49 2.45	40 2.00	23 1.15	5 .25	149 7.45	5.16
NNW	4 .20	31 1.55	38 1.90	42 2.10	24 1.20	4 .20	143 7.15	5.16
N	9 .45	35 1 75	54 2.70	57 2.85	24 1.20	1 .05	180 9.00	4 93
CALM	6 .30						6 .30	CALM
TOTAL	129 6.45	501 25.04	689 34.43	474 23.69	181 9.05	27 1.35	2001 100 00	4.40

NUMBER OF VALID OBSERVATIONS 2001 89.65 PCT.
NUMBER OF INVALID OBSERVATIONS 231 10.35 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 1.01 .05	2 2.02 .11	1 1.01 .05	3 3.03 .16	0 0.00 0.00	7 7.07 .38	6.07
NE	1 1.01 .05	1 1.01 .05	0 0.00 0.00	0 0.00 0.00	5 5.05 .27	0 0.00 0.00	7 7.07 .38	6.46
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	2 2.02 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.02 .11	2.65
ESE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
SE	1 1.01 .05	1 1.01 .05	0 0.00 0.00	2 2.02 .11	0 0.00 0.00	2 2.02 .11	6 6.06 .32	6.02
SSE	0 0.00 0.00	1 1.01 .05	2 2.02 .11	2 2.02 .11	0 0.00 0.00	2 2.02 .11	7 7.07 .38	6.81
S	0 0.00 0.00	1 1.01 .05	2 2.02 .11	0 0.00 0.00	3 3.03 .16	3 3.03 .16	9 9.09 .49	7.89
SSW	1 1.01 .05	1 1.01 .05	0 0.00 0.00	1 1.01 .05	0 0.00 0.00	0 0.00 0.00	3 3.03 .16	3.53
SW	3 3.03 .16	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.02 .11	1 1.01 .05	6 6.06 .32	5.15
WSW	1 1.01 .05	3 3.03 .16	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 4.04 .22	1.95
W	0 0.00 0.00	1 1.01 .05	2 2.02 .11	3 3.03 .16	0 0.00 0.00	0 0.00 0.00	6 6.06 .32	4.68
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.01 .05	0 0.00 0.00	1 1.01 .05	7.80
NW	0 0.00 0.00	0 0.00 0.00	2 2.02 .11	4 4.04 .22	2 2.02 .11	0 0.00 0.00	8 8.08 .43	6.11
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 5.05 .27	11 11.11 .59	2 2.02 .11	18 18.18 .97	8.66
N	0 0.00 0.00	0 0.00 0.00	2 2.02 .11	9 9.09 .49	1 1.01 .05	3 3.03 .16	15 15.15 .81	7.03
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	7 7.07 .38	12 12.12 .65	12 12.12 .65	27 27.27 1.46	28 28.28 1.51	13 13.13 .70	99 100.00 5.35	6.50

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 2.13 .11	4 4.26 .22	0 0.00 0.00	3 3.19 .16	2 2.13 .11	11 11.70 .59	6.15
NE	0 0.00 0.00	0 0.00 0.00	2 2.13 .11	0 0.00 0.00	1 1.06 .05	0 0.00 0.00	3 3.19 .16	5.00
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	1 1.06 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.06 .05	1.40
ESE	0 0.00 0.00	2 2.13 .11	1 1.06 .05	1 1.06 .05	1 1.06 .05	0 0.00 0.00	5 5.32 .27	4.38
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
SSE	0 0.00 0.00	0 0.00 0.00	1 1.06 .05	1 1.06 .05	0 0.00 0.00	0 0.00 0.00	2 2.13 .11	6.20
S	0 0.00 0.00	0 0.00 0.00	1 1.06 .05	0 0.00 0.00	1 1.06 .05	0 0.00 0.00	2 2.13 .11	5.80
SSW	0 0.00 0.00	1 1.06 .05	6 6.38 .32	4 4.26 .22	4 4.26 .22	0 0.00 0.00	15 15.96 .81	6.04
SW	0 0.00 0.00	0 0.00 0.00	3 3.19 .16	1 1.06 .05	2 2.13 .11	1 1.06 .05	7 7.45 .38	6.60
WSW	0 0.00 0.00	1 1.06 .05	2 2.13 .11	1 1.06 .05	1 1.06 .05	0 0.00 0.00	5 5.32 .27	4.86
W	1 1.06 .05	0 0.00 0.00	2 2.13 .11	2 2.13 .11	0 0.00 0.00	0 0.00 0.00	5 5.32 .27	4.08
WNW	0 0.00 0.00	1 1.06 .05	1 1.06 .05	3 3.19 .16	0 0.00 0.00	0 0.00 0.00	5 5.32 .27	5.78
NW	0 0.00 0.00	1 1.06 .05	0 0.00 0.00	6 6.38 .32	3 3.19 .16	0 0.00 0.00	10 10.64 .54	6.73
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 6.38 .32	5 5.32 .27	1 1.06 .05	12 12.77 .65	7.47
N	0 0.00 0.00	0 0.00 0.00	3 3.19 .16	5 5.32 .27	1 1.06 .05	2 2.13 .11	11 11.70 .59	6.95
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 2.13 .11	8 8.51 .43	26 27.66 1.40	30 31.91 1.62	22 23.40 1.19	6 6.38 .32	94 100.00 5.08	6.10

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0 0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	1	0	2	0	4	5.88
	0.00	.85	.85	0.00	1.69	0.00	3.39	
	0.00	.05	.05	0.00	.11	0.00	.22	
NF	0	3	2	0	1	0	6	3.78
	0.00	2.54	1.69	0.00	.85	0.00	5.08	
	0.00	.16	.11	0.00	.05	0.00	.32	
ENE	0	0	3	3	0	0	6	5.52
	0.00	0.00	2.54	2.54	0.00	0.00	5.08	
	0.00	0.00	.16	.16	0.00	0.00	.32	
E	0	1	0	0	0	0	1	2.80
	0.00	.85	0.00	0.00	0.00	0.00	.85	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
ESE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
SE	0	0	3	1	0	0	4	4.50
	0.00	0.00	2.54	.85	0.00	0.00	3.39	
	0.00	0.00	.16	.05	0.00	0.00	.22	
SSE	0	0	1	2	2	0	5	6.24
	0.00	0.00	.85	1.69	1.69	0.00	4.24	
	0.00	0.00	.05	.11	.11	0.00	.27	
S	0	1	3	3	1	1	9	6.17
	0.00	.85	2.54	2.54	.85	.85	7.63	
	0.00	.05	.16	.16	.05	.05	.49	
SSW	0	2	6	4	6	0	18	5.76
	0.00	1.69	5.08	3.39	5.08	0.00	15.25	
	0.00	.11	.32	.22	.32	0.00	.97	
SW	0	0	1	0	0	1	2	6.95
	0.00	0.00	.85	0.00	0.00	.85	1.69	
	0.00	0.00	.05	0.00	0.00	.05	.11	
WSW	0	0	4	2	0	0	6	4.55
	0.00	0.00	3.39	1.69	0.00	0.00	5.08	
	0.00	0.00	.22	.11	0.00	0.00	.32	
W	1	1	5	0	0	0	7	3.59
	.85	.85	4.24	0.00	0.00	0.00	5.93	
	.05	.05	.27	0.00	0.00	0.00	.38	
WNW	0	0	1	3	1	0	5	6.36
	0.00	0.00	.85	2.54	.85	0.00	4.24	
	0.00	0.00	.05	.16	.05	0.00	.27	
NW	0	0	3	7	4	1	15	6.79
	0.00	0.00	2.54	5.93	3.39	.85	12.71	
	0.00	0.00	.16	.38	.22	.05	.81	
NNW	0	0	2	7	1	1	11	6.30
	0.00	0.00	1.69	5.93	.85	.85	9.32	
	0.00	0.00	.11	.38	.05	.05	.59	
N	0	2	5	7	4	1	19	6.14
	0.00	1.69	4.24	5.93	3.39	.85	16.10	
	0.00	.11	.27	.38	.22	.05	1.03	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	1	11	40	39	22	5	118	5.73
	.85	9.32	33.90	33.05	18.64	4.24	100.00	
	.05	.59	2.16	2.11	1.19	.27	6.37	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	16	34	18	3	1	74	4.24
	.24	1.92	4.09	2.16	.36	.12	8.89	
	.11	.86	1.84	.97	.16	.05	4.00	
NE	2	13	25	10	4	2	56	4.58
	.24	1.56	3.00	1.20	.48	.24	6.73	
	.11	.70	1.35	.54	.22	.11	3.02	
ENE	1	7	17	18	5	0	48	4.93
	.12	.84	2.04	2.16	.60	0.00	5.77	
	.05	.38	.92	.97	.27	0.00	2.59	
E	1	5	23	10	1	0	40	4.25
	.12	.60	2.76	1.20	.12	0.00	4.81	
	.05	.27	1.24	.54	.05	0.00	2.16	
ESE	1	9	18	9	2	0	39	4.29
	.12	1.08	2.16	1.08	.24	0.00	4.69	
	.05	.49	.97	.49	.11	0.00	2.11	
SE	1	10	10	1	0	0	22	3.32
	.12	1.20	1.20	.12	0.00	0.00	2.64	
	.05	.54	.54	.05	0.00	0.00	1.19	
SSE	0	6	13	12	3	1	35	4.94
	0.00	.72	1.56	1.44	.36	.12	4.21	
	0.00	.32	.70	.65	.16	.05	1.89	
S	0	1	19	18	9	6	53	6.42
	0.00	.12	2.28	2.16	1.08	.72	6.37	
	0.00	.05	1.03	.97	.49	.32	2.86	
SSW	2	4	6	18	6	1	37	5.70
	.24	.48	.72	2.16	.72	.12	4.45	
	.11	.22	.32	.97	.32	.05	2.00	
SW	2	2	6	4	2	0	16	4.75
	.24	.24	.72	.48	.24	0.00	1.92	
	.11	.11	.32	.22	.11	0.00	.86	
WSW	2	3	4	1	3	1	14	4.93
	.24	.36	.48	.12	.36	.12	1.68	
	.11	.16	.22	.05	.16	.05	.76	
W	6	5	18	4	3	0	36	4.04
	.72	.60	2.16	.48	.36	0.00	4.33	
	.32	.27	.97	.22	.16	0.00	1.94	
WNW	0	9	9	14	2	7	41	5.88
	0.00	1.08	1.08	1.68	.24	.84	4.93	
	0.00	.49	.49	.76	.11	.38	2.21	
NW	2	14	15	17	22	11	81	6.57
	.24	1.68	1.80	2.04	2.64	1.32	9.74	
	.11	.76	.81	.92	1.19	.59	4.37	
NNW	2	21	27	37	32	17	136	6.34
	.24	2.52	3.25	4.45	3.85	2.04	16.35	
	.11	1.13	1.46	2.00	1.73	.92	7.34	
N	2	11	36	33	18	4	104	5.57
	.24	1.32	4.33	3.97	2.16	.48	12.50	
	.11	.59	1.94	1.78	.97	.22	5.62	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	26	136	280	224	115	51	832	5.34
	3.12	16.35	33.65	26.92	13.82	6.13	100.00	
	1.40	7.34	15.12	12.10	6.21	2.75	44.92	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT. 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	4	8	1	0	0	15	3.17
	.60	1.20	2.40	.30	0.00	0.00	4.49	
	.11	.22	.43	.05	0.00	0.00	.81	
NE	0	1	1	0	0	0	2	2.70
	0.00	.30	.30	0.00	0.00	0.00	.60	
	0.00	.05	.05	0.00	0.00	0.00	.11	
ENE	2	8	1	2	0	0	13	2.88
	.60	2.40	.30	.60	0.00	0.00	3.89	
	.11	.43	.05	.11	0.00	0.00	.70	
E	1	6	13	0	0	0	20	3.58
	.30	1.80	3.89	0.00	0.00	0.00	5.99	
	.05	.32	.70	0.00	0.00	0.00	1.08	
ESE	0	5	5	2	1	0	13	4.07
	0.00	1.50	1.50	.60	.30	0.00	3.89	
	0.00	.27	.27	.11	.05	0.00	.70	
SE	2	9	3	5	0	0	19	3.51
	.60	2.69	.90	1.50	0.00	0.00	5.69	
	.11	.49	.16	.27	0.00	0.00	1.03	
SSE	2	0	21	21	3	0	47	5.07
	.60	0.00	6.29	6.29	.90	0.00	14.07	
	.11	0.00	1.13	1.13	.16	0.00	2.54	
S	0	8	20	19	4	1	52	4.97
	0.00	2.40	5.99	5.69	1.20	.30	15.57	
	0.00	.43	1.08	1.03	.22	.05	2.81	
SSW	2	1	8	4	0	0	15	4.17
	.60	.30	2.40	1.20	0.00	0.00	4.49	
	.11	.05	.43	.22	0.00	0.00	.81	
SW	1	1	4	3	0	0	9	4.20
	.30	.30	1.20	.90	0.00	0.00	2.69	
	.05	.05	.22	.16	0.00	0.00	.49	
WSW	0	3	6	2	0	0	11	3.93
	0.00	.90	1.80	.60	0.00	0.00	3.29	
	0.00	.16	.32	.11	0.00	0.00	.59	
W	1	7	7	4	0	0	19	3.54
	.30	2.10	2.10	1.20	0.00	0.00	5.69	
	.05	.38	.38	.22	0.00	0.00	1.03	
WNW	4	4	9	1	0	0	18	2.95
	1.20	1.20	2.69	.30	0.00	0.00	5.39	
	.22	.22	.49	.05	0.00	0.00	.97	
NW	0	9	10	7	1	1	28	4.17
	0.00	2.69	2.99	2.10	.30	.30	8.38	
	0.00	.49	.54	.38	.05	.05	1.51	
NNW	2	6	7	2	1	0	18	3.49
	.60	1.80	2.10	.60	.30	0.00	5.39	
	.11	.32	.38	.11	.05	0.00	.97	
N	2	10	12	10	1	0	35	4.06
	.60	2.99	3.59	2.99	.30	0.00	10.48	
	.11	.54	.65	.54	.05	0.00	1.89	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	21	82	135	83	11	2	334	4.08
	6.29	24.55	40.42	24.85	3.29	.60	100.00	
	1.13	4.43	7.29	4.48	.59	.11	18.03	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	6	1	0	0	0	7	2.70
	0.00	2.52	.42	0.00	0.00	0.00	2.94	
	0.00	.32	.05	0.00	0.00	0.00	.38	
NE	0	5	5	0	0	0	10	3.16
	0.00	2.10	2.10	0.00	0.00	0.00	4.20	
	0.00	.27	.27	0.00	0.00	0.00	.54	
ENE	0	5	3	0	0	0	8	2.61
	0.00	2.10	1.26	0.00	0.00	0.00	3.36	
	0.00	.27	.16	0.00	0.00	0.00	.43	
E	1	6	4	1	0	0	12	3.06
	.42	2.52	1.68	.42	0.00	0.00	5.04	
	.05	.32	.22	.05	0.00	0.00	.65	
ESE	0	3	4	0	0	0	7	3.14
	0.00	1.26	1.68	0.00	0.00	0.00	2.94	
	0.00	.16	.22	0.00	0.00	0.00	.38	
SE	3	0	10	2	0	0	15	3.72
	1.26	0.00	4.20	.84	0.00	0.00	6.30	
	.16	0.00	.54	.11	0.00	0.00	.81	
SSE	1	7	11	7	0	0	26	3.93
	.42	2.94	4.62	2.94	0.00	0.00	10.92	
	.05	.38	.59	.38	0.00	0.00	1.40	
S	2	6	25	5	0	0	38	3.57
	.84	2.52	10.50	2.10	0.00	0.00	15.97	
	.11	.32	1.35	.27	0.00	0.00	2.05	
SSW	2	6	13	0	0	0	21	3.20
	.84	2.52	5.46	0.00	0.00	0.00	8.82	
	.11	.32	.70	0.00	0.00	0.00	1.13	
SW	0	7	4	1	0	0	12	3.19
	0.00	2.94	1.68	.42	0.00	0.00	5.04	
	0.00	.38	.22	.05	0.00	0.00	.65	
WSW	1	8	6	0	0	0	15	2.75
	.42	3.36	2.52	0.00	0.00	0.00	6.30	
	.05	.43	.32	0.00	0.00	0.00	.81	
W	2	12	4	0	0	0	18	2.63
	.84	5.04	1.68	0.00	0.00	0.00	7.56	
	.11	.65	.22	0.00	0.00	0.00	.97	
WNW	0	6	7	0	0	0	13	3.03
	0.00	2.52	2.94	0.00	0.00	0.00	5.46	
	0.00	.32	.38	0.00	0.00	0.00	.70	
NW	1	10	2	0	0	0	13	2.28
	.42	4.20	.84	0.00	0.00	0.00	5.46	
	.05	.54	.11	0.00	0.00	0.00	.70	
NNW	3	2	5	0	0	0	10	2.78
	1.26	.84	2.10	0.00	0.00	0.00	4.20	
	.16	.11	.27	0.00	0.00	0.00	.54	
N	1	5	5	1	0	0	12	2.93
	.42	2.10	2.10	.42	0.00	0.00	5.04	
	.05	.27	.27	.05	0.00	0.00	.65	
CALM	1						1	CALM
	.42						.42	
	.05						.05	
TOTAL	18	94	109	17	0	0	238	3.15
	7.56	39.50	45.80	7.14	0.00	0.00	100.00	
	.97	5.08	5.89	.92	0.00	0.00	12.85	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY -10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .73 .05	.60
NE	0 0.00 0.00	1 .73 .05	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.46 .11	3.25
ENE	0 0.00 0.00	1 .73 .05	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.46 .11	3.05
E	0 0.00 0.00	0 0.00 0.00	7 5.11 .38	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 5.11 .38	3.66
ESE	0 0.00 0.00	0 0.00 0.00	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .73 .05	3.30
SE	2 1.46 .11	5 3.65 .27	5 3.65 .27	1 .73 .05	0 0.00 0.00	0 0.00 0.00	13 9.49 .70	2.99
SSE	1 .73 .05	0 0.00 0.00	7 5.11 .38	4 2.92 .22	0 0.00 0.00	0 0.00 0.00	12 8.76 .65	4.12
S	4 2.92 .22	2 1.46 .11	3 2.19 .16	2 1.46 .11	0 0.00 0.00	0 0.00 0.00	11 8.03 .59	2.88
SSW	6 4.38 .32	5 3.65 .27	5 3.65 .27	1 .73 .05	0 0.00 0.00	0 0.00 0.00	17 12.41 .92	2.43
SW	3 2.19 .16	4 2.92 .22	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.84 .43	1.89
WSW	2 1.46 .11	6 4.38 .32	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.84 .43	2.06
W	4 2.92 .22	14 10.22 .76	2 1.46 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 14.60 1.08	2.19
WNW	5 3.65 .27	10 7.30 .54	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 10.95 .81	1.73
NW	4 2.92 .22	6 4.38 .32	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 8.03 .59	2.19
NNW	0 0.00 0.00	6 4.38 .32	2 1.46 .11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.84 .43	2.46
N	0 0.00 0.00	0 0.00 0.00	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .73 .05	4.70
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	32 23.36 1.73	60 43.80 3.24	37 27.01 2.00	8 5.84 .43	0 0.00 0.00	0 0.00 0.00	137 100.00 7.40	2.58

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	5 .27	30 1.62	50 2.70	20 1.08	11 .59	3 .16	119 6.43	4.32
NE	3 .16	24 1.30	36 1.94	10 .54	11 .59	2 .11	86 4.64	4.45
ENE	3 .16	21 1.13	25 1.35	23 1.24	5 .27	0 0.00	77 4.16	4.34
E	4 .22	20 1.08	47 2.54	11 .59	1 .05	0 0.00	83 4.48	3.78
ESE	1 .05	19 1.03	29 1.57	12 .65	4 .22	0 0.00	65 3.51	4.12
SE	9 .49	25 1.35	31 1.67	12 .65	0 0.00	2 .11	79 4.27	3.65
SSE	4 .22	14 .76	56 3.02	49 2.65	8 .43	3 .16	134 7.24	4.88
S	6 .32	19 1.03	73 3.94	47 2.54	18 .97	11 .59	174 9.40	5.19
SSW	13 .70	20 1.08	44 2.38	32 1.73	16 .86	1 .05	126 6.80	4.66
SW	9 .49	14 .76	19 1.03	9 .49	6 .32	3 .16	60 3.24	4.30
WSW	6 .32	24 1.30	22 1.19	6 .32	4 .22	1 .05	63 3.40	3.64
W	15 .81	40 2.16	40 2.16	13 .70	3 .16	0 0.00	111 5.99	3.40
WNW	9 .49	30 1.62	27 1.46	21 1.13	4 .22	7 .38	98 5.29	4.37
NW	7 .38	40 2.16	33 1.78	41 2.21	32 1.73	13 .70	166 8.96	5.55
NNW	7 .38	35 1.89	43 2.32	57 3.08	50 2.70	21 1.13	213 11.50	6.05
N	5 .27	28 1.51	64 3.46	65 3.51	25 1.35	10 .54	197 10.64	5.38
CALM	1 .05						1 .05	CALM
TOTAL	107 5.78	403 21.76	639 34.50	428 23.11	198 10.69	77 4.16	1852 100.00	4.76

NUMBER OF VALID OBSERVATIONS 1852 90.78 PCT
NUMBER OF INVALID OBSERVATIONS 188 9.22 PCT.
TOTAL NUMBER OF OBSERVATIONS 2040 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	2	6	5	4	0	17	5.56
	0.00	.90	2.71	2.26	1.81	0.00	7.69	
	0.00	.12	.36	.30	.24	0.00	1.03	
NE	0	0	2	0	0	0	2	3.45
	0.00	0.00	.90	0.00	0.00	0.00	.90	
	0.00	0.00	.12	0.00	0.00	0.00	.12	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	0	0	0	1	0	1	8.20
	0.00	0.00	0.00	0.00	.45	0.00	.45	
	0.00	0.00	0.00	0.00	.06	0.00	.06	
ESE	1	0	0	1	0	0	2	3.60
	.45	0.00	0.00	.45	0.00	0.00	.90	
	.06	0.00	0.00	.06	0.00	0.00	.12	
SE	0	0	2	5	2	0	9	6.31
	0.00	0.00	.90	2.26	.90	0.00	4.07	
	0.00	0.00	.12	.30	.12	0.00	.54	
SSE	0	1	2	13	7	2	25	7.07
	0.00	.45	.90	5.88	3.17	.90	11.31	
	0.00	.06	.12	.79	.42	.12	1.51	
S	0	0	2	10	11	2	25	7.39
	0.00	0.00	.90	4.52	4.98	.90	11.31	
	0.00	0.00	.12	.60	.66	.12	1.51	
SSW	1	1	1	10	7	12	32	8.28
	.45	.45	.45	4.52	3.17	5.43	14.48	
	.06	.06	.06	.60	.42	.72	1.93	
SW	0	2	3	0	5	4	14	7.71
	0.00	.90	1.36	0.00	2.26	1.81	6.33	
	0.00	.12	.18	0.00	.30	.24	.85	
WSW	2	0	1	0	4	3	10	7.86
	.90	0.00	.45	0.00	1.81	1.36	4.52	
	.12	0.00	.06	0.00	.24	.18	.60	
W	1	0	1	7	1	1	11	6.29
	.45	0.00	.45	3.17	.45	.45	4.98	
	.06	0.00	.06	.42	.06	.06	.66	
WNW	0	1	1	1	0	8	11	11.55
	0.00	.45	.45	.45	0.00	3.62	4.98	
	0.00	.06	.06	.06	0.00	.48	.66	
NW	0	0	6	7	5	6	24	8.08
	0.00	0.00	2.71	3.17	2.26	2.71	10.86	
	0.00	0.00	.36	.42	.30	.36	1.45	
NNW	0	0	1	11	13	3	28	7.97
	0.00	0.00	.45	4.98	5.88	1.36	12.67	
	0.00	0.00	.06	.66	.79	.18	1.69	
N	0	0	2	5	3	0	10	6.21
	0.00	0.00	.90	2.26	1.36	0.00	4.52	
	0.00	0.00	.12	.30	.18	0.00	.60	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	5	7	30	75	63	41	221	7.52
	2.26	3.17	13.57	33.94	28.51	18.55	100.00	
	.30	.42	1.81	4.53	3.80	2.48	13.35	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENFRATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	3	3	1	2	0	10	4.44
	1.01	3.03	3.03	1.01	2.02	0.00	10.10	
	.06	.18	.18	.06	.12	0.00	.60	
NE	1	4	1	0	0	0	6	2.25
	1.01	4.04	1.01	0.00	0.00	0.00	6.06	
	.06	.24	.06	0.00	0.00	0.00	.36	
ENE	1	1	0	1	0	0	3	3.33
	1.01	1.01	0.00	1.01	0.00	0.00	3.03	
	.06	.06	0.00	.06	0.00	0.00	.18	
E	1	0	0	0	0	0	1	1.20
	1.01	0.00	0.00	0.00	0.00	0.00	1.01	
	.06	0.00	0.00	0.00	0.00	0.00	.06	
ESE	0	0	0	0	0	4	4	10.87
	0.00	0.00	0.00	0.00	0.00	4.04	4.04	
	0.00	0.00	0.00	0.00	0.00	.24	.24	
SE	0	0	4	0	0	0	4	3.80
	0.00	0.00	4.04	0.00	0.00	0.00	4.04	
	0.00	0.00	.24	0.00	0.00	0.00	.24	
SSE	0	0	3	2	0	0	5	4.98
	0.00	0.00	3.03	2.02	0.00	0.00	5.05	
	0.00	0.00	.18	.12	0.00	0.00	.30	
S	0	0	1	0	1	2	4	9.50
	0.00	0.00	1.01	0.00	1.01	2.02	4.04	
	0.00	0.00	.06	0.00	.06	.12	.24	
SSW	0	0	4	3	4	3	14	7.24
	0.00	0.00	4.04	3.03	4.04	3.03	14.14	
	0.00	0.00	.24	.18	.24	.18	.85	
SW	0	0	4	3	2	0	9	5.97
	0.00	0.00	4.04	3.03	2.02	0.00	9.09	
	0.00	0.00	.24	.18	.12	0.00	.54	
WSW	0	0	1	2	2	0	5	7.02
	0.00	0.00	1.01	2.02	2.02	0.00	5.05	
	0.00	0.00	.06	.12	.12	0.00	.30	
W	0	0	0	2	1	1	4	7.90
	0.00	0.00	0.00	2.02	1.01	1.01	4.04	
	0.00	0.00	0.00	.12	.06	.06	.24	
WNW	0	0	1	0	0	1	2	8.30
	0.00	0.00	1.01	0.00	0.00	1.01	2.02	
	0.00	0.00	.06	0.00	0.00	.06	.12	
NW	0	1	2	0	2	1	6	6.67
	0.00	1.01	2.02	0.00	2.02	1.01	6.06	
	0.00	.06	.12	0.00	.12	.06	.36	
NNW	1	0	0	7	3	1	12	6.92
	1.01	0.00	0.00	7.07	3.03	1.01	12.12	
	.06	0.00	0.00	.42	.18	.06	.72	
N	1	0	2	6	1	0	10	5.16
	1.01	0.00	2.02	6.06	1.01	0.00	10.10	
	.06	0.00	.12	.36	.06	0.00	.60	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	6	9	26	27	18	13	99	6.10
	6.06	9.09	26.26	27.27	18.18	13.13	100.00	
	.36	.54	1.57	1.63	1.09	.79	5.98	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .91 .06	0 0.00 0.00	1 .91 .06	5 4.55 .30	5 4.55 .30	2 1.82 .12	14 12.73 .85	7.27
NE	0 0.00 0.00	4 3.64 .24	2 1.82 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 5.45 .36	2.60
ENE	1 .91 .06	1 .91 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.82 .12	1.90
E	2 1.82 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .91 .06	3 2.73 .18	4.93
ESE	0 0.00 0.00	2 1.82 .12	1 .91 .06	0 0.00 0.00	0 0.00 0.00	1 .91 .06	4 3.64 .24	4.57
SE	0 0.00 0.00	0 0.00 0.00	3 2.73 .18	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.73 .18	3.63
SSE	0 0.00 0.00	0 0.00 0.00	1 .91 .06	4 3.64 .24	1 .91 .06	0 0.00 0.00	6 5.45 .36	6.23
S	0 0.00 0.00	0 0.00 0.00	3 2.73 .18	4 3.64 .24	2 1.82 .12	1 .91 .06	10 9.09 .60	6.60
SSW	0 0.00 0.00	0 0.00 0.00	2 1.82 .12	4 3.64 .24	3 2.73 .18	2 1.82 .12	11 10.00 .66	7.43
SW	0 0.00 0.00	2 1.82 .12	3 2.73 .18	2 1.82 .12	0 0.00 0.00	0 0.00 0.00	7 6.36 .42	4.40
WSW	0 0.00 0.00	1 .91 .06	1 .91 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.82 .12	3.45
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.82 .12	0 0.00 0.00	1 .91 .06	3 2.73 .18	8.40
NW	0 0.00 0.00	0 0.00 0.00	2 1.82 .12	2 1.82 .12	3 2.73 .18	1 .91 .06	8 7.27 .48	7.49
NNW	1 .91 .06	1 .91 .06	1 .91 .06	6 5.45 .36	8 7.27 .48	0 0.00 0.00	17 15.45 1.03	6.69
N	0 0.00 0.00	0 0.00 0.00	7 6.36 .42	5 4.55 .30	2 1.82 .12	0 0.00 0.00	14 12.73 .85	5.77
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	5 4.55 .30	11 10.00 .66	27 24.55 1.63	34 30.91 2.05	24 21.82 1.45	9 8.18 .54	110 100.00 6.64	6.07

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .32 .12	18 2.92 1.09	22 3.57 1.33	24 3.89 1.45	3 .49 .18	69 11.18 4.17	6.59
NE	0 0.00 0.00	8 1.30 .48	13 2.11 .79	7 1.13 .42	2 .32 .12	0 0.00 0.00	30 4.86 1.81	4.33
ENE	2 .32 .12	9 1.46 .54	11 1.78 .66	4 .65 .24	5 .81 .30	1 .16 .06	32 5.19 1.93	4.69
E	0 0.00 0.00	12 1.94 .72	9 1.46 .54	8 1.30 .48	3 .49 .18	4 .65 .24	36 5.83 2.17	5.09
ESE	0 0.00 0.00	5 .81 .30	18 2.92 1.09	8 1.30 .48	10 1.62 .60	9 1.46 .54	50 8.10 3.02	6.52
SE	2 .32 .12	1 .16 .06	14 2.27 .85	11 1.78 .66	3 .49 .18	1 .16 .06	32 5.19 1.93	5.39
SSE	1 .16 .06	2 .32 .12	9 1.46 .54	2 .32 .12	0 0.00 0.00	3 .49 .18	17 2.76 1.03	5.04
S	0 0.00 0.00	4 .65 .24	13 2.11 .79	24 3.89 1.45	18 2.92 1.09	12 1.94 .72	71 11.51 4.29	7.10
SSW	1 .16 .06	5 .81 .30	6 .97 .36	13 2.11 .79	11 1.78 .66	5 .81 .30	41 6.65 2.48	6.51
SW	2 .32 .12	0 0.00 0.00	4 .65 .24	5 .81 .30	8 1.30 .48	3 .49 .18	22 3.57 1.33	6.87
WSW	4 .65 .24	4 .65 .24	3 .49 .18	3 .49 .18	3 .49 .18	0 0.00 0.00	17 2.76 1.03	3.98
W	2 .32 .12	0 0.00 0.00	3 .49 .18	2 .32 .12	2 .32 .12	5 .81 .30	14 2.27 .85	7.62
WNW	0 0.00 0.00	2 .32 .12	3 .49 .18	5 .81 .30	0 0.00 0.00	6 .97 .36	16 2.59 .97	7.80
NW	2 .32 .12	2 .32 .12	6 .97 .36	21 3.40 1.27	8 1.30 .48	3 .49 .18	42 6.81 2.54	6.41
NNW	1 .16 .05	2 .32 .12	6 .97 .36	32 5.19 1.93	16 2.59 .97	11 1.78 .66	68 11.02 4.11	7.27
N	1 .16 .06	2 .32 .12	22 3.57 1.33	24 3.89 1.45	9 1.46 .54	2 .32 .12	60 9.72 3.62	5.74
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	18 2.92 1.09	60 9.72 3.62	158 25.61 9.54	191 30.96 11.53	122 19.77 7.37	68 11.02 4.11	617 100.00 37.26	6.21

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .27 .06	4 1.10 .24	6 1.65 .36	3 .82 .18	0 0.00 0.00	0 0.00 0.00	14 3.85 .85	3.89
NE	2 .55 .12	4 1.10 .24	2 .55 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.20 .48	2.06
ENE	3 .82 .18	8 2.20 .48	4 1.10 .24	1 .27 .06	0 0.00 0.00	0 0.00 0.00	16 4.40 .97	2.74
E	2 .55 .12	8 2.20 .48	5 1.37 .30	4 1.10 .24	0 0.00 0.00	1 .27 .06	20 5.49 1.21	3.82
ESE	2 .55 .12	8 2.20 .48	8 2.20 .48	4 1.10 .24	2 .55 .12	0 0.00 0.00	24 6.59 1.45	4.02
SE	1 .27 .06	8 2.20 .48	9 2.47 .54	5 1.37 .30	2 .55 .12	0 0.00 0.00	25 6.87 1.51	4.00
SSE	0 0.00 0.00	8 2.20 .48	11 3.02 .66	8 2.20 .48	0 0.00 0.00	0 0.00 0.00	27 7.42 1.63	4.30
S	0 0.00 0.00	4 1.10 .24	13 3.57 .79	39 10.71 2.36	15 4.12 .91	9 2.47 .54	80 21.98 4.83	6.75
SSW	0 0.00 0.00	2 .55 .12	6 1.65 .36	18 4.95 1.09	21 5.77 1.27	8 2.20 .48	55 15.11 3.32	7.40
SW	0 0.00 0.00	2 .55 .12	5 1.37 .30	1 .27 .06	0 0.00 0.00	0 0.00 0.00	8 2.20 .48	3.72
WSW	0 0.00 0.00	4 1.10 .24	5 1.37 .30	1 .27 .06	0 0.00 0.00	0 0.00 0.00	10 2.75 .60	3.39
W	2 .55 .12	0 0.00 0.00	0 0.00 0.00	2 .55 .12	0 0.00 0.00	0 0.00 0.00	4 1.10 .24	3.50
WNW	0 0.00 0.00	3 .82 .18	6 1.65 .36	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 2.47 .54	3.30
NW	0 0.00 0.00	7 1.92 .42	8 2.20 .48	4 1.10 .24	0 0.00 0.00	0 0.00 0.00	19 5.22 1.15	3.89
NNW	1 .27 .06	5 1.37 .30	10 2.75 .60	6 1.65 .36	1 .27 .06	0 0.00 0.00	23 6.32 1.39	4.35
N	1 .27 .05	3 .82 .18	12 3.30 .72	6 1.65 .36	0 0.00 0.00	0 0.00 0.00	22 6.04 1.33	4.23
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	15 4.12 .91	78 21.43 4.71	110 30.22 6.64	102 28.02 6.16	41 11.26 2.48	18 4.95 1.09	364 100.00 21.98	5.01

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .67 .06	2 1.34 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.01 .18	3.03
NE	0 0.00 0.00	4 2.68 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.68 .24	1.97
ENE	1 .67 .06	0 0.00 0.00	5 3.36 .30	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.03 .36	3.55
E	0 0.00 0.00	0 0.00 0.00	6 4.03 .36	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.03 .36	3.78
ESE	0 0.00 0.00	5 3.36 .30	6 4.03 .36	2 1.34 .12	0 0.00 0.00	0 0.00 0.00	13 8.72 .79	3.88
SE	0 0.00 0.00	7 4.70 .42	13 8.72 .79	1 .67 .06	0 0.00 0.00	0 0.00 0.00	21 14.09 1.27	3.39
SSE	0 0.00 0.00	8 5.37 .48	17 11.41 1.03	1 .67 .06	0 0.00 0.00	0 0.00 0.00	26 17.45 1.57	3.61
S	1 .67 .06	2 1.34 .12	13 8.72 .79	2 1.34 .12	0 0.00 0.00	0 0.00 0.00	18 12.08 1.09	3.82
SSW	1 .67 .06	4 2.68 .24	7 4.70 .42	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 8.05 .72	3.11
SW	1 .67 .06	3 2.01 .18	1 .67 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.36 .30	2.34
WSW	0 0.00 0.00	1 .67 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .67 .06	2.50
W	0 0.00 0.00	1 .67 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .67 .06	2.30
WNW	2 1.34 .12	1 .67 .06	6 4.03 .36	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 6.04 .54	3.31
NW	1 .67 .06	5 3.36 .30	2 1.34 .12	1 .67 .06	0 0.00 0.00	0 0.00 0.00	9 6.04 .54	2.98
NNW	0 0.00 0.00	7 4.70 .42	2 1.34 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 6.04 .54	2.89
N	0 0.00 0.00	2 1.34 .12	3 2.01 .18	1 .67 .06	0 0.00 0.00	0 0.00 0.00	6 4.03 .36	3.62
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	7 4.70 .42	51 34.23 3.08	83 55.70 5.01	8 5.37 .48	0 0.00 0.00	0 0.00 0.00	149 100.00 9.00	3.38

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	1 1.04 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .06	2.80
NE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	1 1.04 .06	1 1.04 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.08 .12	1.70
ESE	0 0.00 0.00	1 1.04 .06	2 2.08 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 3.12 .18	3.60
SE	0 0.00 0.00	4 4.17 .24	9 9.37 .54	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 13.54 .79	3.22
SSE	1 1.04 .06	6 6.25 .36	15 15.62 .91	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 22.92 1.33	3.19
S	0 0.00 0.00	4 4.17 .24	6 6.25 .36	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 10.42 .60	3.04
SSW	0 0.00 0.00	5 5.21 .30	3 3.12 .18	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 8.33 48	2.64
SW	0 0.00 0.00	4 4.17 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 4.17 .24	2.20
WSW	1 1.04 .06	2 2.08 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 3.12 .18	1.77
W	2 2.08 .12	4 4.17 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 6.25 .36	1.97
WNW	1 1.04 .06	4 4.17 .24	4 4.17 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 9.37 .54	2.87
NW	2 2.08 .12	4 4.17 .24	1 1.04 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 7.29 .42	2.01
NNW	1 1.04 .06	1 1.04 .06	2 2.08 .12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 4.17 .24	2.67
N	1 1.04 .06	0 0.00 0.00	3 3.12 .18	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 4.17 .24	2.97
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	10 10.42 .60	41 42.71 2.48	45 46.87 2.72	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	96 100.00 5.80	2.80

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	3 .18	13 .79	36 2.17	36 2.17	35 2.11	5 .30	128 7.73	5.95
NE	3 .18	24 1.45	20 1.21	7 .42	2 .12	0 0.00	56 3.38	3.40
ENE	8 .48	19 1.15	20 1.21	6 .36	5 .30	1 .06	59 3.56	3.88
E	6 .36	21 1.27	20 1.21	12 .72	4 .24	6 .36	69 4.17	4.50
ESE	3 .18	21 1.27	35 2.11	15 .91	12 .72	14 .85	100 6.04	5.53
SE	3 .18	20 1.21	54 3.26	22 1.33	7 .42	1 .06	107 6.46	4.38
SSE	2 .12	25 1.51	58 3.50	30 1.81	8 .48	5 .30	128 7.73	4.72
S	1 .06	14 .85	51 3.08	79 4.77	47 2.84	26 1.57	218 13.16	6.57
SSW	3 .18	17 1.03	29 1.75	48 2.90	46 2.78	30 1.81	173 10.45	6.82
SW	3 .18	13 .79	20 1.21	11 .66	15 .91	7 .42	69 4.17	5.71
WSW	7 .42	12 .72	11 .66	6 .36	9 .54	3 .18	48 2.90	4.79
W	7 .42	5 .30	4 .24	13 .79	4 .24	7 .42	40 2.42	5.89
WNW	3 .18	11 .66	21 1.27	8 .48	0 0.00	16 .97	59 3.56	6.42
NW	5 .30	19 1.15	27 1.63	35 2.11	18 1.09	11 .66	115 6.94	5.90
NNW	5 .30	16 .97	22 1.33	62 3.74	41 2.48	15 .91	161 9.72	6.53
N	4 .24	7 .42	51 3.08	47 2.84	15 .91	2 .12	126 7.61	5.28
CALM	0 0.00						0 0.00	CALM
TOTAL	66 3.99	257 15.52	479 28.93	437 26.39	268 16.18	149 9.00	1656 100.00	5.65

NUMBER OF VALID OBSERVATIONS 1656 74.19 PCT.
NUMBER OF INVALID OBSERVATIONS 576 25.81 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	4	4	4	0	0	12	4.00
	0.00	1.25	1.25	1.25	0.00	0.00	3.74	
	0.00	.19	.19	.19	0.00	0.00	.58	
NE	0	1	2	0	0	0	3	4.13
	0.00	.31	.62	0.00	0.00	0.00	.93	
	0.00	.05	.10	0.00	0.00	0.00	.15	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	0	3	3	0	0	6	5.42
	0.00	0.00	.93	.93	0.00	0.00	1.87	
	0.00	0.00	.15	.15	0.00	0.00	.29	
ESE	0	0	0	8	2	0	10	7.04
	0.00	0.00	0.00	2.49	.62	0.00	3.12	
	0.00	0.00	0.00	.39	.10	0.00	.49	
SE	0	0	0	9	1	0	10	6.89
	0.00	0.00	0.00	2.80	.31	0.00	3.12	
	0.00	0.00	0.00	.44	.05	0.00	.49	
SSE	0	0	3	5	15	2	25	8.00
	0.00	0.00	.93	1.56	4.67	.62	7.79	
	0.00	0.00	.15	.24	.73	.10	1.21	
S	0	0	5	15	24	22	66	9.24
	0.00	0.00	1.56	4.67	7.48	6.85	20.56	
	0.00	0.00	.24	.73	1.16	1.07	3.20	
SSW	0	0	9	9	16	7	41	8.05
	0.00	0.00	2.80	2.80	4.98	2.18	12.77	
	0.00	0.00	.44	.44	.78	.34	1.99	
SW	0	3	1	2	7	9	22	9.01
	0.00	.93	.31	.62	2.18	2.80	6.85	
	0.00	.15	.05	.10	.34	.44	1.07	
WSW	0	3	2	3	6	1	15	6.73
	0.00	.93	.62	.93	1.87	.31	4.67	
	0.00	.15	.10	.15	.29	.05	.73	
W	1	1	7	2	5	0	16	5.43
	.31	.31	2.18	.62	1.56	0.00	4.98	
	.05	.05	.34	.10	.24	0.00	.78	
WNW	2	0	7	3	5	0	17	5.55
	.62	0.00	2.18	.93	1.56	0.00	5.30	
	.10	0.00	.34	.15	.24	0.00	.82	
NW	0	0	4	7	12	8	31	8.25
	0.00	0.00	1.25	2.18	3.74	2.49	9.66	
	0.00	0.00	.19	.34	.58	.39	1.50	
NNW	0	0	3	10	8	1	22	6.95
	0.00	0.00	.93	3.12	2.49	.31	6.85	
	0.00	0.00	.15	.49	.39	.05	1.07	
N	0	1	4	19	1	0	25	5.68
	0.00	.31	1.25	5.92	.31	0.00	7.79	
	0.00	.05	.19	.92	.05	0.00	1.21	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	13	54	99	102	50	321	7.49
	.93	4.05	16.82	30.84	31.78	15.58	100.00	
	.15	.63	2.62	4.80	4.95	2.43	15.57	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	0	1	1	1	0	3	6.27
	0.00	0.00	1.14	1.14	1.14	0.00	3.41	
	0.00	0.00	.05	.05	.05	0.00	.15	
NE	0	2	0	0	0	0	2	2.35
	0.00	2.27	0.00	0.00	0.00	0.00	2.27	
	0.00	.10	0.00	0.00	0.00	0.00	.10	
ENE	0	0	1	4	1	0	6	6.23
	0.00	0.00	1.14	4.55	1.14	0.00	6.82	
	0.00	0.00	.05	.19	.05	0.00	.29	
E	0	0	1	1	1	0	3	5.80
	0.00	0.00	1.14	1.14	1.14	0.00	3.41	
	0.00	0.00	.05	.05	.05	0.00	.15	
ESE	0	1	1	1	0	0	3	4.90
	0.00	1.14	1.14	1.14	0.00	0.00	3.41	
	0.00	.05	.05	.05	0.00	0.00	.15	
SE	0	0	0	4	1	0	5	7.12
	0.00	0.00	0.00	4.55	1.14	0.00	5.68	
	0.00	0.00	0.00	.19	.05	0.00	.24	
SSE	0	0	0	2	3	2	7	9.01
	0.00	0.00	0.00	2.27	3.41	2.27	7.95	
	0.00	0.00	0.00	.10	.15	.10	.34	
S	0	0	1	2	4	6	13	9.64
	0.00	0.00	1.14	2.27	4.55	6.82	14.77	
	0.00	0.00	.05	.10	.19	.29	.63	
SSW	0	0	2	1	2	1	6	7.57
	0.00	0.00	2.27	1.14	2.27	1.14	6.82	
	0.00	0.00	.10	.05	.10	.05	.29	
SW	0	1	0	1	1	1	4	7.05
	0.00	1.14	0.00	1.14	1.14	1.14	4.55	
	0.00	.05	0.00	.05	.05	.05	.19	
WSW	0	1	0	1	0	0	2	4.35
	0.00	1.14	0.00	1.14	0.00	0.00	2.27	
	0.00	.05	0.00	.05	0.00	0.00	.10	
W	0	0	1	1	1	0	3	6.37
	0.00	0.00	1.14	1.14	1.14	0.00	3.41	
	0.00	0.00	.05	.05	.05	0.00	.15	
WNW	0	1	1	3	4	0	9	7.00
	0.00	1.14	1.14	3.41	4.55	0.00	10.23	
	0.00	.05	.05	.15	.19	0.00	.44	
NW	0	1	1	4	5	0	11	6.82
	0.00	1.14	1.14	4.55	5.68	0.00	12.50	
	0.00	.05	.05	.19	.24	0.00	.53	
NNW	0	0	0	2	3	0	5	7.52
	0.00	0.00	0.00	2.27	3.41	0.00	5.68	
	0.00	0.00	0.00	.10	.15	0.00	.24	
N	0	0	0	4	2	0	6	7.28
	0.00	0.00	0.00	4.55	2.27	0.00	6.82	
	0.00	0.00	0.00	.19	.10	0.00	.29	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	7	10	32	29	10	88	7.25
	0.00	7.95	11.36	36.36	32.95	11.36	100.00	
	0.00	.34	.49	1.55	1.41	.49	4.27	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .98 .05	1 .98 .05	1 .98 .05	1 .98 .05	0 0.00 0.00	4 3.92 .19	5.72
NE	1 .98 .05	1 .98 .05	1 .98 .05	5 4.90 .24	0 0.00 0.00	0 0.00 0.00	8 7.84 .39	4.80
ENE	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	1 .98 .05	0 0.00 0.00	0 0.00 0.00	3 2.94 .15	3.87
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	3 2.94 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.94 .15	4.17
SE	0 0.00 0.00	0 0.00 0.00	1 .98 .05	6 5.88 .29	1 .98 .05	1 .98 .05	9 8.82 .44	7.00
SSE	0 0.00 0.00	0 0.00 0.00	1 .98 .05	3 2.94 .15	3 2.94 .15	1 .98 .05	8 7.84 .39	7.99
S	1 .98 .05	0 0.00 0.00	1 .98 .05	1 .98 .05	6 5.88 .29	3 2.94 .15	12 11.76 .58	8.32
SSW	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	4 3.92 .19	4 3.92 .19	1 .98 .05	11 10.78 .53	6.78
SW	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	4.20
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	2 1.96 .10	4 3.92 .19	8.65
W	0 0.00 0.00	0 0.00 0.00	1 .98 .05	4 3.92 .19	2 1.96 .10	0 0.00 0.00	7 6.86 .34	6.83
WNW	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	1 .98 .05	2 1.96 .10	0 0.00 0.00	5 4.90 .24	6.14
NW	0 0.00 0.00	1 .98 .05	4 3.92 .19	4 3.92 .19	2 1.96 .10	1 .98 .05	12 11.76 .58	6.03
NNW	0 0.00 0.00	0 0.00 0.00	1 .98 .05	5 4.90 .24	0 0.00 0.00	0 0.00 0.00	6 5.88 .29	6.18
N	0 0.00 0.00	1 .98 .05	1 .98 .05	3 2.94 .15	1 .98 .05	2 1.96 .10	8 7.84 .39	7.20
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.96 .10	6 5.88 .29	21 20.59 1.02	40 39.22 1.94	22 21.57 1.07	11 10.78 .53	102 100.00 4.95	6.62

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .30 .10	13 1.97 .63	15 2.28 .73	4 .61 .19	0 0.00 0.00	34 5.16 1.65	5.37
NE	0 0.00 0.00	6 .91 .29	12 1.82 .58	8 1.21 .39	0 0.00 0.00	0 0.00 0.00	26 3.95 1.26	4.17
ENE	0 0.00 0.00	1 .15 .05	13 1.97 .63	3 .46 .15	1 .15 .05	0 0.00 0.00	18 2.73 .87	4.56
E	1 .15 .05	2 .30 .10	16 2.43 .78	7 1.06 .34	2 .30 .10	0 0.00 0.00	28 4.25 1.36	4.54
ESE	0 0.00 0.00	2 .30 .10	12 1.82 .58	25 3.79 1.21	4 .61 .19	5 .76 .24	48 7.28 2.33	6.41
SE	0 0.00 0.00	3 .46 .15	7 1.06 .34	28 4.25 1.36	15 2.28 .73	5 .76 .24	58 8.80 2.81	6.76
SSE	1 .15 .05	1 .15 .05	4 .61 .19	19 2.88 .92	19 2.88 .92	16 2.43 .78	60 9.10 2.91	8.36
S	0 0.00 0.00	2 .30 .10	5 .76 .24	32 4.86 1.55	36 5.46 1.75	16 2.43 .78	91 13.81 4.42	8.09
SSW	0 0.00 0.00	0 0.00 0.00	3 .46 .15	17 2.58 .82	19 2.88 .92	9 1.37 .44	48 7.28 2.33	8.12
SW	0 0.00 0.00	2 .30 .10	4 .61 .19	6 .91 .29	2 .30 .10	0 0.00 0.00	14 2.12 .68	5.46
WSW	0 0.00 0.00	0 0.00 0.00	7 1.06 .34	4 .61 .19	6 .91 .29	1 .15 .05	18 2.73 .87	6.52
W	1 .15 .05	0 0.00 0.00	3 .46 .15	8 1.21 .39	11 1.67 .53	0 0.00 0.00	23 3.49 1.12	6.63
WNW	0 0.00 0.00	1 .15 .05	7 1.06 .34	7 1.06 .34	7 1.06 .34	4 .61 .19	26 3.95 1.26	6.75
NW	0 0.00 0.00	1 .15 .05	10 1.52 .49	19 2.88 .92	20 3.03 .97	5 .76 .24	55 8.35 2.67	7.14
NNW	0 0.00 0.00	3 .46 .15	11 1.67 .53	20 3.03 .97	16 2.43 .78	4 .61 .19	54 8.19 2.62	6.66
N	0 0.00 0.00	1 .15 .05	19 2.88 .92	16 2.43 .78	17 2.58 .82	5 .76 .24	58 8.80 2.81	6.68
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 .46 .15	27 4.10 1.31	146 22.15 7.08	234 35.51 11.35	179 27.16 8.69	70 10.62 3.40	659 100.00 31.97	6.81

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL APRIL COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED. 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .20 .05	1 .20 .05	6 1.21 .29	0 0.00 0.00	0 0.00 0.00	3 .60 .15	11 2.21 .53	5.51
NE	0 0.00 0.00	13 2.62 .63	7 1.41 .34	1 .20 .05	0 0.00 0.00	0 0.00 0.00	21 4.23 1.02	2.76
ENE	0 0.00 0.00	3 .60 .15	7 1.41 .34	6 1.21 .29	0 0.00 0.00	0 0.00 0.00	16 3.22 .78	4.24
E	0 0.00 0.00	1 .20 .05	14 2.82 .68	11 2.21 .53	1 .20 .05	0 0.00 0.00	27 5.43 1.31	5.17
ESE	0 0.00 0.00	3 .60 .15	13 2.62 .63	19 3.82 .92	7 1.41 .34	1 .20 .05	43 8.65 2.09	5.74
SE	0 0.00 0.00	1 .20 .05	12 2.41 .58	21 4.23 1.02	5 1.01 .24	1 .20 .05	40 8.05 1.94	5.94
SSE	0 0.00 0.00	5 1.01 .24	36 7.24 1.75	34 6.84 1.65	10 2.01 .49	4 .80 .19	89 17.91 4.32	5.65
S	0 0.00 0.00	3 .60 .15	22 4.43 1.07	36 7.24 1.75	26 5.23 1.26	6 1.21 .29	93 18.71 4.51	6.66
SSW	0 0.00 0.00	1 .20 .05	12 2.41 .58	24 4.83 1.16	5 1.01 .24	2 .40 .10	44 8.85 2.13	6.17
SW	0 0.00 0.00	3 .60 .15	6 1.21 .29	7 1.41 .34	2 .40 .10	1 .20 .05	19 3.82 .92	5.29
WSW	0 0.00 0.00	1 .20 .05	5 1.01 .24	5 1.01 .24	0 0.00 0.00	0 0.00 0.00	11 2.21 .53	4.39
W	1 .20 .05	0 0.00 0.00	3 .60 .15	2 .40 .10	0 0.00 0.00	0 0.00 0.00	6 1.21 .29	4.03
WNW	0 0.00 0.00	2 .40 .10	1 .20 .05	2 .40 .10	0 0.00 0.00	0 0.00 0.00	5 1.01 .24	4.02
NW	0 0.00 0.00	6 1.21 .29	12 2.41 .58	3 .60 .15	0 0.00 0.00	0 0.00 0.00	21 4.23 1.02	3.71
NNW	1 .20 .05	3 .60 .15	18 3.62 .87	12 2.41 .58	1 .20 .05	0 0.00 0.00	35 7.04 1.70	4.66
N	1 .20 .05	4 .80 .19	4 .80 .19	3 .60 .15	4 .80 .19	0 0.00 0.00	16 3.22 .78	4.89
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 .80 .19	50 10.06 2.43	178 35.81 8.64	186 37.42 9.02	61 12.27 2.96	18 3.62 .87	497 100.00 24.11	5.47

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .84 .10	4 1.67 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 2.51 .29	3.05
NE	3 1.26 .15	3 1.26 .15	3 1.26 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 3.77 .44	2.53
ENE	1 .42 .05	3 1.26 .15	9 3.77 .44	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 5.44 .63	3.06
E	1 .42 .05	1 .42 .05	6 2.51 .29	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 3.35 .39	3.20
ESE	0 0.00 0.00	3 1.26 .15	14 5.86 .68	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 7.11 .82	3.47
SE	0 0.00 0.00	15 6.28 .73	23 9.62 1.12	5 2.09 .24	0 0.00 0.00	0 0.00 0.00	43 17.99 2.09	3.63
SSE	0 0.00 0.00	12 5.02 .58	33 13.81 1.60	8 3.35 .39	0 0.00 0.00	0 0.00 0.00	53 22.18 2.57	3.95
S	1 .42 .05	3 1.26 .15	14 5.86 .68	1 .42 .05	0 0.00 0.00	0 0.00 0.00	19 7.95 .92	3.66
SSW	0 0.00 0.00	2 .84 .10	4 1.67 .19	1 .42 .05	0 0.00 0.00	0 0.00 0.00	7 2.93 .34	3.06
SW	0 0.00 0.00	2 .84 .10	5 2.09 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 2.93 .34	3.47
WSW	1 .42 .05	4 1.67 .19	3 1.26 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 3.35 .39	2.84
W	0 0.00 0.00	1 .42 .05	2 .84 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.26 .15	3.33
WNW	0 0.00 0.00	6 2.51 .29	6 2.51 .29	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 5.02 .58	3.07
NW	0 0.00 0.00	5 2.09 .24	5 2.09 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 4.18 .49	3.25
NNW	0 0.00 0.00	2 .84 .10	5 2.09 .24	1 .42 .05	0 0.00 0.00	0 0.00 0.00	8 3.35 .39	3.77
N	0 0.00 0.00	7 2.93 .34	7 2.93 .34	2 .84 .10	0 0.00 0.00	0 0.00 0.00	16 6.69 .78	3.34
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	7 2.93 .34	71 29.71 3.44	143 59.83 6.94	18 7.53 .87	0 0.00 0.00	0 0.00 0.00	239 100.00 11.60	3.48

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL APRIL COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00 0.00	4 2.58 .19	4 2.58 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.16 .39	3.31
NE	1 .65 .05	3 1.94 .15	3 1.94 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 4.52 .34	2.69
ENE	0 0.00 0.00	1 .65 .05	9 5.81 .44	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 6.45 .49	3.52
E	0 0.00 0.00	2 1.29 .10	15 9.68 .73	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 10.97 .82	3.48
ESE	0 0.00 0.00	4 2.58 .19	7 4.52 .34	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 7.10 .53	3.04
SE	0 0.00 0.00	13 8.39 .63	14 9.03 .68	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	27 17.42 1.31	3.10
SSE	1 .65 .05	12 7.74 .58	18 11.61 .87	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	31 20.00 1.50	3.07
S	1 .65 .05	3 1.94 .15	4 2.58 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.16 .39	2.61
SSW	1 .65 .05	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.94 .15	2.30
SW	0 0.00 0.00	1 .65 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .65 .05	2.80
WSW	2 1.29 .10	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.58 .19	1.65
W	3 1.94 .15	3 1.94 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.87 .29	1.48
WNW	2 1.29 .10	3 1.94 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.23 .24	1.90
NW	1 .65 .05	5 3.23 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.87 .29	1.87
NNW	0 0.00 0.00	1 .65 .05	4 2.58 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.23 .24	3.62
N	0 0.00 0.00	3 1.94 .15	3 1.94 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.87 .29	3.18
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	12 7.74 .58	62 40.00 3.01	81 52.26 3.93	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	155 100.00 7.52	2.94

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

ALL CLASSES
DATA SOURCE ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED. 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .05	14 .68	33 1.60	21 1.02	6 .29	3 .15	78 3.78	4.84
NE	5 .24	29 1.41	28 1.36	14 .68	0 0.00	0 0.00	76 3.69	3.47
ENE	1 .05	10 .49	39 1.89	14 .68	2 .10	0 0.00	66 3.20	4.15
E	2 .10	6 .29	55 2.67	22 1.07	4 .19	0 0.00	89 4.32	4.51
ESE	0 0.00	13 .63	50 2.43	53 2.57	13 .63	6 .29	135 6.55	5.52
SE	0 0.00	32 1.55	57 2.77	73 3.54	23 1.12	7 .34	192 9.32	5.40
SSE	2 .10	30 1.46	95 4.61	71 3.44	50 2.43	25 1.21	273 13.25	5.99
S	3 .15	11 .53	52 2.52	87 4.22	96 4.66	53 2.57	302 14.65	7.55
SSW	1 .05	5 .24	32 1.55	56 2.72	46 2.23	20 .97	160 7.76	7.12
SW	0 0.00	12 .58	18 .87	16 .78	12 .58	11 .53	69 3.35	6.36
WSW	3 .15	11 .53	17 .82	15 .73	12 .58	4 .19	62 3.01	5.47
W	6 .29	5 .24	17 .82	17 .82	19 .92	0 0.00	64 3.11	5.46
WNW	4 .19	13 .63	24 1.16	16 .78	18 .87	4 .19	79 3.83	5.44
NW	1 .05	19 .92	36 1.75	37 1.80	39 1.89	14 .68	146 7.08	6.28
NNW	1 .05	9 .44	42 2.04	50 2.43	28 1.36	5 .24	135 6.55	5.91
N	1 .05	17 .82	38 1.84	47 2.28	25 1.21	7 .34	135 6.55	5.79
CALM	0 0.00						0 0.00	CALM
TOTAL	31 1.50	236 11.45	633 30.71	609 29.55	393 19.07	159 7.71	2061 100.00	5.92

NUMBER OF VALID OBSERVATIONS 2061 95.42 PCT.
NUMBER OF INVALID OBSERVATIONS 99 4.58 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	6	7	9	1	0	23	4.66
	0.00	1.56	1.82	2.34	.26	0.00	5.99	
	0.00	.28	.32	.42	.05	0.00	1.07	
NE	1	2	6	2	0	0	11	3.52
	26	.52	1.56	.52	0.00	0.00	2.86	
	.05	.09	.28	.09	0.00	0.00	.51	
ENE	0	1	7	1	0	0	9	4.62
	0.00	.26	1.82	.26	0.00	0.00	2.34	
	0.00	.05	.32	05	0.00	0.00	.42	
E	0	3	5	4	1	0	13	4.68
	0.00	.78	1.30	1.04	.26	0.00	3.39	
	0.00	.14	.23	.19	.05	0.00	.60	
ESE	0	6	6	6	3	3	24	5.57
	0.00	1.56	1.56	1.56	.78	.78	6.25	
	0.00	.28	.28	.28	.14	.14	1.11	
SE	0	2	10	7	0	0	19	4.66
	0.00	.52	2.60	1.82	0.00	0.00	4.95	
	0.00	.09	.46	.32	0.00	0.00	.88	
SSE	0	2	12	8	3	0	25	5.18
	0.00	.52	3.12	2.08	.78	0.00	6.51	
	0.00	.09	.56	.37	.14	0.00	1.16	
S	0	0	4	28	29	9	70	7.79
	0.00	0.00	1.04	7.29	7.55	2.34	18.23	
	0.00	0.00	.19	1.30	1.34	.42	3.25	
SSW	1	3	5	17	38	16	80	8.57
	.26	.78	1.30	4.43	9.90	4.17	20.83	
	.05	.14	.23	.79	1.76	.74	3.71	
SW	0	1	9	4	5	3	22	6.40
	0.00	.26	2.34	1.04	1.30	.78	5.73	
	0.00	.05	.42	.19	.23	.14	1.02	
WSW	0	4	0	0	0	0	4	2.35
	0.00	1.04	0.00	0.00	0.00	0.00	1.04	
	0.00	.19	0.00	0.00	0.00	0.00	.19	
W	0	1	0	1	0	0	2	4.05
	0.00	.26	0.00	.26	0.00	0.00	.52	
	0.00	.05	0.00	.05	0.00	0.00	.09	
WNW	0	2	0	0	0	0	2	2.50
	0.00	.52	0.00	0.00	0.00	0.00	.52	
	0.00	.09	0.00	0.00	0.00	0.00	.09	
NW	1	0	7	12	0	0	20	5.12
	.26	0.00	1.82	3.12	0.00	0.00	5.21	
	.05	0.00	.32	.56	0.00	0.00	.93	
NNW	0	2	9	20	0	0	31	5.14
	0.00	.52	2.34	5.21	0.00	0.00	8.07	
	0.00	.09	.42	.93	0.00	0.00	1.44	
N	0	2	12	13	2	0	29	5.38
	0.00	.52	3.12	3.39	.52	0.00	7.55	
	0.00	.09	.56	.60	.09	0.00	1.34	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	37	99	132	82	31	384	6.28
	.78	9.64	25.78	34.37	21.35	8.07	100.00	
	.14	1.72	4.59	6.12	3.80	1.44	17.80	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	3	1	1	0	5	5.26
	0.00	0.00	3.26	1.09	1.09	0.00	5.43	
	0.00	0.00	.14	.05	.05	0.00	.23	
NE	0	1	4	0	0	0	5	3.90
	0.00	1.09	4.35	0.00	0.00	0.00	5.43	
	0.00	.05	.19	0.00	0.00	0.00	.23	
ENE	0	1	0	1	1	0	3	5.83
	0.00	1.09	0.00	1.09	1.09	0.00	3.26	
	0.00	.05	0.00	.05	.05	0.00	.14	
E	0	0	0	1	0	3	4	10.05
	0.00	0.00	0.00	1.09	0.00	3.26	4.35	
	0.00	0.00	0.00	.05	0.00	.14	.19	
ESE	0	1	0	3	1	1	6	7.10
	0.00	1.09	0.00	3.26	1.09	1.09	6.52	
	0.00	.05	0.00	.14	.05	.05	.28	
SE	0	0	4	2	1	0	7	5.34
	0.00	0.00	4.35	2.17	1.09	0.00	7.61	
	0.00	0.00	.19	.09	.05	0.00	.32	
SSE	0	0	1	0	0	0	1	3.70
	0.00	0.00	1.09	0.00	0.00	0.00	1.09	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
S	0	1	1	8	11	2	23	7.76
	0.00	1.09	1.09	8.70	11.96	2.17	25.00	
	0.00	.05	.05	.37	.51	.09	1.07	
SSW	0	0	3	0	6	2	11	7.94
	0.00	0.00	3.26	0.00	6.52	2.17	11.96	
	0.00	0.00	.14	0.00	.28	.09	.51	
SW	0	0	0	1	4	0	5	7.98
	0.00	0.00	0.00	1.09	4.35	0.00	5.43	
	0.00	0.00	0.00	.05	.19	0.00	.23	
WSW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
W	0	0	3	0	0	0	3	3.93
	0.00	0.00	3.26	0.00	0.00	0.00	3.26	
	0.00	0.00	.14	0.00	0.00	0.00	.14	
WNW	0	0	1	0	0	0	1	3.20
	0.00	0.00	1.09	0.00	0.00	0.00	1.09	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
NW	0	2	1	2	1	0	6	5.07
	0.00	2.17	1.09	2.17	1.09	0.00	6.52	
	0.00	.09	.05	.09	.05	0.00	.28	
NNW	0	0	3	0	2	0	5	5.42
	0.00	0.00	3.26	0.00	2.17	0.00	5.43	
	0.00	0.00	.14	0.00	.09	0.00	.23	
N	0	2	2	1	2	0	7	5.07
	0.00	2.17	2.17	1.09	2.17	0.00	7.61	
	0.00	.09	.09	.05	09	0.00	.32	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	8	26	20	30	8	92	6.53
	0.00	8.70	28.26	21.74	32.61	8.70	100.00	
	0.00	.37	1.21	.93	1.39	.37	4.27	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	3 2.33 .14	2 1.55 .09	2 1.55 .09	0 0.00 0.00	0 0.00 0.00	7 5.43 .32	3.96
NE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .78 .05	0 0.00 0.00	0 0.00 0.00	1 .78 .05	5.10
ENE	0 0.00 0.00	0 0.00 0.00	1 .78 .05	1 .78 .05	1 .78 .05	0 0.00 0.00	3 2.33 .14	5.87
E	0 0.00 0.00	2 1.55 .09	2 1.55 .09	2 1.55 .09	0 0.00 0.00	0 0.00 0.00	6 4.65 .28	4.57
ESE	0 0.00 0.00	0 0.00 0.00	2 1.55 .09	2 1.55 .09	0 0.00 0.00	0 0.00 0.00	4 3.10 .19	5.20
SE	0 0.00 0.00	0 0.00 0.00	4 3.10 .19	2 1.55 .09	0 0.00 0.00	0 0.00 0.00	6 4.65 .28	4.58
SSE	0 0.00 0.00	2 1.55 .09	1 .78 .05	1 .78 .05	2 1.55 .09	1 .78 .05	7 5.43 .32	6.26
S	1 .78 .05	1 .78 .05	6 4.65 .28	8 6.20 .37	13 10.08 .60	3 2.33 .14	32 24.81 1.48	6.97
SSW	1 .78 .05	1 .78 .05	4 3.10 .19	3 2.33 .14	10 7.75 .46	3 2.33 .14	22 17.05 1.02	7.38
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.55 .09	0 0.00 0.00	1 .78 .05	3 2.33 .14	8.10
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .78 .05	0 0.00 0.00	1 .78 .05	8.00
W	0 0.00 0.00	2 1.55 .09	3 2.33 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.88 .23	3.32
WNW	1 .78 .05	1 .78 .05	4 3.10 .19	1 .78 .05	1 .78 .05	0 0.00 0.00	8 6.20 .37	4.26
NW	1 .78 .05	0 0.00 0.00	0 0.00 0.00	3 2.33 .14	0 0.00 0.00	0 0.00 0.00	4 3.10 .19	4.65
NNW	0 0.00 0.00	1 .78 .05	2 1.55 .09	4 3.10 .19	1 .78 .05	0 0.00 0.00	8 6.20 .37	5.45
N	0 0.00 0.00	1 .78 .05	0 0.00 0.00	5 3.88 .23	6 4.65 .28	0 0.00 0.00	12 9.30 .56	6.90
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 3.10 .19	14 10.85 .65	31 24.03 1.44	37 28.68 1.72	35 27.13 1.62	8 6.20 .37	129 100.00 5.98	6.07

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .18 .05	1 .18 .05	19 3.43 .88	19 3.43 .88	3 .54 .14	3 .54 .14	46 8.30 2.13	5.73
NE	2 .36 .09	4 .72 .19	14 2.53 .65	8 1.44 .37	1 .18 .05	0 0.00 0.00	29 5.23 1.34	4.24
ENE	1 .18 .05	8 1.44 .37	12 2.17 .56	14 2.53 .65	3 .54 .14	0 0.00 0.00	38 6.86 1.76	4.68
E	0 0.00 0.00	6 1.08 .28	12 2.17 .56	11 1.99 .51	2 .36 .09	0 0.00 0.00	31 5.60 1.44	4.73
ESE	1 .18 .05	5 .90 .23	9 1.62 .42	16 2.89 .74	1 .18 .05	0 0.00 0.00	32 5.78 1.48	4.91
SE	1 .18 .05	2 .36 .09	18 3.25 .83	16 2.89 .74	1 .18 .05	0 0.00 0.00	38 6.86 1.76	4.93
SSE	0 0.00 0.00	7 1.26 .32	13 2.35 .60	10 1.81 .46	3 .54 .14	0 0.00 0.00	33 5.96 1.53	4.92
S	1 .18 .05	8 1.44 .37	17 3.07 .79	40 7.22 1.85	29 5.23 1.34	24 4.33 1.11	119 21.48 5.52	7.47
SSW	1 .18 .05	1 .18 .05	6 1.08 .28	18 3.25 .83	21 3.79 .97	8 1.44 .37	55 9.93 2.55	7.51
SW	0 0.00 0.00	4 .72 .19	1 .18 .05	1 18 .05	1 .18 .05	0 0.00 0.00	7 1.26 .32	3.93
WSW	1 .18 .05	3 .54 .14	5 .90 .23	4 .72 .19	0 0.00 0.00	0 0.00 0.00	13 2.35 .60	4.02
W	0 0.00 0.00	4 .72 .19	10 1.81 .46	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 2.53 .65	3.34
WNW	2 .36 .09	4 .72 .19	5 .90 .23	4 72 .19	1 .18 .05	0 0.00 0.00	16 2.89 .74	3.94
NW	0 0.00 0.00	2 .36 .09	2 .36 .09	13 2.35 .60	5 .90 .23	0 0.00 0.00	22 3.97 1.02	6.10
NNW	0 0.00 0.00	2 .36 .09	9 1.62 .42	15 2.71 .70	2 .36 .09	0 0.00 0.00	28 5.05 1.30	5.19
N	0 0.00 0.00	7 1.26 .32	11 1.99 .51	11 1.99 .51	3 .54 .14	1 .18 .05	33 5.96 1.53	5.14
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	11 1.99 .51	68 12.27 3.15	163 29.42 7.56	200 36.10 9.27	76 13.72 3.52	36 6.50 1.67	554 100.00 25.68	5.70

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	4	9	16	0	0	29	5.02
	0.00	.68	1.52	2.70	0.00	0.00	4.90	
	0.00	.19	.42	.74	0.00	0.00	1.34	
NE	2	12	16	4	1	0	35	3.57
	.34	2.03	2.70	.68	.17	0.00	5.91	
	.09	.56	.74	.19	.05	0.00	1.62	
ENE	4	14	9	1	0	0	28	2.67
	.68	2.36	1.52	.17	0.00	0.00	4.73	
	.19	.65	.42	.05	0.00	0.00	1.30	
E	2	2	9	13	2	0	28	4.62
	.34	.34	1.52	2.20	.34	0.00	4.73	
	.09	.09	.42	.60	.09	0.00	1.30	
ESE	2	5	20	4	0	0	31	3.84
	.34	.84	3.38	.68	0.00	0.00	5.24	
	.09	.23	.93	.19	0.00	0.00	1.44	
SE	1	10	24	9	1	1	46	4.21
	.17	1.69	4.05	1.52	.17	.17	7.77	
	.05	.46	1.11	.42	.05	.05	2.13	
SSE	0	16	32	25	2	0	75	4.35
	0.00	2.70	5.41	4.22	.34	0.00	12.67	
	0.00	.74	1.48	1.16	.09	0.00	3.48	
S	5	13	25	88	21	22	174	6.42
	.84	2.20	4.22	14.86	3.55	3.72	29.39	
	.23	.60	1.16	4.08	.97	1.02	8.07	
SSW	2	7	11	8	5	0	33	4.50
	.34	1.18	1.86	1.35	.84	0.00	5.57	
	.09	.32	.51	.37	.23	0.00	1.53	
SW	2	9	10	7	1	0	29	4.01
	.34	1.52	1.69	1.18	.17	0.00	4.90	
	.09	.42	.46	.32	.05	0.00	1.34	
WSW	1	3	0	3	0	0	7	3.74
	.17	.51	0.00	.51	0.00	0.00	1.18	
	.05	.14	0.00	.14	0.00	0.00	.32	
W	2	1	3	1	0	0	7	3.43
	.34	.17	.51	.17	0.00	0.00	1.18	
	09	.05	.14	.05	0.00	0.00	.32	
WNW	2	4	4	1	1	0	12	3.21
	.34	.68	.68	.17	.17	0.00	2.03	
	.09	.19	.19	.05	.05	0.00	.56	
NW	1	2	4	2	0	0	9	3.68
	.17	.34	.68	.34	0.00	0.00	1.52	
	.05	.09	.19	.09	0.00	0.00	.42	
NNW	0	2	12	11	2	0	27	5.04
	0.00	.34	2.03	1.86	.34	0.00	4.56	
	0.00	.09	.56	.51	.09	0.00	1.25	
N	1	4	7	9	1	0	22	4.62
	.17	.68	1.18	1.52	.17	0.00	3.72	
	.05	.19	.32	.42	.05	0.00	1.02	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	27	108	195	202	37	23	592	4.82
	4.56	18.24	32.94	34.12	6.25	3.89	100.00	
	1.25	5.01	9.04	9.36	1.72	1.07	27.45	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	5	4	0	0	0	9	3.19
	0.00	2.17	1.74	0.00	0.00	0.00	3.91	
	0.00	.23	.19	0.00	0.00	0.00	.42	
NE	0	13	9	0	1	0	23	3.11
	0.00	5.65	3.91	0.00	.43	0.00	10.00	
	0.00	.60	.42	0.00	.05	0.00	1.07	
ENE	1	10	13	0	0	0	24	2.88
	.43	4.35	5.65	0.00	0.00	0.00	10.43	
	.05	.46	.60	0.00	0.00	0.00	1.11	
E	1	8	13	1	0	0	23	3.17
	.43	3.48	5.65	.43	0.00	0.00	10.00	
	.05	.37	.60	.05	0.00	0.00	1.07	
ESE	2	12	8	0	0	0	22	2.97
	.87	5.22	3.48	0.00	0.00	0.00	9.57	
	.09	.56	.37	0.00	0.00	0.00	1.02	
SE	0	16	5	0	0	0	21	2.60
	0.00	6.96	2.17	0.00	0.00	0.00	9.13	
	0.00	.74	.23	0.00	0.00	0.00	.97	
SSE	0	20	9	0	0	0	29	2.83
	0.00	8.70	3.91	0.00	0.00	0.00	12.61	
	0.00	.93	.42	0.00	0.00	0.00	1.34	
S	1	7	12	0	0	0	20	3.16
	.43	3.04	5.22	0.00	0.00	0.00	8.70	
	.05	.32	.56	0.00	0.00	0.00	.93	
SSW	2	3	3	0	0	0	8	2.86
	.87	1.30	1.30	0.00	0.00	0.00	3.48	
	.09	.14	.14	0.00	0.00	0.00	.37	
SW	0	5	0	0	0	0	5	2.30
	0.00	2.17	0.00	0.00	0.00	0.00	2.17	
	0.00	.23	0.00	0.00	0.00	0.00	.23	
WSW	2	2	1	0	0	0	5	2.12
	.87	.87	.43	0.00	0.00	0.00	2.17	
	.09	.09	.05	0.00	0.00	0.00	.23	
W	2	1	2	0	0	0	5	2.44
	.87	.43	.87	0.00	0.00	0.00	2.17	
	.09	.05	.09	0.00	0.00	0.00	.23	
WNW	0	2	2	0	0	0	4	2.60
	0.00	.87	.87	0.00	0.00	0.00	1.74	
	0.00	.09	09	0.00	0.00	0.00	.19	
NW	0	5	1	0	0	0	6	2.58
	0.00	2.17	.43	0.00	0.00	0.00	2.61	
	0.00	.23	.05	0.00	0.00	0.00	.28	
NNW	1	7	0	0	0	0	8	2.20
	.43	3.04	0.00	0.00	0.00	0.00	3.48	
	.05	.32	0.00	0.00	0.00	0.00	.37	
N	2	7	7	2	0	0	18	3.11
	.87	3.04	3.04	.87	0.00	0.00	7.83	
	.09	.32	.32	.09	0.00	0.00	.83	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	14	123	89	3	1	0	230	2.89
	6.09	53.48	38.70	1.30	.43	0.00	100.00	
	.65	5.70	4.13	.14	.05	0.00	10.66	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	3 1.70 .14	6 3.41 .28	15 8.52 .70	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	24 13.64 1.11	3.10
NE	3 1.70 .14	4 2.27 .19	4 2.27 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 6.25 .51	2.35
ENE	0 0.00 0.00	9 5.11 .42	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 6.25 .51	2.59
E	2 1.14 .09	7 3.98 .32	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 5.68 .46	2.32
ESE	1 .57 .05	8 4.55 .37	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 6.25 .51	2.29
SE	3 1.70 .14	9 5.11 .42	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 7.39 .60	2.27
SSE	1 .57 .05	6 3.41 .28	3 1.70 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 5.68 .46	2.69
S	1 .57 .05	15 8.52 .70	4 2.27 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 11.36 .93	2.55
SSW	2 1.14 .09	0 0.00 0.00	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.27 .19	2.47
SW	1 .57 .05	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.14 .09	2.00
WSW	1 .57 .05	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.14 .09	1.75
W	4 2.27 .19	4 2.27 .19	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 5.11 .42	1.68
WNW	0 0.00 0.00	10 5.68 .46	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 6.25 .51	2.35
NW	1 .57 .05	11 6.25 .51	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 7.39 .60	2.10
NNW	0 0.00 0.00	9 5.11 .42	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 5.68 .46	2.48
N	2 1.14 .09	8 4.55 .37	5 2.84 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 8.52 .70	2.56
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	25 14.20 1.16	108 61.36 5.01	43 24.43 1.99	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	176 100.00 8.16	2.46

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	4 .19	25 1.16	59 2.74	47 2.18	5 .23	3 .14	143 6.63	4.71
NE	8 .37	36 1.67	53 2.46	15 .70	3 .14	0 0.00	115 5.33	3.55
ENE	6 .28	43 1.99	44 2.04	18 .83	5 .23	0 0.00	116 5.38	3.68
E	5 .23	28 1.30	42 1.95	32 1.48	5 .23	3 .14	115 5.33	4.35
ESE	6 .28	37 1.72	47 2.18	31 1.44	5 .23	4 .19	130 6.03	4.34
SE	5 .23	39 1.81	66 3.06	36 1.67	3 .14	1 .05	150 6.95	4.12
SSE	1 .05	53 2.46	71 3.29	44 2.04	10 .46	1 .05	180 8.34	4.30
S	9 .42	45 2.09	69 3.20	172 7.97	103 4.78	60 2.78	458 21.23	6.70
SSW	9 .42	15 .70	34 1.58	46 2.13	80 3.71	29 1.34	213 9.87	7.18
SW	3 .14	20 .93	20 .93	15 .70	11 .51	4 .19	73 3.38	4.99
WSW	5 .23	13 .60	6 .28	7 .32	1 .05	0 0.00	32 1.48	3.43
W	8 .37	13 .60	22 1.02	2 .09	0 0.00	0 0.00	45 2.09	2.99
WNW	5 .23	23 1.07	17 .79	6 .28	3 .14	0 0.00	54 2.50	3.34
NW	4 .19	22 1.02	16 .74	32 1.48	6 .28	0 0.00	80 3.71	4.52
NNW	1 .05	23 1.07	36 1.67	50 2.32	7 .32	0 0.00	117 5.42	4.74
N	5 .23	31 1.44	44 2.04	41 1.90	14 .65	1 .05	136 6.31	4.71
CALM	0 0.00						0 0.00	CALM
TOTAL	84 3.89	466 21.60	646 29.95	594 27.54	261 12.10	106 4.91	2157 100.00	5.06

NUMBER OF VALID OBSERVATIONS	2157	96.64 PCT.
NUMBER OF INVALID OBSERVATIONS	75	3.36 PCT.
TOTAL NUMBER OF OBSERVATIONS	2232	100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	4 1.05 .20	8 2.09 .39	12 3.14 .59	1 .26 .05	0 0.00 0.00	25 6.54 1.23	5.11
NE	0 0.00 0.00	3 .79 .15	11 2.88 54	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 3.66 .69	3.89
ENE	2 .52 .10	2 .52 .10	10 2.62 .49	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 3.66 .69	3.15
E	0 0.00 0.00	0 0.00 0.00	3 .79 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 .79 .15	3.90
ESE	0 0.00 0.00	4 1.05 .20	3 .79 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 1.83 .35	3.04
SE	0 0.00 0.00	2 .52 .10	2 .52 .10	2 .52 .10	0 0.00 0.00	0 0.00 0.00	6 1.57 .30	3.70
SSE	0 0.00 0.00	7 1.83 .35	13 3.40 .64	10 2.62 .49	0 0.00 0.00	0 0.00 0.00	30 7.85 1.48	4.30
S	0 0.00 0.00	8 2.09 .39	19 4.97 .94	33 8.64 1.63	22 5.76 1.09	2 .52 .10	84 21.99 4.14	6.17
SSW	0 0.00 0.00	3 .79 .15	25 6.54 1.23	30 7.85 1.48	26 6.81 1.28	15 3.93 .74	99 25.92 4.88	6.96
SW	0 0.00 0.00	7 1.83 .35	8 2.09 .39	9 2.36 .44	3 .79 .15	2 .52 .10	29 7.59 1.43	5.53
WSW	0 0.00 0.00	4 1.05 .20	2 .52 .10	1 .26 .05	0 0.00 0.00	0 0.00 0.00	7 1.83 .35	3.29
W	0 0.00 0.00	7 1.83 .35	8 2.09 .39	2 .52 .10	0 0.00 0.00	0 0.00 0.00	17 4.45 .84	3.83
WNW	0 0.00 0.00	1 .26 .05	3 .79 .15	6 1.57 .30	0 0.00 0.00	0 0.00 0.00	10 2.62 .49	5.14
NW	1 .26 .05	2 .52 .10	0 0.00 0.00	2 .52 .10	1 .26 .05	0 0.00 0.00	6 1.57 .30	4.12
NNW	1 .26 .05	0 0.00 0.00	2 .52 .10	10 2.62 .49	3 .79 .15	0 0.00 0.00	16 4.19 .79	6.25
N	0 0.00 0.00	4 1.05 .20	2 .52 .10	3 .79 .15	6 1.57 .30	0 0.00 0.00	15 3.93 .74	5.59
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 1.05 .20	58 15.18 2.86	119 31.15 5.87	120 31.41 5.92	62 16.23 3.06	19 4.97 .94	382 100.00 18.85	5.57

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	6.10
NE	0 0.00 0.00	2 2.22 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.22 .10	2.15
ENE	0 0.00 0.00	1 1.11 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	1.70
E	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	3.90
ESE	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	2 2.22 .10	0 0.00 0.00	0 0.00 0.00	3 3.33 .15	5.17
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.22 .10	0 0.00 0.00	0 0.00 0.00	2 2.22 .10	5.50
SSE	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	5.00
S	0 0.00 0.00	3 3.33 .15	2 2.22 .10	9 10.00 .44	10 11.11 .49	1 1.11 .05	25 27.78 1.23	6.84
SSW	0 0.00 0.00	1 1.11 .05	4 4.44 .20	8 8.89 .39	2 2.22 .10	1 1.11 .05	16 17.78 .79	5.79
SW	0 0.00 0.00	0 0.00 0.00	3 3.33 .15	2 2.22 .10	0 0.00 0.00	0 0.00 0.00	5 5.56 .25	5.20
WSW	0 0.00 0.00	0 0.00 0.00	1 1.11 .05	1 1.11 .05	0 0.00 0.00	1 1.11 .05	3 3.33 .15	7.47
W	0 0.00 0.00	4 4.44 .20	2 2.22 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 6.67 .30	2.85
WNW	0 0.00 0.00	3 3.33 .15	2 2.22 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 5.56 .25	3.24
NW	0 0.00 0.00	3 3.33 .15	0 0.00 0.00	4 4.44 .20	0 0.00 0.00	0 0.00 0.00	7 7.78 .35	4.07
NNW	0 0.00 0.00	0 0.00 0.00	4 4.44 .20	5 5.56 .25	0 0.00 0.00	0 0.00 0.00	9 10.00 .44	5.53
N	0 0.00 0.00	3 3.33 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 3.33 .15	2.20
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	20 22.22 .99	21 23.33 1.04	34 37.78 1.68	12 13.33 .59	3 3.33 .15	90 100.00 4.44	5.31

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY -- 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	2 2.06 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.06 .10	4.10
NE	1 1.03 .05	1 1.03 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.06 .10	2.15
ENE	0 0.00 0.00	1 1.03 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	2.70
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	4.40
SE	0 0.00 0.00	0 0.00 0.00	3 3.09 .15	1 1.03 .05	0 0.00 0.00	0 0.00 0.00	4 4.12 .20	4.52
SSE	0 0.00 0.00	1 1.03 .05	3 3.09 .15	4 4.12 .20	1 1.03 .05	0 0.00 0.00	9 9.28 .44	5.10
S	0 0.00 0.00	1 1.03 .05	4 4.12 .20	12 12.37 .59	10 10.31 .49	1 1.03 .05	28 28.87 1.38	6.84
SSW	0 0.00 0.00	3 3.09 .15	2 2.06 .10	10 10.31 .49	4 4.12 .20	2 2.06 .10	21 21.65 1.04	6.38
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	2 2.06 .10	3 3.09 .15	9.67
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	1 1.03 .05	11.70
W	0 0.00 0.00	1 1.03 .05	1 1.03 .05	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	3 3.09 .15	6.10
WNW	0 0.00 0.00	2 2.06 .10	4 4.12 .20	1 1.03 .05	0 0.00 0.00	0 0.00 0.00	7 7.22 .35	4.06
NW	0 0.00 0.00	1 1.03 .05	5 5.15 .25	3 3.09 .15	0 0.00 0.00	0 0.00 0.00	9 9.28 .44	4.60
NNW	0 0.00 0.00	1 1.03 .05	4 4.12 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 5.15 .25	4.08
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.03 .05	0 0.00 0.00	1 1.03 .05	7.70
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 1.03 .05	12 12.37 .59	29 29.90 1.43	31 31.96 1.53	17 17.53 .84	7 7.22 .35	97 100.00 4.79	5.84

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	3 .62 .15	7 1.44 .35	2 .41 .10	0 0.00 0.00	0 0.00 0.00	12 2.46 .59	4.07
NE	0 0.00 0.00	4 .82 .20	7 1.44 .35	1 .21 .05	0 0.00 0.00	0 0.00 0.00	12 2.46 .59	3.35
ENE	0 0.00 0.00	2 .41 .10	12 2.46 .59	2 .41 .10	0 0.00 0.00	0 0.00 0.00	16 3.29 .79	3.71
E	0 0.00 0.00	7 1.44 .35	12 2.46 .59	2 .41 .10	2 .41 .10	0 0.00 0.00	23 4.72 1.13	3.95
ESE	1 .21 .05	4 .82 .20	10 2.05 .49	1 .21 .05	3 .62 .15	0 0.00 0.00	19 3.90 .94	4.18
SE	0 0.00 0.00	7 1.44 .35	13 2.67 .64	0 0.00 0.00	1 .21 .05	0 0.00 0.00	21 4.31 1.04	3.49
SSE	1 .21 .05	10 2.05 .49	24 4.93 1.18	16 3.29 .79	2 .41 .10	0 0.00 0.00	53 10.88 2.61	4.52
S	1 .21 .05	9 1.85 .44	38 7.80 1.87	41 8.42 2.02	42 8.62 2.07	4 .82 .20	135 27.72 6.66	6.16
SSW	0 0.00 0.00	4 .82 .20	18 3.70 .89	35 7.19 1.73	22 4.52 1.09	6 1.23 .30	85 17.45 4.19	6.49
SW	0 0.00 0.00	2 .41 .10	5 1.03 .25	2 .41 .10	1 .21 .05	2 .41 .10	12 2.46 .59	5.36
WSW	1 .21 .05	3 .62 .15	4 .82 .20	1 .21 .05	0 0.00 0.00	0 0.00 0.00	9 1.85 .44	3.20
W	0 0.00 0.00	3 .62 .15	7 1.44 .35	0 0.00 0.00	0 0.00 0.00	2 .41 .10	12 2.46 .59	4.77
WNW	1 .21 .05	1 .21 .05	4 .82 .20	2 .41 .10	1 .21 .05	2 .41 .10	11 2.26 .54	5.73
NW	0 0.00 0.00	1 .21 .05	12 2.46 .59	4 .82 .20	0 0.00 0.00	0 0.00 0.00	17 3.49 .84	4.57
NNW	1 .21 .05	2 .41 .10	13 2.67 .64	13 2.67 .64	0 0.00 0.00	0 0.00 0.00	29 5.95 1.43	4.60
N	0 0.00 0.00	5 1.03 .25	12 2.46 .59	4 .82 .20	0 0.00 0.00	0 0.00 0.00	21 4.31 1.04	3.90
CALM	0 0.00 0.00						0 0.00 0 00	CALM
TOTAL	6 1.23 .30	67 13.76 3 31	198 40 66 9.77	126 25.87 6.22	74 15.20 3.65	16 3.29 .79	487 100.00 24.03	5.18

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1 .17 .05	1 .17 .05	5 .86 .25	1 .17 .05	0 0.00 0.00	0 0.00 0.00	8 1.38 .39	3.77
NE	1 .17 .05	8 1.38 .39	7 1.21 .35	2 .35 .10	0 0.00 0.00	0 0.00 0.00	18 3.11 .89	3.28
ENE	0 0.00 0.00	6 1.04 .30	6 1.04 .30	1 .17 .05	0 0.00 0.00	0 0.00 0.00	13 2.25 .64	3.10
E	3 .52 .15	6 1.04 .30	9 1.55 .44	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	18 3.11 .89	2.84
ESE	1 .17 .05	7 1.21 .35	7 1.21 .35	2 .35 .10	0 0.00 0.00	0 0.00 0.00	17 2.94 .84	3.46
SE	0 0.00 0.00	10 1.73 .49	11 1.90 .54	3 .52 .15	0 0.00 0.00	0 0.00 0.00	24 4.15 1.18	3.52
SSE	1 .17 .05	11 1.90 .54	48 8.29 2.37	22 3.80 1.09	3 .52 .15	0 0.00 0.00	85 14.68 4.19	4.39
S	1 .17 .05	21 3.63 1.04	94 16.23 4.64	50 8.64 2.47	16 2.76 .79	3 .52 .15	185 31.95 9.13	4.99
SSW	1 .17 .05	10 1.73 .49	22 3.80 1.09	45 7.77 2.22	9 1.55 .44	5 .86 .25	92 15.89 4.54	5.80
SW	0 0.00 0.00	10 1.73 .49	16 2.76 .79	4 .69 .20	3 .52 .15	0 0.00 0.00	33 5.70 1.63	4.18
WSW	0 0.00 0.00	7 1.21 .35	4 .69 .20	2 .35 .10	0 0.00 0.00	0 0.00 0.00	13 2.25 .64	3.33
W	0 0.00 0.00	8 1.38 .39	5 .86 .25	0 0.00 0.00	1 .17 .05	0 0.00 0.00	14 2.42 .69	3.26
WNW	0 0.00 0.00	5 .86 .25	6 1.04 .30	5 .86 .25	0 0.00 0.00	0 0.00 0.00	16 2.76 .79	4.29
NW	1 .17 .05	3 .52 .15	4 .69 .20	2 .35 .10	3 .52 .15	0 0.00 0.00	13 2.25 .64	4.84
NNW	0 0.00 0.00	3 .52 .15	6 1.04 .30	6 1.04 .30	4 .69 .20	0 0.00 0.00	19 3.28 .94	5.17
N	0 0.00 0.00	5 .86 .25	5 .86 .25	1 .17 .05	0 0.00 0.00	0 0.00 0.00	11 1.90 .54	3.27
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	10 1.73 .49	121 20.90 5.97	255 44.04 12.58	146 25.22 7.20	39 6.74 1.92	8 1.38 .39	579 100.00 28.56	4.57

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	10 4.46 .49	2 .89 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 5.36 .59	2.69
NE	2 .89 .10	9 4.02 .44	3 1.34 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 6.25 .69	2.34
ENE	1 .45 .05	5 2.23 .25	1 .45 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.12 .35	2.16
E	1 .45 .05	4 1.79 .20	2 .89 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.12 .35	2.76
ESE	2 .89 .10	12 5.36 .59	2 .89 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	16 7.14 .79	2.50
SE	1 .45 .05	15 6.70 .74	5 2.23 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	21 9.37 1.04	2.61
SSE	2 .89 .10	23 10.27 1.13	14 6.25 .69	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	39 17.41 1.92	2.69
S	1 .45 .05	12 5.36 .59	23 10.27 1.13	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	36 16.07 1.78	3.14
SSW	3 1.34 .15	9 4.02 .44	5 2.23 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 7.59 .84	2.59
SW	3 1.34 .15	5 2.23 .25	3 1.34 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 4.91 .54	2.14
WSW	2 .89 .10	4 1.79 .20	2 .89 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 3.57 .39	2.20
W	1 .45 .05	2 .89 .10	1 .45 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.79 .20	2.12
WNW	0 0.00 0.00	5 2.23 .25	4 1.79 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 4.02 .44	2.82
NW	0 0.00 0.00	3 1.34 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.34 .15	2.00
NNW	1 .45 .05	8 3.57 .39	3 1.34 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 5.36 .59	2.82
N	0 0.00 0.00	6 2.68 .30	2 .89 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 3.57 .39	2.60
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	20 8.93 .99	132 58.93 6.51	72 32.14 3.55	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	224 100.00 11.05	2.64

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 1.19 .10	12 7.14 .59	3 1.79 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 10.12 .84	2.49
NE	2 1.19 .10	5 2.98 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 4.17 .35	2.01
ENE	1 .60 .05	3 1.79 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.38 .20	2.35
E	1 .60 .05	7 4.17 .35	1 .60 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 5.36 .44	2.59
ESE	0 0.00 0.00	3 1.79 .15	4 2.38 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 4.17 .35	2.96
SE	1 .60 .05	9 5.36 .44	3 1.79 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 7.74 .64	2.52
SSE	3 1.79 .15	19 11.31 .94	4 2.38 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	26 15.48 1.28	2.34
S	2 1.19 .10	5 2.98 .25	3 1.79 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 5.95 .49	2.30
SSW	2 1.19 .10	3 1.79 .15	1 .60 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.57 .30	1.95
SW	1 .60 .05	1 .60 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.19 .10	1.75
WSW	1 .60 .05	8 4.76 .39	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 5.36 .44	1.76
W	0 0.00 0.00	2 1.19 .10	2 1.19 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.38 .20	3.10
WNW	1 .60 .05	5 2.98 .25	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.57 .30	1.85
NW	3 1.79 .15	10 5.95 .49	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 7.74 .64	1.93
NNW	2 1.19 .10	9 5.36 .44	4 2.38 .20	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 8.93 .74	2.51
N	3 1.79 .15	16 9.52 .79	1 .60 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 11.90 .99	2.28
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	25 14.88 1.23	117 69.64 5.77	26 15.48 1.28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	168 100.00 8.29	2.32

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL JUNE COMBINED

ALL CLASSES
DATA SOURCE ON-SITE
WIND SENSOR HEIGHT 10.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3 .15	30 1.48	27 1.33	16 .79	1 .05	0 0.00	77 3.80	3.84
NE	6 .30	32 1.58	28 1.38	3 .15	0 0.00	0 0.00	69 3.40	3.03
ENE	4 .20	20 .99	29 1.43	3 .15	0 0.00	0 0.00	56 2.76	3.08
E	5 .25	24 1.18	28 1.38	2 .10	2 .10	0 0.00	61 3.01	3.28
ESE	4 .20	30 1.48	28 1.38	5 .25	3 .15	0 0.00	70 3.45	3.43
SE	2 .10	43 2.12	37 1.83	8 .39	1 .05	0 0.00	91 4.49	3.26
SSE	7 .35	71 3.50	107 5.28	52 2.57	6 .30	0 0.00	243 11.99	3.94
S	5 .25	59 2.91	183 9.03	145 7.15	100 4.93	11 .54	503 24.81	5.51
SSW	6 .30	33 1.63	77 3.80	128 6.31	63 3.11	29 1.43	336 16.58	6.12
SW	4 .20	25 1.23	35 1.73	17 .84	8 .39	6 .30	95 4.69	4.68
WSW	4 .20	26 1.28	13 .64	5 .25	0 0.00	2 .10	50 2.47	3.25
W	1 .05	27 1.33	26 1.28	2 .10	1 .05	3 .15	60 2.96	3.74
WNW	2 .10	22 1.09	23 1.13	14 .69	1 .05	2 .10	64 3.16	4.13
NW	5 .25	23 1.13	21 1.04	15 .74	4 .20	0 0.00	68 3.35	3.92
NNW	5 .25	23 1.13	36 1.78	34 1.68	7 .35	0 0.00	105 5.18	4.51
N	3 15	39 1.92	22 1.09	8 .39	7 .35	0 0.00	79 3.90	3.57
CALM	0 0.00						0 0.00	CALM
TOTAL	66 3.26	527 26.00	720 35.52	457 22.55	204 10.06	53 2.61	2027 100.00	4.60

NUMBER OF VALID OBSERVATIONS 2027 93.84 PCT.
NUMBER OF INVALID OBSERVATIONS 133 6.16 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	1 .25 .05	5 1.26 .23	7 1.77 .33	1 .25 .05	0 0.00 0.00	14 3.54 .66	5.20
NE	0 0.00 0.00	0 0.00 0.00	5 1.26 .23	4 1.01 .19	0 0.00 0.00	0 0.00 0.00	9 2.27 .42	5.21
ENE	0 0.00 0.00	3 .76 .14	9 2.27 .42	10 2.53 .47	0 0.00 0.00	0 0.00 0.00	22 5.56 1.03	4.70
E	0 0.00 0.00	2 .51 .09	7 1.77 .33	3 .76 .14	0 0.00 0.00	0 0.00 0.00	12 3.03 .56	4.46
ESE	0 0.00 0.00	5 1.26 .23	16 4.04 .75	2 .51 .09	0 0.00 0.00	0 0.00 0.00	23 5.81 1.08	3.74
SE	0 0.00 0.00	2 .51 .09	4 1.01 .19	0 0.00 0.00	1 .25 .05	0 0.00 0.00	7 1.77 .33	4.03
SSE	0 0.00 0.00	3 .76 .14	19 4.80 .89	1 .25 .05	1 .25 .05	0 0.00 0.00	24 6.06 1.13	4.07
S	1 .25 .05	5 1.26 .23	26 6.57 1.22	43 10.86 2.02	12 3.03 .56	3 .76 .14	90 22.73 4.22	5.84
SSW	0 0.00 0.00	2 .51 .09	23 5.81 1.08	67 16.92 3.14	3 .76 .14	22 5.56 1.03	117 29.55 5.49	6.64
SW	0 0.00 0.00	1 .25 .05	6 1.52 .28	16 4.04 .75	1 .25 .05	0 0.00 0.00	24 6.06 1.13	5.27
WSW	0 0.00 0.00	2 .51 .09	4 1.01 .19	4 1.01 .19	0 0.00 0.00	0 0.00 0.00	10 2.53 .47	4.49
W	0 0.00 0.00	5 1.26 .23	3 .76 .14	9 2.27 .42	0 0.00 0.00	0 0.00 0.00	17 4.29 .80	4.69
WNW	0 0.00 0.00	2 .51 .09	5 1.26 .23	1 .25 .05	0 0.00 0.00	0 0.00 0.00	8 2.02 .38	3.89
NW	1 .25 .05	2 .51 .09	3 .76 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 1.52 .28	2.97
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .51 .09	0 0.00 0.00	0 0.00 0.00	2 .51 .09	5.60
N	0 0.00 0.00	1 .25 .05	6 1.52 .28	4 1.01 .19	0 0.00 0.00	0 0.00 0.00	11 2.78 .52	4.88
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 .51 .09	36 9.09 1.69	141 35.61 6.62	173 43.69 8.12	19 4.80 .89	25 6.31 1.17	396 100.00 18.58	5.45

KEY: XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	2 1.94 .09	3 2.91 .14	1 .97 .05	0 0.00 0.00	0 0.00 0.00	6 5.83 .28	3.97
NE	1 .97 .05	3 2.91 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.88 .19	1.72
ENE	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	4.15
E	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	4.20
ESE	0 0.00 0.00	2 1.94 .09	0 0.00 0.00	1 .97 .05	0 0.00 0.00	0 0.00 0.00	3 2.91 .14	3.10
SE	0 0.00 0.00	3 2.91 .14	1 .97 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.88 .19	2.57
SSE	0 0.00 0.00	1 .97 .05	4 3.88 .19	3 2.91 .14	0 0.00 0.00	0 0.00 0.00	8 7.77 .38	4.54
S	0 0.00 0.00	1 .97 .05	14 13.59 .66	20 19.42 .94	1 .97 .05	1 .97 .05	37 35.92 1.74	5.36
SSW	0 0.00 0.00	2 1.94 .09	5 4.85 .23	9 8.74 .42	3 2.91 .14	0 0.00 0.00	19 18.45 .89	5.91
SW	0 0.00 0.00	0 0.00 0.00	1 .97 .05	1 .97 .05	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	4.45
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	5.70
W	0 0.00 0.00	3 2.91 .14	2 1.94 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 4.85 .23	2.82
WNW	0 0.00 0.00	0 0.00 0.00	1 .97 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .97 .05	4.20
NW	0 0.00 0.00	1 .97 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .97 .05	2.00
NNW	0 0.00 0.00	1 .97 .05	0 0.00 0.00	1 .97 .05	0 0.00 0.00	0 0.00 0.00	2 1.94 .09	4.10
N	0 0.00 0.00	1 .97 .05	2 1.94 .09	2 1.94 .09	0 0.00 0.00	0 0.00 0.00	5 4.85 .23	4.38
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .97 .05	20 19.42 .94	37 35.92 1.74	40 38.83 1.88	4 3.88 .19	1 .97 .05	103 100.00 4.83	4.71

KEY: XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL JULY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	1	5	0	0	0	6	3.80
	0.00	1.02	5.10	0.00	0.00	0.00	6.12	
	0.00	.05	.23	0.00	0.00	0.00	.28	
NE	0	0	1	0	0	0	1	4.80
	0.00	0.00	1.02	0.00	0.00	0.00	1.02	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
ENE	0	2	2	0	0	0	4	3.53
	0.00	2.04	2.04	0.00	0.00	0.00	4.08	
	0.00	.09	.09	0.00	0.00	0.00	.19	
E	1	0	1	1	0	0	3	3.63
	1.02	0.00	1.02	1.02	0.00	0.00	3.06	
	.05	0.00	.05	.05	0.00	0.00	.14	
ESE	0	0	2	0	0	0	2	4.20
	0.00	0.00	2.04	0.00	0.00	0.00	2.04	
	0.00	0.00	.09	0.00	0.00	0.00	.09	
SE	0	3	0	0	1	0	4	3.77
	0.00	3.06	0.00	0.00	1.02	0.00	4.08	
	0.00	.14	0.00	0.00	.05	0.00	.19	
SSE	0	4	3	1	0	0	8	3.24
	0.00	4.08	3.06	1.02	0.00	0.00	8.16	
	0.00	.19	.14	.05	0.00	0.00	.38	
S	0	5	9	12	1	0	27	4.61
	0.00	5.10	9.18	12.24	1.02	0.00	27.55	
	0.00	.23	.42	.56	.05	0.00	1.27	
SSW	0	3	5	11	0	0	19	5.08
	0.00	3.06	5.10	11.22	0.00	0.00	19.39	
	0.00	.14	.23	.52	0.00	0.00	.89	
SW	0	0	0	3	0	0	3	6.03
	0.00	0.00	0.00	3.06	0.00	0.00	3.06	
	0.00	0.00	0.00	.14	0.00	0.00	.14	
WSW	0	0	1	0	0	0	1	4.90
	0.00	0.00	1.02	0.00	0.00	0.00	1.02	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
W	0	2	1	0	0	0	3	2.80
	0.00	2.04	1.02	0.00	0.00	0.00	3.06	
	0.00	.09	.05	0.00	0.00	0.00	.14	
WNW	0	3	0	1	0	0	4	3.02
	0.00	3.06	0.00	1.02	0.00	0.00	4.08	
	0.00	.14	0.00	.05	0.00	0.00	.19	
NW	0	0	2	0	0	0	2	4.15
	0.00	0.00	2.04	0.00	0.00	0.00	2.04	
	0.00	0.00	.09	0.00	0.00	0.00	.09	
NNW	1	4	1	0	0	0	6	2.07
	1.02	4.08	1.02	0.00	0.00	0.00	6.12	
	.05	.19	.05	0.00	0.00	0.00	28	
N	0	0	4	1	0	0	5	4.66
	0.00	0.00	4.09	1.02	0.00	0.00	5.10	
	0.00	0.00	.19	.05	0.00	0.00	.23	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	27	37	30	2	0	98	4.19
	2.04	27.55	37.76	30.61	2.04	0.00	100 00	
	.09	1.27	1.74	1.41	.09	0.00	4 60	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1	11	7	2	0	0	21	3.30
	.21	2.27	1.45	.41	0.00	0.00	4.34	
	.05	.52	.33	.09	0.00	0.00	.99	
NE	1	9	14	3	1	0	28	3.64
	.21	1.86	2.89	.62	.21	0.00	5.79	
	.05	.42	.66	.14	.05	0.00	1.31	
ENE	0	12	20	5	0	0	37	3.65
	0.00	2.48	4.13	1.03	0.00	0.00	7.64	
	0.00	.56	.94	.23	0.00	0.00	1.74	
E	2	17	12	4	1	0	36	3.36
	.41	3.51	2.48	.83	.21	0.00	7.44	
	.09	.80	.56	.19	.05	0.00	1.69	
ESE	0	18	11	4	1	0	34	3.42
	0.00	3.72	2.27	.83	.21	0.00	7.02	
	0.00	.84	.52	.19	.05	0.00	1.60	
SE	0	3	10	7	2	0	22	4.80
	0.00	.62	2.07	1.45	.41	0.00	4.55	
	0.00	.14	.47	.33	.09	0.00	1.03	
SSE	1	8	16	3	0	0	28	3.49
	.21	1.65	3.31	.62	0.00	0.00	5.79	
	.05	.38	.75	.14	0.00	0.00	1.31	
S	0	17	48	36	19	2	122	5.21
	0.00	3.51	9.92	7.44	3.93	.41	25.21	
	0.00	.80	2.25	1.69	.89	.09	5.73	
SSW	0	7	24	26	3	0	60	4.99
	0.00	1.45	4.96	5.37	.62	0.00	12.40	
	0.00	.33	1.13	1.22	.14	0.00	2.82	
SW	0	5	6	3	0	0	14	4.10
	0.00	1.03	1.24	.62	0.00	0.00	2.89	
	0.00	.23	.28	.14	0.00	0.00	.66	
WSW	1	4	4	0	0	0	9	2.86
	.21	83	.83	0.00	0.00	0.00	1.86	
	.05	.19	.19	0.00	0.00	0.00	.42	
W	0	3	8	4	0	0	15	4.15
	0.00	.62	1.65	.83	0.00	0.00	3 10	
	0.00	.14	.38	.19	0.00	0.00	.70	
WNW	0	1	7	7	0	0	15	4.86
	0.00	.21	1.45	1.45	0.00	0.00	3 10	
	0.00	.05	.33	.33	0.00	0.00	70	
NW	1	3	6	7	0	0	17	4.06
	.21	.62	1.24	1.45	0.00	0.00	3 51	
	.05	.14	.28	.33	0.00	0.00	80	
NNW	1	2	3	0	0	0	6	2.82
	.21	.41	.62	0.00	0.00	0.00	1 24	
	.05	.09	.14	0.00	0.00	0.00	28	
N	1	2	14	3	0	0	20	3.85
	.21	.41	2.89	.62	0.00	0.00	4 13	
	.05	.09	.66	.14	0.00	0.00	94	
CALM	0						0	CALM
	0.00						0 00	
	0.00						0 00	
TOTAL	9	122	210	114	27	2	484	4 26
	1.86	25.21	43.39	23.55	5.58	.41	100 00	
	.42	5.73	9.85	5.35	1.27	.09	22 71	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .21 .05	10 2.09 .47	5 1.04 .23	2 .42 09	0 0.00 0.00	0 0.00 0.00	18 3.76 .84	3.08
NE	1 21 .05	8 1.67 .38	10 2.09 .47	1 .21 .05	0 0.00 0.00	0 0.00 0.00	20 4.18 .94	3.42
ENE	2 .42 .09	12 2.51 .56	11 2.30 .52	0 0.00 0.00	1 .21 .05	0 0.00 0.00	26 5.43 1.22	3.22
E	0 0.00 0.00	13 2.71 .61	17 3.55 .80	8 1.67 .38	2 .42 .09	2 .42 .09	42 8.77 1.97	4.45
ESE	3 .63 .14	18 3.76 .84	10 2.09 .47	4 .84 .19	0 0.00 0.00	0 0.00 0.00	35 7.31 1.64	3.04
SE	4 .84 .19	23 4.80 1.08	14 2.92 .66	2 .42 .09	0 0.00 0.00	0 0.00 0.00	43 8.98 2.02	2.86
SSE	0 0.00 0.00	43 8.98 2.02	29 6.05 1.36	2 .42 .09	0 0.00 0.00	0 0.00 0.00	74 15.45 3.47	3.03
S	2 .42 .09	34 7.10 1.60	62 12.94 2.91	28 5.85 1.31	1 .21 .05	0 0.00 0.00	127 26.51 5.96	3.95
SSW	1 .21 .05	13 2.71 .61	16 3.34 .75	5 1.04 .23	0 0.00 0.00	0 0.00 0.00	35 7.31 1.64	3.68
SW	0 0.00 0.00	5 1.04 .23	4 .84 .19	3 .63 .14	0 0.00 0.00	0 0.00 0.00	12 2.51 .56	3.64
WSW	0 0.00 0.00	1 .21 .05	3 .63 .14	1 .21 .05	0 0.00 0.00	0 0.00 0.00	5 1.04 .23	3.52
W	0 0.00 0.00	3 .63 .14	1 .21 .05	1 .21 .05	0 0.00 0.00	0 0.00 0.00	5 1.04 .23	3.34
WNW	0 0.00 0.00	0 0.00 0.00	2 .42 .09	2 .42 .09	0 0.00 0.00	0 0.00 0.00	4 .84 .19	4.90
NW	2 .42 .09	2 .42 .09	7 1.46 .33	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 2.30 .52	3.34
NNW	1 .21 .05	2 .42 .09	2 .42 .09	1 .21 .05	0 0.00 0.00	0 0.00 0.00	6 1.25 .28	2.82
N	4 .84 .19	5 1.04 .23	3 .63 .14	4 .84 .19	0 0.00 0.00	0 0.00 0.00	16 3.34 .75	3.30
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	21 4.38 .99	192 40.08 9.01	196 40.92 9.20	64 13.36 3.00	4 .84 .19	2 .42 .09	479 100.00 22.48	3.51

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .27 .05	11 2.98 .52	3 .81 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 4.07 .70	2.49
NE	0 0.00 0.00	8 2.17 .38	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.17 .38	2.24
ENE	2 .54 .09	15 4.07 .70	8 2.17 .38	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	25 6.78 1.17	2.70
E	3 .81 .14	17 4.61 .80	13 3.52 .61	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	33 8.94 1.55	2.84
ESE	8 2.17 .38	11 2.98 .52	18 4.88 .84	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	37 10.03 1.74	2.82
SE	4 1.08 .19	31 8.40 1.45	6 1.63 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	41 11.11 1.92	2.32
SSE	1 .27 .05	59 15.99 2.77	18 4.88 .84	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	78 21.14 3.66	2.62
S	2 .54 .09	27 7.32 1.27	26 7.05 1.22	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	55 14.91 2.58	3.03
SSW	1 .27 .05	11 2.98 .52	9 2.44 .42	1 .27 .05	0 0.00 0.00	0 0.00 0.00	22 5.96 1.03	3.05
SW	0 0.00 0.00	6 1.63 .28	8 2.17 .38	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 3.79 .66	2.96
WSW	1 .27 .05	2 .54 .09	3 .81 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 1.63 .28	2.73
W	0 0.00 0.00	2 .54 .09	3 .81 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.36 .23	3.14
WNW	0 0.00 0.00	1 .27 .05	2 .54 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 .81 .14	3.20
NW	1 .27 .05	1 .27 .05	1 .27 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 .81 .14	2.33
NNW	2 .54 .09	5 1.36 .23	1 .27 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.17 .38	1.81
N	1 .27 .05	7 1.90 .33	8 2.17 .38	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	16 4.34 .75	2.81
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	27 7.32 1.27	214 57.99 10.04	127 34.42 5.96	1 .27 .05	0 0.00 0.00	0 0.00 0.00	369 100.00 17.32	2.72

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	21 10.40 .99	3 1.49 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	24 11.88 1.13	2.67
NE	0 0.00 0.00	9 4.46 .42	2 .99 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 5.45 .52	2.71
ENE	1 .50 .05	5 2.48 .23	12 5.94 .56	1 .50 .05	0 0.00 0.00	0 0.00 0.00	19 9.41 .89	3.42
E	1 .50 .05	10 4.95 .47	7 3.47 .33	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	18 8.91 .84	2.65
ESE	0 0.00 0.00	9 4.46 .42	3 1.49 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 5.94 .56	2.32
SE	2 .99 .09	13 6.44 .61	5 2.48 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 9.90 .94	2.30
SSE	1 .50 .05	27 13.37 1.27	10 4.95 .47	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	38 18.81 1.78	2.61
S	3 1.49 .14	15 7.43 .70	12 5.94 .56	1 .50 .05	0 0.00 0.00	0 0.00 0.00	31 15.35 1.45	2.72
SSW	1 .50 .05	2 .99 .09	1 .50 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.98 .19	2.47
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
W	1 .50 .05	3 1.49 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.98 .19	1.70
WNW	1 .50 .05	3 1.49 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.98 .19	2.13
NW	1 .50 .05	1 .50 .05	1 .50 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.49 .14	2.47
NNW	0 0.00 0.00	4 1.98 .19	0 0.00 0.00	1 .50 .05	0 0.00 0.00	0 0.00 0.00	5 2.48 .23	2.96
N	0 0.00 0.00	6 2.97 .28	2 .99 .09	1 .50 .05	0 0.00 0.00	0 0.00 0.00	9 4.46 .42	3.07
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	12 5.94 .56	128 63.37 6.01	58 28.71 2.72	4 1.98 .19	0 0.00 0.00	0 0.00 0.00	202 100.00 9.48	2.67

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3 .14	57 2.67	31 1.45	12 .56	1 .05	0 0.00	104 4.88	3.32
NE	3 .14	37 1.74	32 1.50	8 .38	1 .05	0 0.00	81 3.80	3.41
ENE	5 .23	49 2.30	64 3.00	16 .75	1 .05	0 0.00	135 6.34	3.53
E	7 .33	59 2.77	59 2.77	16 .75	3 .14	2 .09	146 6.85	3.58
ESE	11 .52	63 2.96	60 2.82	11 .52	1 .05	0 0.00	146 6.85	3.14
SE	10 .47	78 3.66	40 1.88	9 .42	4 .19	0 0.00	141 6.62	3.00
SSE	3 .14	145 6.80	99 4.65	10 .47	1 .05	0 0.00	258 12.11	3.04
S	8 .38	104 4.88	197 9.24	140 6.57	34 1.60	6 .28	489 22.95	4.57
SSW	3 .14	40 1.88	83 3.89	119 5.58	9 .42	22 1.03	276 12.95	5.40
SW	0 0.00	17 .80	25 1.17	26 1.22	1 .05	0 0.00	69 3.24	4.29
WSW	2 .09	9 .42	15 .70	7 .33	0 0.00	0 0.00	33 1.55	3.66
W	1 .05	21 .99	18 .84	14 .66	0 0.00	0 0.00	54 2.53	3.77
WNW	1 .05	10 .47	17 .80	11 .52	0 0.00	0 0.00	39 1.83	4.05
NW	6 .28	10 .47	20 .94	7 .33	0 0.00	0 0.00	43 2.02	3.45
NNW	5 .23	18 .84	7 .33	5 .23	0 0.00	0 0.00	35 1.64	2.71
N	6 .28	22 1.03	39 1.83	15 .70	0 0.00	0 0.00	82 3.85	3.67
CALM	0 0.00						0 0.00	CALM
TOTAL	74 3.47	739 34.68	806 37.82	426 19.99	56 2.63	30 1.41	2131 100.00	3.91

NUMBER OF VALID OBSERVATIONS 2131 95.47 PCT.
NUMBER OF INVALID OBSERVATIONS 101 4.53 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1	1	2	6	0	0	10	5.12
	.35	.35	.70	2.10	0.00	0.00	3.50	
	.05	.05	.09	.28	0.00	0.00	.47	
NE	0	0	2	2	0	0	4	5.00
	0.00	0.00	.70	.70	0.00	0.00	1.40	
	0.00	0.00	.09	.09	0.00	0.00	.19	
ENE	0	0	1	0	0	0	1	3.90
	0.00	0.00	.35	0.00	0.00	0.00	.35	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
E	1	0	1	0	1	0	3	4.63
	.35	0.00	35	0.00	.35	0.00	1.05	
	.05	0.00	.05	0.00	.05	0.00	.14	
ESE	0	2	3	1	0	0	6	3.78
	0.00	.70	1.05	.35	0.00	0.00	2.10	
	0.00	.09	14	.05	0.00	0.00	.28	
SE	0	2	5	4	0	0	11	4.43
	0.00	.70	1.75	1.40	0.00	0.00	3.85	
	0.00	.09	.23	.19	0.00	0.00	.51	
SSE	1	4	5	6	1	0	17	4.33
	.35	1.40	1.75	2.10	.35	0.00	5.94	
	.05	.19	.23	.28	.05	0.00	.79	
S	1	2	26	38	22	0	89	6.03
	.35	.70	9.09	13.29	7.69	0.00	31.12	
	.05	.09	1.21	1.77	1.02	0.00	4.14	
SSW	0	4	15	55	8	0	82	5.86
	0.00	1.40	5.24	19.23	2.80	0.00	28.67	
	0.00	.19	.70	2.56	.37	0.00	3.81	
SW	1	1	6	5	0	0	13	4.45
	.35	.35	2.10	1.75	0.00	0.00	4.55	
	.05	.05	.28	.23	0.00	0.00	.60	
WSW	1	1	1	0	0	0	3	2.90
	.35	.35	.35	0.00	0.00	0.00	1.05	
	.05	.05	.05	0.00	0.00	0.00	.14	
W	0	0	1	0	0	0	1	4.10
	0.00	0.00	.35	0.00	0.00	0.00	.35	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
WNW	0	2	1	0	0	0	3	3.20
	0.00	.70	.35	0.00	0.00	0.00	1.05	
	0.00	.09	.05	0.00	0.00	0.00	.14	
NW	1	2	1	9	7	0	20	6.22
	.35	.70	.35	3.15	2.45	0.00	6.99	
	.05	.09	.05	.42	.33	0.00	.93	
NNW	0	1	1	9	0	0	11	5.65
	0.00	.35	.35	3.15	0.00	0.00	3.85	
	0.00	.05	.05	.42	0.00	0.00	.51	
N	1	5	2	4	0	0	12	3.74
	.35	1.75	.70	1.40	0.00	0.00	4.20	
	.05	.23	.09	.19	0.00	0.00	.56	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	8	27	73	139	39	0	286	5.46
	2.80	9.44	25.52	48.60	13.64	0.00	100.00	
	.37	1.26	3.40	6.47	1.81	0.00	13.30	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	0	1	1	0	0	2	5.10
	0.00	0.00	.76	.76	0.00	0.00	1.52	
	0.00	0.00	.05	.05	0.00	0.00	.09	
NE	0	0	0	1	0	0	1	6.80
	0.00	0.00	0.00	.76	0.00	0.00	.76	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
ENE	0	0	1	0	0	0	1	3.40
	0.00	0.00	.76	0.00	0.00	0.00	.76	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
E	0	0	1	0	0	0	1	3.70
	0.00	0.00	.76	0.00	0.00	0.00	.76	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
ESE	0	3	3	0	0	0	6	3.05
	0.00	2.27	2.27	0.00	0.00	0.00	4.55	
	0.00	.14	.14	0.00	0.00	0.00	.28	
SE	0	2	2	1	0	0	5	4.00
	0.00	1.52	1.52	.76	0.00	0.00	3.79	
	0.00	.09	.09	.05	0.00	0.00	.23	
SSE	0	2	2	1	1	0	6	4.78
	0.00	1.52	1.52	.76	.76	0.00	4.55	
	0.00	.09	.09	.05	.05	0.00	.28	
S	0	2	14	24	7	0	47	5.57
	0.00	1.52	10.61	18.18	5.30	0.00	35.61	
	0.00	.09	.65	1.12	.33	0.00	2.19	
SSW	0	0	10	19	5	0	34	5.97
	0.00	0.00	7.58	14.39	3.79	0.00	25.76	
	0.00	0.00	.47	.88	.23	0.00	1.58	
SW	0	0	3	3	0	0	6	5.30
	0.00	0.00	2.27	2.27	0.00	0.00	4.55	
	0.00	0.00	.14	.14	0.00	0.00	.28	
WSW	0	2	1	0	0	0	3	3.03
	0.00	1.52	.76	0.00	0.00	0.00	2.27	
	0.00	.09	.05	0.00	0.00	0.00	.14	
W	1	3	1	0	0	0	5	2.26
	.76	2.27	.76	0.00	0.00	0.00	3.79	
	.05	.14	.05	0.00	0.00	0.00	.23	
WNW	0	3	0	0	0	0	3	2.30
	0.00	2.27	0.00	0.00	0.00	0.00	2.27	
	0.00	.14	0.00	0.00	0.00	0.00	.14	
NW	0	1	1	2	2	0	6	5.80
	0.00	.76	.76	1.52	1.52	0.00	4.55	
	0.00	.05	.05	.09	.09	0.00	.28	
NNW	0	0	0	1	0	0	1	5.60
	0.00	0.00	0.00	.76	0.00	0.00	.76	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
N	0	0	5	0	0	0	5	3.80
	0.00	0.00	3.79	0.00	0.00	0.00	3.79	
	0.00	0.00	.23	0.00	0.00	0.00	.23	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	1	18	45	53	15	0	132	5.11
	.76	13.64	34.09	40.15	11.36	0.00	100.00	
	.05	.84	2.09	2.47	.70	0.00	6.14	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 1.34 .09	0 0.00 0.00	2 1.34 .09	0 0.00 0.00	0 0.00 0.00	4 2.68 .19	3.87
NE	0 0.00 0.00	1 .67 .05	3 2.01 .14	1 .67 .05	0 0.00 0.00	0 0.00 0.00	5 3.36 .23	4.08
ENE	0 0.00 0.00	0 0.00 0.00	3 2.01 .14	3 2.01 .14	0 0.00 0.00	0 0.00 0.00	6 4.03 .28	4.75
E	1 .67 .05	0 0.00 0.00	0 0.00 0.00	2 1.34 .09	0 0.00 0.00	0 0.00 0.00	3 2.01 .14	4.73
ESE	0 0.00 0.00	0 0.00 0.00	2 1.34 .09	1 .67 .05	0 0.00 0.00	0 0.00 0.00	3 2.01 .14	4.60
SE	0 0.00 0.00	2 1.34 .09	1 .67 .05	1 .67 .05	0 0.00 0.00	0 0.00 0.00	4 2.68 .19	3.87
SSE	0 0.00 0.00	4 2.68 .19	9 6.04 .42	1 .67 .05	2 1.34 .09	0 0.00 0.00	16 10.74 .74	4.45
S	0 0.00 0.00	4 2.68 .19	9 6.04 .42	17 11.41 .79	6 4.03 .28	0 0.00 0.00	36 24.16 1.67	5.61
SSW	0 0.00 0.00	1 .67 .05	13 8.72 .60	18 12.08 .84	6 4.03 .28	0 0.00 0.00	38 25.50 1.77	5.77
SW	1 .67 .05	1 .67 .05	2 1.34 .09	5 3.36 .23	0 0.00 0.00	0 0.00 0.00	9 6.04 .42	5.16
WSW	0 0.00 0.00	1 .67 .05	6 4.03 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 4.70 .33	3.84
W	0 0.00 0.00	0 0.00 0.00	3 2.01 .14	1 .67 .05	0 0.00 0.00	0 0.00 0.00	4 2.68 .19	4.62
WNW	1 .67 .05	1 .67 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.34 .09	1.80
NW	0 0.00 0.00	1 .67 .05	0 0.00 0.00	1 .67 .05	1 .67 .05	0 0.00 0.00	3 2.01 .14	5.57
NNW	0 0.00 0.00	1 .67 .05	1 .67 .05	1 .67 .05	0 0.00 0.00	0 0.00 0.00	3 2.01 .14	4.50
N	0 0.00 0.00	0 0.00 0.00	6 4.03 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.03 .28	3.57
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 2.01 .14	19 12.75 .88	58 38.93 2.70	54 36.24 2.51	15 10.07 .70	0 0.00 0.00	149 100.00 6.93	5.02

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3 .60 .14	16 3.20 .74	14 2.80 .65	12 2.40 .56	3 .60 .14	0 0.00 0.00	48 9.60 2.23	4.20
NE	3 .60 .14	6 1.20 .28	15 3.00 .70	13 2.60 .60	0 0.00 0.00	0 0.00 0.00	37 7.40 1.72	4.07
ENE	0 0.00 0.00	7 1.40 .33	19 3.80 .88	9 1.80 .42	1 .20 .05	0 0.00 0.00	36 7.20 1.67	4.26
E	2 .40 .09	6 1.20 .28	17 3.40 .79	10 2.00 .47	1 .20 .05	0 0.00 0.00	36 7.20 1.67	4.39
ESE	0 0.00 0.00	7 1.40 .33	7 1.40 .33	5 1.00 .23	0 0.00 0.00	0 0.00 0.00	19 3.80 .88	3.76
SE	0 0.00 0.00	13 2.60 .60	10 2.00 .47	4 .80 .19	0 0.00 0.00	0 0.00 0.00	27 5.40 1.26	3.43
SSE	0 0.00 0.00	13 2.60 .60	20 4.00 .93	9 1.80 .42	1 .20 .05	0 0.00 0.00	43 8.60 2.00	4.07
S	1 .20 .05	20 4.00 .93	45 9.00 2.09	37 7.40 1.72	8 1.60 .37	0 0.00 0.00	111 22.20 5.16	4.78
SSW	0 0.00 0.00	7 1.40 .33	29 5.80 1.35	23 4.60 1.07	1 .20 .05	0 0.00 0.00	60 12.00 2.79	4.68
SW	2 .40 .09	5 1.00 .23	10 2.00 .47	4 .80 .19	0 0.00 0.00	0 0.00 0.00	21 4.20 .98	3.87
WSW	1 .20 .05	3 .60 .14	4 .80 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 1.60 .37	3.10
W	1 .20 .05	1 .20 .05	1 .20 .05	2 .40 .09	0 0.00 0.00	0 0.00 0.00	5 1.00 .23	4.10
WNW	2 .40 .09	4 .80 .19	2 .40 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 1.60 .37	2.37
NW	1 .20 .05	3 .60 .14	3 .60 .14	5 1.00 .23	0 0.00 0.00	0 0.00 0.00	12 2.40 .56	4.25
NNW	1 .20 .05	1 .20 .05	3 .60 .14	2 .40 .09	1 .20 .05	0 0.00 0.00	8 1.60 .37	4.50
N	1 .20 .05	7 1.40 .33	8 1.60 .37	3 .60 .14	1 .20 .05	1 .20 .05	21 4.20 .98	4.18
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	18 3.60 .84	119 23.80 5.53	207 41.40 9.63	138 27.60 6.42	17 3.40 .79	1 .20 .05	500 100.00 23.26	4.27

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .17 .05	8 1.36 .37	4 .68 .19	3 .51 .14	0 0.00 0.00	1 .17 .05	17 2.89 .79	3.72
NE	1 .17 .05	16 2.72 .74	5 .85 .23	3 .51 .14	0 0.00 0.00	0 0.00 0.00	25 4.24 1.16	2.95
ENE	0 0.00 0.00	10 1.70 .47	8 1.36 .37	4 .68 .19	2 .34 .09	0 0.00 0.00	24 4.07 1.12	4.04
E	0 0.00 0.00	10 1.70 .47	7 1.19 .33	5 .85 .23	0 0.00 0.00	0 0.00 0.00	22 3.74 1.02	3.88
ESE	2 .34 .09	10 1.70 .47	13 2.21 .60	3 .51 .14	0 0.00 0.00	0 0.00 0.00	28 4.75 1.30	3.35
SE	1 .17 .05	20 3.40 .93	10 1.70 .47	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	31 5.26 1.44	2.87
SSE	0 0.00 0.00	23 3.90 1.07	49 8.32 2.28	13 2.21 .60	0 0.00 0.00	0 0.00 0.00	85 14.43 3.95	3.78
S	0 0.00 0.00	49 8.32 2.28	114 19.35 5.30	54 9.17 2.51	3 .51 .14	0 0.00 0.00	220 37.35 10.23	4.23
SSW	2 .34 .09	15 2.55 .70	25 4.24 1.16	13 2.21 .60	0 0.00 0.00	0 0.00 0.00	55 9.34 2.56	3.94
SW	1 .17 .05	6 1.02 .28	2 .34 .09	1 .17 .05	0 0.00 0.00	0 0.00 0.00	10 1.70 .47	3.03
WSW	1 .17 .05	2 .34 .09	1 .17 .05	2 .34 .09	2 .34 .09	0 0.00 0.00	8 1.36 .37	4.34
W	1 .17 .05	3 .51 .14	0 0.00 0.00	1 .17 .05	0 0.00 0.00	0 0.00 0.00	5 .85 .23	2.90
WNW	0 0.00 0.00	5 .85 .23	2 .34 .09	0 0.00 0.00	1 .17 .05	0 0.00 0.00	8 1.36 .37	3.46
NW	1 .17 .05	4 .68 .19	2 .34 .09	3 .51 .14	0 0.00 0.00	0 0.00 0.00	10 1.70 .47	3.63
NNW	0 0.00 0.00	5 .85 .23	5 .85 .23	6 1.02 .28	0 0.00 0.00	0 0.00 0.00	16 2.72 .74	4.31
N	1 .17 .05	11 1.87 .51	10 1.70 .47	2 .34 .09	1 .17 .05	0 0.00 0.00	25 4.24 1.16	3.41
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	12 2.04 .56	197 33.45 9.16	257 43.63 11.95	113 19.19 5.26	9 1.53 .42	1 .17 .05	589 100.00 27.40	3.85

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	6 1.89 .28	5 1.57 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 3.46 .51	2.68
NE	3 .94 .14	6 1.89 .28	1 .31 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 3.14 .47	1.97
ENE	2 .63 .09	7 2.20 .33	3 .94 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 3.77 .56	2.63
E	2 .63 .09	8 2.52 .37	5 1.57 .23	3 .94 .14	0 0.00 0.00	0 0.00 0.00	18 5.66 .84	3.29
ESE	2 .63 .09	8 2.52 .37	1 .31 .05	2 .63 .09	0 0.00 0.00	0 0.00 0.00	13 4.09 .60	2.78
SE	2 .63 .09	36 11.32 1.67	4 1.26 .19	3 .94 .14	0 0.00 0.00	0 0.00 0.00	45 14.15 2.09	2.67
SSE	2 .63 .07	56 17.61 2.60	19 5.97 .88	2 .63 .09	0 0.00 0.00	0 0.00 0.00	79 24.84 3.67	2.82
S	4 1.26 .19	28 8.81 1.30	27 8.49 1.26	7 2.20 .33	0 0.00 0.00	0 0.00 0.00	66 20.75 3.07	3.27
SSW	2 .63 .09	7 2.20 .33	6 1.89 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 4.72 .70	2.67
SW	1 .31 .05	1 .31 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .63 .09	1.40
WSW	1 .31 .05	4 1.26 .19	0 0.00 0.00	1 .31 .05	0 0.00 0.00	0 0.00 0.00	6 1.89 .28	2.50
W	1 .31 .05	3 .94 .14	1 .31 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.57 .23	1.92
WNW	1 .31 .05	3 .94 .14	4 1.26 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.52 .37	2.80
NW	1 .31 .05	5 1.57 .23	6 1.89 .28	1 .31 .05	0 0.00 0.00	0 0.00 0.00	13 4.09 .60	3.22
NNW	0 0.00 0.00	3 .94 .14	3 .94 .14	1 .31 .05	0 0.00 0.00	0 0.00 0.00	7 2.20 .33	3.57
N	0 0.00 0.00	6 1.89 .28	1 .31 .05	1 .31 .05	0 0.00 0.00	0 0.00 0.00	8 2.52 .37	3.12
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	24 7.55 1.12	187 58.81 8.70	86 27.04 4.00	21 6.60 .98	0 0.00 0.00	0 0.00 0.00	318 100.00 14.79	2.88

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4 2.27 .19	9 5.11 .42	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 7.39 .60	1.81
NE	2 1.14 .09	4 2.27 .19	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 4.55 .37	2.39
ENE	0 0.00 0.00	1 .57 .05	1 .57 .05	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	4 2.27 .19	4.57
E	2 1.14 .09	11 6.25 .51	4 2.27 .19	1 .57 .05	0 0.00 0.00	0 0.00 0.00	18 10.23 .84	2.79
ESE	1 .57 .05	6 3.41 .28	5 2.84 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 6.82 .56	2.93
SE	2 1.14 .09	18 10.23 .84	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	21 11.93 .98	2.35
SSE	2 1.14 .09	37 21.02 1.72	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	40 22.73 1.86	2.34
S	0 0.00 0.00	15 8.52 .70	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 9.66 .79	2.58
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
SW	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .57 .05	1.10
WSW	0 0.00 0.00	1 .57 .05	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.14 .09	2.75
W	3 1.70 .14	0 0.00 0.00	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 2.27 .19	1.72
WNW	3 1.70 .14	5 2.84 .23	3 1.70 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 6.25 .51	2.23
NW	5 2.84 .23	2 1.14 .09	2 1.14 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 5.11 .42	1.71
NNW	3 1.70 .14	3 1.70 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.41 .28	1.78
N	5 2.84 .23	5 2.84 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 5.68 .47	1.80
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	33 18.75 1.53	117 66.48 5.44	23 13.07 1.07	3 1.70 .14	0 0.00 0.00	0 0.00 0.00	176 100.00 8.19	2.36

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	9 .42	42 1.95	26 1.21	24 1.12	3 .14	1 .05	105 4.88	3.76
NE	9 .42	33 1.53	28 1.30	20 .93	0 0.00	0 0.00	90 4.19	3.45
ENE	2 .09	25 1.16	36 1.67	18 .84	3 .14	0 0.00	84 3.91	4.00
E	8 .37	35 1.63	35 1.63	21 .98	2 .09	0 0.00	101 4.70	3.81
ESE	5 .23	36 1.67	34 1.58	12 .56	0 0.00	0 0.00	87 4.05	3.35
SE	5 .23	93 4.33	33 1.53	13 .60	0 0.00	0 0.00	144 6.70	3.02
SSE	5 .23	139 6.47	105 4.88	32 1.49	5 .23	0 0.00	286 13.30	3.45
S	6 .28	120 5.58	237 11.02	177 8.23	46 2.14	0 0.00	586 27.26	4.64
SSW	4 .19	34 1.58	98 4.56	128 5.95	20 .93	0 0.00	284 13.21	5.07
SW	7 .33	14 .65	23 1.07	18 .84	0 0.00	0 0.00	62 2.88	4.06
WSW	4 .19	14 .65	14 .65	3 .14	2 .09	0 0.00	37 1.72	3.37
W	7 .33	10 .47	8 .37	4 .19	0 0.00	0 0.00	29 1.35	2.94
WNW	7 .33	23 1.07	12 .56	0 0.00	1 .05	0 0.00	43 2.00	2.64
NW	9 .42	18 .84	15 .70	21 .98	10 .47	0 0.00	73 3.40	4.39
NNW	4 .19	14 .65	13 .60	20 .93	1 .05	0 0.00	52 2.42	4.27
N	8 .37	34 1.58	32 1.49	10 47	2 .09	1 .05	87 4.05	3.46
CALM	0 0.00						0 0.00	CALM
TOTAL	99 4.60	684 31.81	749 34.84	521 24.23	95 4.42	2 .09	2150 100.00	4.06

NUMBER OF VALID OBSERVATIONS 2150 96.33 PCT.
NUMBER OF INVALID OBSERVATIONS 82 3.67 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .35 .05	2 .70 .09	11 3.83 .52	13 4.53 .61	3 1.05 .14	0 0.00 0.00	30 10.45 1.41	5.10
NE	0 0.00 0.00	3 1.05 .14	4 1.39 .19	3 1.05 .14	0 0.00 0.00	0 0.00 0.00	10 3.48 .47	4.11
ENE	0 0.00 0.00	0 0.00 0.00	1 .35 .05	3 1.05 .14	0 0.00 0.00	0 0.00 0.00	4 1.39 .19	5.22
E	0 0.00 0.00	1 .35 .05	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .70 .09	3.65
ESE	0 0.00 0.00	5 1.74 .24	3 1.05 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.79 .38	3.06
SE	4 1.39 .19	10 3.48 .47	12 4.18 .56	5 1.74 .24	0 0.00 0.00	0 0.00 0.00	31 10.80 1.46	3.30
SSE	0 0.00 0.00	3 1.05 .14	14 4.88 .66	9 3.14 .42	0 0.00 0.00	0 0.00 0.00	26 9.06 1.22	4.48
S	1 .35 .05	14 4.88 .66	12 4.18 .56	17 5.92 .80	6 2.09 .28	0 0.00 0.00	50 17.42 2.35	4.79
SSW	2 .70 .09	8 2.79 .38	11 3.83 .52	10 3.48 .47	5 1.74 .24	0 0.00 0.00	36 12.54 1.69	4.54
SW	0 0.00 0.00	7 2.44 .33	3 1.05 .14	1 .35 .05	0 0.00 0.00	0 0.00 0.00	11 3.83 .52	3.05
WSW	2 .70 .09	2 .70 .09	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.74 .24	1.96
W	0 0.00 0.00	8 2.79 .38	4 1.39 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 4.18 .56	2.91
WNW	1 .35 .05	3 1.05 .14	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.74 .24	2.46
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
NNW	0 0.00 0.00	3 1.05 .14	12 4.18 .56	5 1.74 .24	4 1.39 .19	1 .35 .05	25 8.71 1.18	5.49
N	0 0.00 0.00	0 0.00 0.00	7 2.44 .33	13 4.53 .61	8 2.79 .38	1 .35 .05	29 10.10 1.36	6.59
CALM	3 1.05 .14						3 1.05 .14	CALM
TOTAL	14 4.88 .66	69 24.04 3.25	97 33.80 4.56	79 27.53 3.72	26 9.06 1.22	2 .70 .09	287 100.00 13.50	4.49

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	3 2.38 .14	1 .79 .05	1 .79 .05	0 0.00 0.00	5 3.97 .24	5.14
NE	0 0.00 0.00	1 .79 .05	6 4.76 .28	1 .79 .05	0 0.00 0.00	0 0.00 0.00	8 6.35 .38	3.82
ENE	0 0.00 0.00	4 3.17 .19	3 2.38 .14	1 .79 .05	0 0.00 0.00	0 0.00 0.00	8 6.35 .38	3.36
E	0 0.00 0.00	0 0.00 0.00	2 1.59 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.59 .09	4.55
ESE	0 0.00 0.00	1 .79 .05	3 2.38 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.17 .19	3.52
SE	0 0.00 0.00	2 1.59 .09	4 3.17 .19	1 .79 .05	0 0.00 0.00	0 0.00 0.00	7 5.56 .33	3.70
SSE	0 0.00 0.00	2 1.59 .09	8 6.35 .38	6 4.76 .28	0 0.00 0.00	0 0.00 0.00	16 12.70 .75	4.71
S	1 .79 .05	6 4.76 .28	14 11.11 .66	3 2.38 .14	2 1.59 .09	0 0.00 0.00	26 20.63 1.22	4.07
SSW	0 0.00 0.00	4 3.17 .19	6 4.76 .28	4 3.17 .19	3 2.38 .14	2 1.59 .09	19 15.08 .89	5.69
SW	0 0.00 0.00	7 5.56 .33	1 .79 .05	2 1.59 .09	0 0.00 0.00	0 0.00 0.00	10 7.94 .47	3.27
WSW	0 0.00 0.00	1 .79 .05	0 0.00 0.00	1 .79 .05	0 0.00 0.00	0 0.00 0.00	2 1.59 .09	4.45
W	1 .79 .05	1 .79 .05	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.38 .14	2.23
WNW	0 0.00 0.00	0 0.00 0.00	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .79 .05	3.10
NW	0 0.00 0.00	2 1.59 .09	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.38 .14	2.87
NNW	0 0.00 0.00	0 0.00 0.00	1 .79 .05	4 3.17 .19	0 0.00 0.00	0 0.00 0.00	5 3.97 .24	5.80
N	0 0.00 0.00	0 0.00 0.00	2 1.59 .09	5 3.97 .24	0 0.00 0.00	0 0.00 0.00	7 5.56 .33	5.37
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.59 .09	31 24.60 1.46	56 44.44 2.63	29 23.02 1.36	6 4.76 .28	2 1.59 .09	126 100.00 5.93	4.35

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	2 1.79 09	1 .89 .05	5 4.46 .24	0 0.00 0.00	0 0.00 0.00	8 7.14 .38	4.91
NE	0 0.00 0.00	4 3.57 19	3 2.68 .14	3 2.68 .14	0 0.00 0.00	0 0.00 0.00	10 8.93 .47	4.08
ENE	0 0.00 0.00	2 1.79 .09	3 2.68 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 4.46 .24	3.22
E	0 0.00 0.00	1 .89 .05	2 1.79 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.68 .14	3.93
ESE	0 0.00 0.00	0 0.00 0.00	2 1.79 .09	1 .89 .05	0 0.00 0.00	0 0.00 0.00	3 2.68 .14	4.10
SE	0 0.00 0.00	1 .89 .05	3 2.68 .14	1 .89 .05	0 0.00 0.00	0 0.00 0.00	5 4.46 .24	3.80
SSE	1 .89 .05	4 3.57 .19	4 3.57 .19	3 2.68 .14	1 .89 .05	0 0.00 0.00	13 11.61 .61	3.84
S	0 0.00 0.00	5 4.46 .24	12 10.71 .56	7 6.25 .33	1 .89 .05	0 0.00 0.00	25 22.32 1.18	4.25
SSW	0 0.00 0.00	3 2.68 .14	3 2.68 .14	7 6.25 .33	0 0.00 0.00	2 1.79 .09	15 13.39 .71	5.47
SW	0 0.00 0.00	2 1.79 .09	0 0.00 0.00	4 3.57 .19	0 0.00 0.00	0 0.00 0.00	6 5.36 .28	4.60
WSW	0 0.00 0.00	2 1.79 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.79 .09	2.35
W	0 0.00 0.00	1 .89 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .89 .05	3.00
WNW	0 0.00 0.00	0 0.00 0.00	1 .89 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .89 .05	3.60
NW	1 .89 .05	1 .89 .05	1 .89 .05	0 0.00 0.00	1 .89 .05	0 0.00 0.00	4 3.57 .19	3.57
NNW	0 0.00 0.00	1 .89 .05	2 1.79 .09	4 3.57 .19	0 0.00 0.00	0 0.00 0.00	7 6.25 .33	4.99
N	0 0.00 0.00	0 0.00 0.00	1 .89 .05	2 1.79 .09	1 .89 .05	0 0.00 0.00	4 3.57 .19	6.10
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.79 .09	29 25.89 1.36	38 33.93 1.79	37 33.04 1.74	4 3.57 .19	2 1.79 .09	112 100.00 5.27	4.38

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	2 .35 .09	6 1.06 .28	14 2.46 .66	8 1.41 .38	10 1.76 .47	0 0.00 0.00	40 7.04 1.88	5.14
NE	3 .53 .14	10 1.76 .47	9 1.58 .42	9 1.58 .42	0 0.00 0.00	0 0.00 0.00	31 5.46 1.46	3.68
ENE	2 .35 .09	11 1.94 .52	8 1.41 .38	9 1.58 .42	0 0.00 0.00	0 0.00 0.00	30 5.28 1.41	3.78
E	5 .88 .24	10 1.76 .47	18 3.17 .85	5 .88 .24	0 0.00 0.00	0 0.00 0.00	38 6.69 1.79	3.38
ESE	2 .35 .09	12 2.11 .56	23 4.05 1.08	1 .18 .05	0 0.00 0.00	0 0.00 0.00	38 6.69 1.79	3.51
SE	4 .70 .19	16 2.82 .75	15 2.64 .71	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 6.16 1.65	2.94
SSE	1 .18 .05	14 2.46 .66	21 3.70 .99	10 1.76 .47	2 .35 .09	0 0.00 0.00	48 8.45 2.26	4.12
S	8 1.41 .38	15 2.64 .71	24 4.23 1.13	25 4.40 1.18	7 1.23 .33	4 .70 .19	83 14.61 3.90	4.91
SSW	1 .18 .05	14 2.46 .66	20 3.52 .94	6 1.06 .28	1 .18 .05	1 .18 .05	43 7.57 2.02	3.87
SW	3 .53 .14	11 1.94 .52	11 1.94 .52	3 .53 .14	0 0.00 0.00	0 0.00 0.00	28 4.93 1.32	3.29
WSW	1 .18 .05	1 .18 .05	2 .35 .09	2 .35 .09	0 0.00 0.00	0 0.00 0.00	6 1.06 .28	4.08
W	2 .35 .09	4 .70 .19	2 .35 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 1.41 .38	2.34
WNW	1 .18 .05	6 1.06 .28	3 .53 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 1.76 .47	2.84
NW	0 0.00 0.00	6 1.06 .28	7 1.23 .33	5 .88 .24	2 .35 .09	0 0.00 0.00	20 3.52 .94	4.57
NNW	1 .18 .05	9 1.58 .42	24 4.23 1.13	14 2.46 .66	1 .18 .05	0 0.00 0.00	49 8.63 2.30	4.47
N	3 .53 .14	8 1.41 .38	32 5.63 1.51	18 3.17 .85	0 0.00 0.00	0 0.00 0.00	61 10.74 2.87	4.27
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	39 6.87 1.83	153 26.94 7.20	233 41.02 10.96	115 20.25 5.41	23 4.05 1.08	5 .88 .24	568 100.00 26.72	4.06

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3	7	3	4	0	0	17	3.34
	.70	1.63	.70	.93	0.00	0.00	3.95	
	.14	.33	.14	.19	0.00	0.00	.80	
NE	3	13	0	2	0	0	18	2.47
	.70	3.02	0.00	.47	0.00	0.00	4.19	
	.14	.61	0.00	.09	0.00	0.00	.85	
ENE	5	10	13	2	0	0	30	3.06
	1.16	2.33	3.02	.47	0.00	0.00	6.98	
	.24	.47	.61	.09	0.00	0.00	1.41	
E	2	14	6	2	0	0	24	2.90
	.47	3.26	1.40	.47	0.00	0.00	5.58	
	.09	.66	.28	.09	0.00	0.00	1.13	
ESE	1	15	5	1	0	0	22	2.67
	.23	3.49	1.16	.23	0.00	0.00	5.12	
	.05	.71	.24	.05	0.00	0.00	1.03	
SE	5	18	13	1	1	0	38	2.81
	1.16	4.19	3.02	.23	.23	0.00	8.84	
	.24	.85	.61	.05	.05	0.00	1.79	
SSE	7	30	52	3	0	0	92	3.17
	1.63	6.98	12.09	.70	0.00	0.00	21.40	
	.33	1.41	2.45	.14	0.00	0.00	4.33	
S	7	20	33	20	0	0	80	3.82
	1.63	4.65	7.67	4.65	0.00	0.00	18.60	
	.33	.94	1.55	.94	0.00	0.00	3.76	
SSW	4	8	11	6	0	0	29	3.45
	.93	1.86	2.56	1.40	0.00	0.00	6.74	
	.19	.38	.52	.28	0.00	0.00	1.36	
SW	0	9	4	0	0	0	13	2.89
	0.00	2.09	.93	0.00	0.00	0.00	3.02	
	0.00	.42	.19	0.00	0.00	0.00	.61	
WSW	3	2	0	0	0	0	5	1.46
	.70	.47	0.00	0.00	0.00	0.00	1.16	
	.14	.09	0.00	0.00	0.00	0.00	.24	
W	0	4	1	0	0	0	5	2.20
	0.00	.93	.23	0.00	0.00	0.00	1.16	
	0.00	.19	.05	0.00	0.00	0.00	.24	
WNW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
NW	3	3	2	1	1	0	10	3.26
	.70	.70	.47	.23	.23	0.00	2.33	
	.14	.14	.09	.05	.05	0.00	.47	
NNW	6	8	3	1	0	0	18	2.27
	1.40	1.86	.70	.23	0.00	0.00	4.19	
	.28	.38	.14	.05	0.00	0.00	.85	
N	1	4	14	8	0	1	28	4.60
	.23	.93	3.26	1.86	0.00	.23	6.51	
	.05	.19	.66	.38	0.00	.05	1.32	
CALM	1						1	CALM
	.23						.23	
	.05						.05	
TOTAL	51	165	160	51	2	1	430	3.22
	11.86	38.37	37.21	11.86	.47	.23	100.00	
	2.40	7.76	7.53	2.40	.09	.05	20.23	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4	2	9	1	0	0	16	3.08
	1.25	.63	2.82	.31	0.00	0.00	5.02	
	.19	.09	.42	.05	0.00	0.00	.75	
NE	3	8	1	0	0	0	12	2.11
	.94	2.51	.31	0.00	0.00	0.00	3.76	
	.14	.38	.05	0.00	0.00	0.00	.56	
ENE	2	5	9	0	0	0	16	2.81
	.63	1.57	2.82	0.00	0.00	0.00	5.02	
	.09	.24	.42	0.00	0.00	0.00	.75	
E	3	10	7	0	0	0	20	2.45
	.94	3.13	2.19	0.00	0.00	0.00	6.27	
	.14	.47	.33	0.00	0.00	0.00	.94	
ESE	0	15	4	0	0	0	19	2.58
	0.00	4.70	1.25	0.00	0.00	0.00	5.96	
	0.00	.71	.19	0.00	0.00	0.00	.89	
SE	4	40	5	0	0	0	49	2.23
	1.25	12.54	1.57	0.00	0.00	0.00	15.36	
	.19	1.88	.24	0.00	0.00	0.00	2.30	
SSE	9	54	11	0	0	0	74	2.28
	2.82	16.93	3.45	0.00	0.00	0.00	23.20	
	.42	2.54	.52	0.00	0.00	0.00	3.48	
S	5	16	13	1	0	0	35	2.59
	1.57	5.02	4.08	.31	0.00	0.00	10.97	
	.24	.75	.61	.05	0.00	0.00	1.65	
SSW	6	10	2	0	0	0	18	2.08
	1.88	3.13	.63	0.00	0.00	0.00	5.64	
	.28	.47	.09	0.00	0.00	0.00	.85	
SW	4	3	0	0	0	0	7	1.43
	1.25	.94	0.00	0.00	0.00	0.00	2.19	
	.19	.14	0.00	0.00	0.00	0.00	.33	
WSW	1	2	0	0	0	0	3	1.60
	.31	.63	0.00	0.00	0.00	0.00	.94	
	.05	.09	0.00	0.00	0.00	0.00	.14	
W	1	2	0	0	0	0	3	1.63
	.31	.63	0.00	0.00	0.00	0.00	.94	
	.05	.09	0.00	0.00	0.00	0.00	.14	
WNW	1	2	0	0	0	0	3	1.83
	.31	.63	0.00	0.00	0.00	0.00	.94	
	.05	.09	0.00	0.00	0.00	0.00	.14	
NW	7	6	1	0	0	0	14	1.68
	2.19	1.88	.31	0.00	0.00	0.00	4.39	
	.33	.28	.05	0.00	0.00	0.00	.66	
NNW	6	6	0	0	0	0	12	1.87
	1.88	1.88	0.00	0.00	0.00	0.00	3.76	
	.28	.28	0.00	0.00	0.00	0.00	.56	
N	2	3	10	1	0	0	16	3.12
	.63	.94	3.13	.31	0.00	0.00	5.02	
	.09	.14	.47	.05	0.00	0.00	.75	
CALM	2						2	CALM
	.63						.63	
	.09						.09	
TOTAL	60	184	72	3	0	0	319	2.34
	18.81	57.68	22.57	.94	0.00	0.00	100.00	
	2.82	8.65	3.39	.14	0.00	0.00	15.00	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	17 5.99 .80	15 5.28 .71	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	32 11.27 1.51	3.04
NE	3 1.06 14	26 9.15 1.22	6 2.11 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 12.32 1.65	2.49
ENE	4 1.41 .19	8 2.82 .38	2 .70 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 4.93 .66	2.09
E	1 .35 .05	15 5.28 .71	6 2.11 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 7.75 1.03	2.64
ESE	0 0.00 0.00	27 9.51 1.27	8 2.82 .38	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 12.32 1.65	2.47
SE	11 3.87 .52	27 9.51 1.27	5 1.76 .24	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	43 15.14 2.02	2.03
SSE	6 2.11 .28	28 9.86 1.32	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 12.32 1.65	2.02
S	5 1.76 .24	8 2.82 .38	2 .70 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 5.28 .71	1.77
SSW	5 1.76 .24	2 .70 .09	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.82 .38	1.46
SW	2 .70 .07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .70 .09	1.05
WSW	1 .35 .05	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .70 .09	1.75
W	1 .35 .05	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .70 .09	1.20
WNW	3 1.06 .14	4 1.41 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 2.46 .33	1.74
NW	5 1.76 .24	6 2.11 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 3.87 .52	1.63
NNW	3 1.06 .14	6 2.11 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 3.17 .42	2.09
N	1 .35 .05	7 2.46 .33	3 1.06 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 3.87 .52	2.73
CALM	1 .35 .05						1 .35 .05	CALM
TOTAL	52 18.31 2.45	183 64.44 8.61	49 17.25 2.30	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	284 100.00 13.36	2.26

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	10 .47	36 1.69	56 2.63	32 1.51	14 .66	0 0.00	148 6.96	4.24
NE	12 .56	65 3.06	29 1.36	18 .85	0 0.00	0 0.00	124 5.83	3.09
ENE	13 .61	40 1.88	39 1.83	15 .71	0 0.00	0 0.00	107 5.03	3.21
E	11 .52	51 2.40	42 1.98	7 .33	0 0.00	0 0.00	111 5.22	3.00
ESE	3 .14	75 3.53	48 2.26	3 .14	0 0.00	0 0.00	129 6.07	2.93
SE	28 1.32	114 5.36	57 2.68	8 .38	1 .05	0 0.00	208 9.78	2.66
SSE	24 1.13	135 6.35	111 5.22	31 1.46	3 .14	0 0.00	304 14.30	3.19
S	27 1.27	84 3.95	110 5.17	73 3.43	16 .75	4 .19	314 14.77	4.08
SSW	18 .85	49 2.30	54 2.54	33 1.55	9 .42	5 .24	168 7.90	3.98
SW	9 .42	39 1.83	19 89	10 .47	0 0.00	0 0.00	77 3.62	3.06
WSW	8 .38	11 .52	3 14	3 .14	0 0.00	0 0.00	25 1.18	2.54
W	5 .24	21 .99	8 38	0 0.00	0 0.00	0 0.00	34 1.60	2.40
WNW	6 .28	15 .71	6 .28	0 0.00	0 0.00	0 0.00	27 1.27	2.41
NW	16 .75	24 1.13	12 .56	6 .28	4 .19	0 0.00	62 2.92	3.04
NNW	16 .75	33 1.55	42 1.98	28 1.32	5 .24	1 .05	125 5.88	4.02
N	7 .33	22 1.03	69 3.25	47 2.21	9 .42	2 .09	156 7.34	4.63
CALM	7 .33						7 .33	CALM
TOTAL	220 10.35	814 38.29	705 33.16	314 14.77	61 2.87	12 .56	2126 100.00	3.48

NUMBER OF VALID OBSERVATIONS 2126 98.43 PCT.
NUMBER OF INVALID OBSERVATIONS 34 1.57 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .75 05	1 .75 .05	2 1.50 .09	0 0.00 0.00	0 0.00 0.00	4 3.01 .18	5.17
NE	0 0.00 0.00	3 2.26 .14	0 0.00 0.00	1 .75 .05	0 0.00 0.00	0 0.00 0.00	4 3.01 .18	3.65
ENE	0 0.00 0.00	1 .75 .05	1 .75 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.50 .09	3.10
E	0 0.00 0.00	2 1.50 .09	1 .75 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.26 .14	2.80
ESE	1 .75 .05	1 .75 .05	2 1.50 .09	7 5.26 .32	1 .75 .05	0 0.00 0.00	12 9.02 .54	5.75
SE	0 0.00 0.00	0 0.00 0.00	2 1.50 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.50 .09	3.70
SSE	0 0.00 0.00	1 .75 .05	3 2.26 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.01 .18	3.30
S	0 0.00 0.00	1 .75 .05	3 2.26 .14	11 8.27 .50	10 7.52 .45	7 5.26 .32	32 24.06 1.44	7.96
SSW	0 0.00 0.00	0 0.00 0.00	1 .75 .05	4 3.01 .18	1 .75 .05	2 1.50 .09	8 6.02 .36	7.82
SW	0 0.00 0.00	0 0.00 0.00	8 6.02 .36	2 1.50 .09	1 .75 .05	2 1.50 .09	13 9.77 .59	5.93
WSW	0 0.00 0.00	0 0.00 0.00	2 1.50 .09	3 2.26 .14	0 0.00 0.00	0 0.00 0.00	5 3.76 .23	4.80
W	0 0.00 0.00	0 0.00 0.00	1 .75 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .75 .05	3.50
WNW	0 0.00 0.00	2 1.50 .09	0 0.00 0.00	4 3.01 .18	2 1.50 .09	0 0.00 0.00	8 6.02 .36	6.21
NW	0 0.00 0.00	1 .75 .05	0 0.00 0.00	1 .75 .05	2 1.50 .09	0 0.00 0.00	4 3.01 .18	6.45
NNW	0 0.00 0.00	0 0.00 0.00	1 .75 .05	4 3.01 .18	11 8.27 .50	0 0.00 0.00	16 12.03 .72	7.54
N	0 0.00 0.00	1 .75 .05	2 1.50 .09	4 3.01 .18	2 1.50 .09	6 4.51 .27	15 11.28 .68	7.83
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .75 .05	14 10.53 .63	28 21.05 1.26	43 32.33 1.94	30 22.56 1.35	17 12.78 .77	133 100.00 5.99	6.58

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 1.75 .09	2 1.75 .09	3 2.63 .14	0 0.00 0.00	0 0.00 0.00	7 6.14 .32	4.46
NE	0 0.00 0.00	1 .88 .05	1 .88 .05	1 .88 .05	0 0.00 0.00	0 0.00 0.00	3 2.63 .14	4.53
ENE	0 0.00 0.00	1 .88 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .88 .05	2.90
E	0 0.00 0.00	0 0.00 0.00	1 .88 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .88 .05	5.00
ESE	0 0.00 0.00	0 0.00 0.00	1 .88 .05	2 1.75 .09	1 .88 .05	0 0.00 0.00	4 3.51 .18	6.30
SE	0 0.00 0.00	0 0.00 0.00	5 4.39 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 4.39 .23	3.86
SSE	0 0.00 0.00	2 1.75 .09	1 .88 .05	2 1.75 .09	1 .88 .05	0 0.00 0.00	6 5.26 .27	4.60
S	1 .88 .05	0 0.00 0.00	8 7.02 .36	4 3.51 .18	8 7.02 .36	5 4.39 .23	26 22.81 1.17	7.13
SSW	1 .88 .05	0 0.00 0.00	1 .88 .05	3 2.63 .14	2 1.75 .09	2 1.75 .09	9 7.89 .41	7.41
SW	0 0.00 0.00	5 4 39 23	1 .88 .05	7 6.14 .32	5 4.39 .23	0 0.00 0.00	18 15.79 .81	5.83
WSW	0 0.00 0.00	1 .88 .05	0 0.00 0.00	0 0.00 0.00	2 1.75 .09	0 0.00 0.00	3 2.63 14	6.43
W	0 0.00 0.00	2 1.75 .09	2 1.75 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3 51 18	3.12
WNW	0 0.00 0.00	2 1.75 .09	0 0.00 0.00	1 .88 .05	0 0.00 0.00	0 0.00 0.00	3 2.63 .14	3.87
NW	0 0.00 0.00	3 2.63 .14	0 0.00 0.00	2 1.75 .09	0 0.00 0.00	0 0.00 0.00	5 4.39 .23	4.04
NNW	0 0.00 0.00	0 0.00 0.00	1 .88 .05	1 .88 .05	4 3.51 .18	0 0.00 0.00	6 5.26 .27	7.43
N	0 0.00 0.00	2 1.75 .09	1 .88 .05	8 7.02 .36	2 1.75 .09	0 0.00 0.00	13 11.40 .59	5.79
CALM	0 0 00 0.00						0 0.00 0 00	CALM
TOTAL	2 1.75 .09	21 18.42 .95	25 21.93 1.13	34 29.82 1.53	25 21.93 1.13	7 6.14 .32	114 100 00 5 13	5.84

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE. ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	2	1	1	0	0	4	3.82
	0.00	1.68	.84	.84	0.00	0.00	3.36	
	0.00	.09	.05	.05	0.00	0.00	.18	
NE	0	0	2	1	0	0	3	4.83
	0.00	0.00	1.68	.84	0.00	0.00	2.52	
	0.00	0.00	.09	.05	0.00	0.00	.14	
ENE	0	0	3	0	0	0	3	3.33
	0.00	0.00	2.52	0.00	0.00	0.00	2.52	
	0.00	0.00	.14	0.00	0.00	0.00	.14	
E	0	0	5	0	0	0	5	4.28
	0.00	0.00	4.20	0.00	0.00	0.00	4.20	
	0.00	0.00	.23	0.00	0.00	0.00	.23	
ESE	0	0	9	2	0	0	11	4.24
	0.00	0.00	7.56	1.68	0.00	0.00	9.24	
	0.00	0.00	.41	.09	0.00	0.00	.50	
SE	0	1	2	0	2	0	5	5.22
	0.00	.84	1.68	0.00	1.68	0.00	4.20	
	0.00	.05	.09	0.00	.09	0.00	.23	
SSE	0	2	1	3	0	0	6	4.27
	0.00	1.68	.84	2.52	0.00	0.00	5.04	
	0.00	.09	.05	.14	0.00	0.00	.27	
S	0	1	4	9	6	1	21	6.60
	0.00	.84	3.36	7.56	5.04	.84	17.65	
	0.00	.05	.18	.41	.27	.05	.95	
SSW	0	2	4	8	2	1	17	6.01
	0.00	1.68	3.36	6.72	1.68	.84	14.29	
	0.00	.09	.18	.36	.09	.05	.77	
SW	0	0	2	4	2	0	8	6.14
	0.00	0.00	1.68	3.36	1.68	0.00	6.72	
	0.00	0.00	.09	.18	.09	0.00	.36	
WSW	0	2	2	0	0	0	4	2.77
	0.00	1.68	1.68	0.00	0.00	0.00	3.36	
	0.00	.09	.09	0.00	0.00	0.00	.18	
W	0	1	5	1	0	0	7	3.86
	0.00	.84	4.20	.84	0.00	0.00	5.88	
	0.00	.05	.23	.05	0.00	0.00	.32	
WNW	0	1	3	1	0	0	5	4.10
	0.00	.84	2.52	.84	0.00	0.00	4.20	
	0.00	.05	.14	.05	0.00	0.00	.23	
NW	0	0	2	0	1	2	5	8.06
	0.00	0.00	1.68	0.00	.84	1.68	4.20	
	0.00	0.00	.09	0.00	.05	.09	.23	
NNW	0	3	1	3	1	0	8	4.65
	0.00	2.52	.84	2.52	.84	0.00	6.72	
	0.00	.14	.05	.14	.05	0.00	.36	
N	0	1	2	2	2	0	7	5.40
	0.00	.84	1.68	1.68	1.68	0.00	5.88	
	0.00	.05	.09	.09	.09	0.00	.32	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	16	48	35	16	4	119	5.24
	0.00	13.45	40.34	29.41	13.45	3.36	100.00	
	0.00	.72	2.16	1.58	.72	.18	5.36	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	7	7	13	2	4	35	5.29
	.33	1.16	1.16	2.16	.33	.67	5.82	
	.07	.32	.32	.59	.09	.18	1.58	
NE	0	8	14	1	0	0	23	3.63
	0.00	1.33	2.33	.17	0.00	0.00	3.83	
	0.00	.36	.63	.05	0.00	0.00	1.04	
ENE	0	2	4	2	0	0	8	4.47
	0.00	.33	.67	.33	0.00	0.00	1.33	
	0.00	.09	.18	.09	0.00	0.00	.36	
E	1	3	10	2	1	0	17	3.85
	.17	.50	1.66	.33	.17	0.00	2.83	
	.05	.14	.45	.09	.05	0.00	.77	
ESE	0	2	5	3	2	0	12	5.09
	0.00	.33	.83	.50	.33	0.00	2.00	
	0.00	.09	.23	.14	.09	0.00	.54	
SE	2	6	11	3	8	2	32	5.38
	.33	1.00	1.83	.50	1.33	.33	5.32	
	.09	.27	.50	.14	.36	.09	1.44	
SSE	0	8	25	10	7	1	51	4.97
	0.00	1.33	4.16	1.66	1.16	.17	8.49	
	0.00	.36	1.13	.45	.32	.05	2.30	
S	2	9	35	63	33	12	154	6.42
	.33	1.50	5.82	10.48	5.49	2.00	25.62	
	.09	.41	1.58	2.84	1.49	.54	6.93	
SSW	1	8	13	24	5	11	62	6.46
	.17	1.33	2.16	3 99	.83	1.83	10.32	
	.05	.36	.59	1.08	.23	.50	2.79	
SW	3	7	6	8	5	0	29	4.58
	.50	1.16	1.00	1.33	.83	0.00	4.83	
	.14	.32	.27	.36	.23	0.00	1.31	
WSW	4	8	6	0	2	0	20	3.30
	.67	1.33	1.00	0.00	.33	0.00	3.33	
	18	.36	.27	0.00	.09	0.00	.90	
W	0	9	6	3	3	0	21	4.20
	0.00	1.50	1.00	.50	.50	0.00	3.49	
	0.00	.41	.27	.14	.14	0.00	.95	
WNW	0	5	5	11	5	0	26	5.71
	0.00	.83	.83	1.83	.83	0.00	4.33	
	0.00	.23	.23	.50	.23	0.00	1.17	
NW	1	6	1	4	1	6	19	6.28
	.17	1.00	.17	.67	.17	1.00	3.16	
	.05	.27	.05	.18	.05	.27	.86	
NNW	1	0	10	19	6	0	36	5.86
	.17	0.00	1.66	3.16	1.00	0.00	5.99	
	.05	0.00	.45	.86	.27	0.00	1.62	
N	1	2	7	28	15	2	55	6.47
	.17	.33	1.16	4.66	2.50	.33	9.15	
	.05	.09	.32	1.26	.68	.09	2.48	
CALM	1						1	CALM
	17						.17	
	.05						.05	
TOTAL	19	90	165	194	95	38	601	5.60
	3.16	14.98	27.45	32.28	15.81	6.32	100.00	
	.85	4.05	7.43	8.73	4.28	1.71	27.06	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14 57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	5 .86 .23	16 2.76 .72	6 1.03 .27	5 .86 .23	3 .52 .14	35 6.03 1.58	5.65
NE	3 52 .14	7 1.21 .32	4 .69 .18	1 .17 .05	0 0.00 0.00	0 0.00 0.00	15 2.59 .68	2.70
ENE	0 0.00 0.00	4 .69 .18	5 .86 .23	4 .69 .18	0 0.00 0.00	0 0.00 0.00	13 2.24 .59	4.15
E	0 0.00 0.00	5 .86 .23	4 .69 .18	3 .52 .14	0 0.00 0.00	0 0.00 0.00	12 2.07 .54	4.22
ESE	0 0.00 0.00	3 .52 .14	13 2.24 .59	7 1.21 .32	1 .17 .05	0 0.00 0.00	24 4.14 1.08	4.73
SE	2 .34 .09	11 1.90 .50	18 3.10 .81	6 1.03 .27	7 1.21 .32	0 0.00 0.00	44 7.59 1.98	4.57
SSE	4 .69 .18	23 3.97 1.04	29 5.00 1.31	23 3.97 1.04	2 .34 .09	0 0.00 0.00	81 13.97 3.65	4.14
S	4 .69 .18	14 2.41 .63	59 10.17 2.66	59 10.17 2.66	43 7.41 1.94	13 2.24 .59	192 33.10 8.64	6.12
SSW	1 .17 .05	11 1.90 .50	13 2.24 .59	9 1.55 .41	3 .52 .14	2 .34 .09	39 6.72 1.76	4.79
SW	0 0.00 0.00	11 1.90 .50	10 1.72 .45	3 .52 .14	0 0.00 0.00	0 0.00 0.00	24 4.14 1.08	3.49
WSW	1 .17 05	3 .52 .14	3 .52 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 1.21 .32	2.59
W	2 .34 .09	11 1.90 .50	3 .52 .14	1 .17 .05	0 0.00 0.00	0 0.00 0.00	17 2.93 .77	2.68
WNW	2 .34 .09	9 1.55 .41	5 .86 .23	2 .34 .09	0 0.00 0.00	0 0.00 0.00	18 3.10 .81	3.10
NW	1 .17 .05	9 1.55 .41	6 1.03 .27	2 .34 .09	0 0.00 0.00	0 0.00 0.00	18 3.10 .81	3.24
NNW	0 0.00 0.00	1 .17 .05	12 2.07 .54	5 .86 .23	0 0.00 0.00	0 0.00 0.00	18 3.10 .81	4.17
N	1 .17 .05	4 .69 .18	11 1.90 .50	4 .69 .18	3 .52 .14	0 0.00 0.00	23 3.97 1.04	4.64
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	21 3.62 .95	131 22.59 5.90	211 36.38 9.50	135 23.28 6.08	64 11.03 2.88	18 3.10 .81	580 100.00 26.11	4.82

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14 57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1 .32 .05	7 2.25 .32	10 3.22 .45	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	18 5.79 .81	2.81
NE	1 .32 .05	2 .64 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 .96 .14	2.07
ENE	0 0.00 0.00	6 1.93 .27	1 .32 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 2.25 .32	2.31
E	1 .32 .05	12 3.86 .54	6 1.93 .27	1 .32 .05	0 0.00 0.00	0 0.00 0.00	20 6.43 .90	2.95
ESE	0 0.00 0.00	10 3.22 .45	7 2.25 .32	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 5.47 .77	2.84
SE	1 .32 .05	23 7.40 1.04	4 1.29 .18	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	28 9.00 1.26	2.66
SSE	0 0.00 0.00	27 8.68 1.22	22 7.07 .99	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	49 15.76 2.21	3.02
S	2 .64 .09	9 2.89 .41	24 7.72 1.08	2 .64 .09	0 0.00 0.00	0 0.00 0.00	37 11.90 1.67	3.54
SSW	3 .96 .14	13 4.18 .59	11 3.54 .50	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	27 8.68 1.22	2.66
SW	2 .64 .09	6 1.93 .27	3 .96 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 3.54 .50	2.39
WSW	5 1.61 .23	4 1.29 .18	1 .32 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 3.22 .45	1.59
W	4 1.29 .18	2 .64 .09	2 .64 .07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.57 .36	1.90
WNW	4 1.29 .18	4 1.29 .18	6 1.93 .27	1 .32 .05	0 0.00 0.00	0 0.00 0.00	15 4.82 .68	2.69
NW	1 .32 .05	17 5.47 .77	12 3.86 .54	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	30 9.65 1.35	2.80
NNW	0 0.00 0.00	8 2.57 .36	7 2.25 .32	2 .64 .09	0 0.00 0.00	0 0.00 0.00	17 5.47 .77	3.14
N	1 .32 .05	10 3.22 .45	3 .96 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 4.50 .63	2.67
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	26 8.36 1.17	160 51.45 7.20	119 38.26 5.36	6 1.93 .27	0 0.00 0.00	0 0.00 0.00	311 100.00 14.00	2.82

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .28 .05	18 4.96 .81	5 1.38 .23	1 .28 .05	0 0.00 0.00	0 0.00 0.00	25 6.89 1.13	2.78
NE	4 1.10 .18	6 1.65 .27	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 2.75 .45	1.88
ENE	2 .55 .09	6 1.65 .27	2 .55 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 2.75 .45	2.23
E	0 0.00 0.00	18 4.96 .81	11 3.03 .50	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	29 7.99 1.31	2.98
ESE	3 .83 .14	20 5.51 .90	3 .83 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	26 7.16 1.17	2.33
SE	5 1.38 .23	36 9.92 1.62	3 .83 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	44 12.12 1.98	2.32
SSE	2 .55 .09	21 5.79 .95	16 4.41 .72	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	39 10.74 1.76	2.82
S	3 .83 .14	29 7.99 1.31	10 2.75 .45	1 .28 .05	0 0.00 0.00	0 0.00 0.00	43 11.85 1.94	2.70
SSW	6 1.65 .27	14 3.86 .63	2 .55 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 6.06 .99	2.11
SW	3 .83 .14	5 1.38 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.20 .36	1.84
WSW	7 1.93 .32	8 2.20 .36	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 4.13 .68	1.52
W	3 .83 .14	5 1.38 .23	1 .28 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 2.48 .41	1.79
WNW	3 .83 .14	14 3.86 .63	3 .83 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 5.51 .90	2.20
NW	3 .83 .14	25 6.89 1.13	3 .83 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	31 8.54 1.40	2.34
NNW	0 0.00 0.00	7 1.93 .32	7 1.93 .32	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 3.86 .63	2.95
N	2 .55 .09	10 2.75 .45	4 1.10 .18	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	16 4.41 .72	2.62
CALM	2 .55 .09						2 .55 .09	CALM
TOTAL	49 13.50 2.21	242 66.67 10.90	70 19.28 3.15	2 .55 .09	0 0.00 0.00	0 0.00 0.00	363 100.00 16.34	2.44

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	4 .18	42 1.89	42 1.89	26 1.17	7 .32	7 .32	128 5.76	4.45
NE	8 .36	27 1.22	21 .95	5 .23	0 0.00	0 0.00	61 2.75	3.14
ENE	2 .09	20 .90	16 .72	6 .27	0 0.00	0 0.00	44 1.98	3.35
E	2 .09	40 1.80	38 1.71	6 .27	1 .05	0 0.00	87 3.92	3.41
ESE	4 .18	36 1.62	40 1.80	21 .95	5 .23	0 0.00	106 4.77	4.00
SE	10 .45	77 3.47	45 2.03	9 .41	17 .77	2 .09	160 7.20	3.77
SSE	6 .27	84 3.78	97 4.37	38 1.71	10 .45	1 .05	236 10.63	3.87
S	12 54	63 2.84	143 6.44	149 6.71	100 4.50	38 1.71	505 22.74	5.92
SSW	12 .54	48 2.16	45 2.03	48 2.16	13 .59	18 .81	184 8.28	5.09
SW	8 .36	34 1.53	30 1.35	24 1.08	13 .59	2 .09	111 5.00	4.40
WSW	17 .77	26 1.17	14 .63	3 .14	4 .18	0 0.00	64 2.88	2.77
W	9 .41	30 1.35	20 .90	5 .23	3 .14	0 0.00	67 3.02	3.11
WNW	9 .41	37 1.67	22 .99	20 .90	7 .32	0 0.00	95 4.28	3.90
NW	6 .27	61 2.75	24 1.08	9 .41	4 .18	8 .36	112 5.04	3.76
NNW	1 05	19 .86	39 1.76	34 1.53	22 .99	0 0.00	115 5.18	5.07
N	5 .23	30 1.35	30 1.35	46 2.07	24 1.08	8 .36	143 6.44	5.40
CALM	3 .14						3 14	CALM
TOTAL	118 5.31	674 30.35	666 29.99	449 20.22	230 10.36	84 3.78	2221 100.00	4.54

NUMBER OF VALID OBSERVATIONS 2221 99.51 PCT.
NUMBER OF INVALID OBSERVATIONS 11 .49 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
NE	0 0.00 0.00	3 2.52 .14	2 1.68 .09	1 .84 .05	0 0.00 0.00	0 0.00 0.00	6 5.04 .28	3.88
ENE	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	4.40
E	0 0.00 0.00	0 0.00 0.00	1 .84 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .84 .05	4.30
ESE	0 0.00 0.00	2 1.68 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.68 .09	2.55
SE	1 .84 .05	1 .84 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.68 .09	1.40
SSE	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	8 6.72 .37	1 .84 .05	0 0.00 0.00	13 10.92 .61	5.45
S	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	7 5.88 .33	0 0.00 0.00	1 .84 .05	12 10.08 .56	5.92
SSW	0 0.00 0.00	0 0.00 0.00	2 1.68 .09	2 1.68 .09	2 1.68 .09	4 3.36 .19	10 8.40 .47	8.98
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 7.56 .42	8 6.72 .37	17 14.29 .79	9.74
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .84 .05	1 .84 .05	10.10
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.52 .14	2 1.68 .09	0 0.00 0.00	5 4.20 .23	7.70
WNW	0 0.00 0.00	1 .84 .05	0 0.00 0.00	7 5.88 .33	3 2.52 .14	0 0.00 0.00	11 9.24 .51	6.58
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 5.88 .33	5 4.20 .23	2 1.68 .09	14 11.76 .65	7.86
NNW	0 0.00 0.00	0 0.00 0.00	1 .84 .05	5 4.20 .23	5 4.20 .23	0 0.00 0.00	11 9.24 .51	7.65
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	6 5.04 .28	0 0.00 0.00	10 8.40 .47	7.61
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .84 .05	7 5.88 .33	18 15.13 .84	44 36.97 2.05	33 27.73 1.54	16 13.45 .74	119 100.00 5.54	7.07

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	1 .88 .05	1 .88 .05	2 1.77 .09	0 0.00 0.00	4 3.54 .19	6.65
NE	0 0.00 0.00	3 2.65 .14	0 0.00 0.00	2 1.77 .09	0 0.00 0.00	0 0.00 0.00	5 4.42 .23	4.30
ENE	0 0.00 0.00	2 1.77 .09	2 1.77 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.54 .19	3.22
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	2 1.77 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.77 .09	1.95
SE	0 0.00 0.00	1 .88 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .88 .05	2.40
SSE	0 0.00 0.00	0 0.00 0.00	2 1.77 .09	3 2.65 .14	0 0.00 0.00	0 0.00 0.00	5 4.42 .23	5.52
S	0 0.00 0.00	0 0.00 0.00	1 .88 .05	10 8.85 .47	0 0.00 0.00	2 1.77 .09	13 11.50 .61	7.12
SSW	0 0.00 0.00	0 0.00 0.00	2 1.77 .09	4 3.54 .19	1 .88 .05	2 1.77 .09	9 7.96 .42	7.44
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 4.42 .23	1 .88 .05	2 1.77 .09	8 7.08 .37	7.72
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.65 .14	0 0.00 0.00	0 0.00 0.00	3 2.65 .14	6.23
W	0 0.00 0.00	1 .88 .05	4 3.54 .19	3 2.65 .14	0 0.00 0.00	0 0.00 0.00	8 7.08 .37	4.55
WNW	0 0.00 0.00	1 .88 .05	1 .88 .05	6 5.31 .28	0 0.00 0.00	0 0.00 0.00	8 7.08 .37	5.45
NW	0 0.00 0.00	2 1.77 .09	0 0.00 0.00	5 4.42 .23	8 7.08 .37	6 5.31 .28	21 18.58 .98	8.69
NNW	0 0.00 0.00	0 0.00 0.00	3 2.65 .14	4 3.54 .19	3 2.65 .14	1 .88 .05	11 9.73 .51	7.16
N	0 0.00 0.00	2 1.77 .09	3 2.65 .14	2 1.77 .09	2 1.77 .09	2 1.77 .09	11 9.73 .51	6.40
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	14 12.39 65	19 16.81 .89	48 42.48 2.23	17 15.04 .79	15 13.27 .70	113 100.00 5.26	6.61

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL NOVEMBER COMBINED

STABILITY CLASS PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	3	7	8	0	19	6.69
	0.00	.68	2.04	4.76	5.44	0.00	12.93	
	0.00	.05	.14	.33	.37	0.00	.88	
NE	0	2	3	0	1	0	6	4.05
	0.00	1.36	2.04	0.00	.68	0.00	4.08	
	0.00	.09	.14	0.00	.05	0.00	.28	
ENE	0	1	1	0	0	0	2	3.40
	0.00	.68	.68	0.00	0.00	0.00	1.36	
	0.00	.05	.05	0.00	0.00	0.00	.09	
E	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ESE	0	1	0	4	0	0	5	5.56
	0.00	.68	0.00	2.72	0.00	0.00	3.40	
	0.00	.05	0.00	.19	0.00	0.00	.23	
SE	0	0	0	1	0	0	1	5.30
	0.00	0.00	0.00	.68	0.00	0.00	.68	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
SSE	0	0	2	3	0	0	5	5.24
	0.00	0.00	1.36	2.04	0.00	0.00	3.40	
	0.00	0.00	.09	.14	0.00	0.00	.23	
S	0	1	7	6	0	1	15	5.29
	0.00	.68	4.76	4.08	0.00	.68	10.20	
	0.00	.05	.33	.28	0.00	.05	.70	
SSW	0	1	3	7	1	2	14	6.16
	0.00	.68	2.04	4.76	.68	1.36	9.52	
	0.00	.05	.14	.33	.05	.09	.65	
SW	0	1	1	2	2	1	7	6.94
	0.00	.68	.68	1.36	1.36	.68	4.76	
	0.00	.05	.05	.09	.09	.05	.33	
WSW	0	2	0	1	0	0	3	4.13
	0.00	1.36	0.00	.68	0.00	0.00	2.04	
	0.00	.09	0.00	.05	0.00	0.00	.14	
W	0	0	4	6	0	0	10	5.11
	0.00	0.00	2.72	4.08	0.00	0.00	6.80	
	0.00	0.00	.19	.28	0.00	0.00	.47	
WNW	0	1	3	1	0	0	5	4.52
	0.00	.68	2.04	.68	0.00	0.00	3.40	
	0.00	.05	.14	.05	0.00	0.00	.23	
NW	0	1	0	13	3	5	22	7.74
	0.00	.68	0.00	8.84	2.04	3.40	14.97	
	0.00	.05	0.00	.61	.14	.23	1.02	
NNW	0	0	3	6	7	2	18	7.16
	0.00	0.00	2.04	4.08	4.76	1.36	12.24	
	0.00	0.00	.14	.28	.33	.09	.84	
N	0	0	2	4	8	1	15	7.71
	0.00	0.00	1.36	2.72	5.44	.68	10.20	
	0.00	0.00	.09	.19	.37	.05	.70	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	12	32	61	30	12	147	6.35
	0.00	8.16	21.77	41.50	20.41	8.16	100.00	
	0.00	.56	1.49	2.84	1.40	.56	6.84	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	4	27	16	13	0	61	5.40
	.14	.54	3.67	2.18	1.77	0.00	8.30	
	.05	.19	1.26	.74	.61	0.00	2.84	
NE	0	5	20	8	0	0	33	4.02
	0.00	.68	2.72	1.09	0.00	0.00	4.49	
	0.00	.23	.93	.37	0.00	0.00	1.54	
ENE	0	2	9	2	1	0	14	4.66
	0.00	.27	1.22	.27	.14	0.00	1.90	
	0.00	.09	.42	.09	.05	0.00	.65	
E	1	3	8	9	1	0	22	4.70
	.14	.41	1.09	1.22	.14	0.00	2.99	
	.05	.14	.37	.42	.05	0.00	1.02	
ESE	1	0	3	5	0	0	9	4.87
	.14	0.00	.41	.68	0.00	0.00	1.22	
	.05	0.00	.14	.23	0.00	0.00	.42	
SE	0	5	5	1	3	1	15	5.00
	0.00	.68	.68	.14	.41	.14	2.04	
	0.00	.23	.23	.05	.14	.05	.70	
SSE	3	14	20	11	2	0	50	4.09
	.41	1.90	2.72	1.50	.27	0.00	6.80	
	.14	.65	.93	.51	.09	0.00	2.33	
S	1	20	63	25	34	2	145	5.33
	.14	2.72	8.57	3.40	4.63	.27	19.73	
	.05	.93	2.93	1.16	1.58	.09	6.75	
SSW	0	10	19	30	11	6	76	5.74
	0.00	1.36	2.59	4.08	1.50	.82	10.34	
	0.00	.47	.88	1.40	.51	.28	3.54	
SW	1	0	13	9	11	1	35	6.15
	.14	0.00	1.77	1.22	1.50	.14	4.76	
	.05	0.00	.61	.42	.51	.05	1.63	
WSW	0	2	2	6	7	0	17	6.50
	0.00	.27	.27	.82	.95	0.00	2.31	
	0.00	.09	.09	.28	.33	0.00	.79	
W	0	7	8	24	3	0	42	5.42
	0.00	.95	1.09	3.27	.41	0.00	5.71	
	0.00	.33	.37	1.12	.14	0.00	1.96	
WNW	0	1	12	13	0	0	26	4.89
	0.00	.14	1.63	1.77	0.00	0.00	3.54	
	0.00	.05	.56	.61	0.00	0.00	1.21	
NW	1	3	10	27	12	1	54	6.05
	.14	.41	1.36	3.67	1.63	.14	7.35	
	.05	.14	.47	1.26	.56	.05	2.51	
NNW	1	2	14	44	21	0	82	6.30
	.14	.27	1.90	5.99	2.86	0.00	11.16	
	.05	.09	.65	2.05	.98	0.00	3.82	
N	3	7	11	27	6	0	54	5.23
	.41	.95	1.50	3.67	.82	0.00	7.35	
	.14	.33	.51	1.26	.28	0.00	2.51	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	13	85	244	257	125	11	735	5.40
	1.77	11.56	33.20	34.97	17.01	1.50	100.00	
	.61	3.96	11.36	11.96	5.82	.51	34.22	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	5 1.01 .23	5 1.01 .23	2 .40 .09	1 .20 .05	0 0.00 0.00	13 2.62 .61	4.11
NE	0 0.00 0.00	6 1.21 .28	7 1.41 .33	1 .20 .05	0 0.00 0.00	0 0.00 0.00	14 2.82 .65	3.26
ENE	1 .20 .05	3 .60 .14	9 1.81 .42	6 1.21 .28	0 0.00 0.00	0 0.00 0.00	19 3.82 .88	4.41
E	0 0.00 0.00	0 0.00 0.00	9 1.81 .42	5 1.01 .23	2 .40 .09	0 0.00 0.00	16 3.22 .74	5.06
ESE	1 .20 .05	4 .80 .19	7 1.41 .33	2 .40 .09	0 0.00 0.00	0 0.00 0.00	14 2.82 .65	3.64
SE	0 0.00 0.00	9 1.81 .42	7 1.41 .33	3 .60 .14	4 .80 .19	0 0.00 0.00	23 4.63 1.07	4.17
SSE	0 0.00 0.00	11 2.21 .51	25 5.03 1.16	18 3.62 .84	1 .20 .05	0 0.00 0.00	55 11.07 2.56	4.61
S	3 .60 .14	19 3.82 .88	33 6.64 1.54	30 6.04 1.40	19 3.82 .88	2 .40 .09	106 21.33 4.93	5.32
SSW	2 .40 .09	8 1.61 .37	27 5.43 1.26	15 3.02 .70	2 .40 .09	1 .20 .05	55 11.07 2.56	4.48
SW	0 0.00 0.00	3 .60 .14	5 1.01 .23	2 .40 .09	0 0.00 0.00	0 0.00 0.00	10 2.01 .47	3.78
WSW	0 0.00 0.00	0 0.00 0.00	7 1.41 .33	1 .20 .05	0 0.00 0.00	0 0.00 0.00	8 1.61 .37	3.74
W	2 .40 .09	10 2.01 .47	18 3.62 .84	5 1.01 .23	1 .20 .05	0 0.00 0.00	36 7.24 1.68	3.78
WNW	0 0.00 0.00	7 1.41 .33	28 5.63 1.30	11 2.21 .51	0 0.00 0.00	0 0.00 0.00	46 9.26 2.14	4.25
NW	1 .20 .05	6 1.21 .28	28 5.63 1.30	14 2.82 .65	0 0.00 0.00	0 0.00 0.00	49 9.86 2.28	4.26
NNW	0 0.00 0.00	3 .60 .14	9 1.81 .42	11 2.21 .51	0 0.00 0.00	0 0.00 0.00	23 4.63 1.07	4.73
N	1 .20 .05	2 .40 .09	4 .80 .19	3 .60 .14	0 0.00 0.00	0 0.00 0.00	10 2.01 .47	3.84
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	11 2.21 .51	96 19.32 4.47	228 45.88 10.61	129 25.96 6.01	30 6.04 1.40	3 .60 .14	497 100.00 23.14	4.49

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	4 1.22 .19	8 2.44 .37	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 3.66 .56	3.20
NE	1 .30 .05	7 2.13 .33	6 1.83 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 4.27 .65	2.77
ENE	0 0.00 0.00	4 1.22 .19	9 2.74 .42	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 3.96 .61	3.25
E	0 0.00 0.00	6 1.83 .28	3 .91 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 2.74 .42	2.97
ESE	0 0.00 0.00	6 1.83 .28	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 1.83 .28	2.38
SE	2 .61 .09	9 2.74 .42	8 2.44 .37	1 .30 .05	0 0.00 0.00	0 0.00 0.00	20 6.10 .93	2.91
SSE	1 .30 .05	23 7.01 1.07	29 8.84 1.35	1 .30 .05	0 0.00 0.00	0 0.00 0.00	54 16.46 2.51	3.25
S	0 0.00 0.00	14 4.27 .65	24 7.32 1.12	1 .30 .05	0 0.00 0.00	0 0.00 0.00	39 11.89 1.82	3.39
SSW	1 .30 .05	8 2.44 .37	10 3.05 .47	7 2.13 .33	2 .61 .09	0 0.00 0.00	28 8.54 1.30	3.99
SW	0 0.00 0.00	8 2.44 .37	7 2.13 .33	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 4.57 .70	3.22
WSW	1 .30 .05	17 5.18 .79	2 .61 .09	1 .30 .05	0 0.00 0.00	0 0.00 0.00	21 6.40 .98	2.69
W	1 .30 .05	9 2.74 .42	5 1.52 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 4.57 .70	2.70
WNW	3 .91 .14	14 4.27 .65	19 5.79 .88	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	36 10.98 1.68	3.05
NW	2 .61 .09	14 4.27 .65	10 3.05 .47	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	26 7.93 1.21	2.68
NNW	0 0.00 0.00	6 1.83 .28	3 .91 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 2.74 .42	2.67
N	0 0.00 0.00	6 1.83 .28	4 1.22 .19	1 .30 .05	0 0.00 0.00	0 0.00 0.00	11 3.35 .51	2.93
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	12 3.65 .56	155 47.26 7.22	147 44.82 6.84	12 3.66 .56	2 .61 .09	0 0.00 0.00	328 100.00 15.27	3.11

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .48 .05	3 1.44 .14	5 2.39 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 4.31 .42	2.94
NE	1 .48 .05	2 .96 .09	4 1.91 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.35 .33	2.70
ENE	2 .96 .09	1 .48 .05	4 1.91 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.35 .33	2.87
E	1 .48 .05	2 .96 .09	3 1.44 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 2.87 .28	2.77
ESE	2 .96 .09	3 1.44 .14	4 1.91 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 4.31 .42	2.60
SE	0 0.00 0.00	10 4.78 .47	5 2.39 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 7.18 .70	2.91
SSE	2 .96 .09	12 5.74 .56	21 10.05 .98	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 16.75 1.63	3.16
S	1 .48 .05	23 11.00 1.07	23 11.00 1.07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	47 22.49 2.19	3.00
SSW	1 .48 .05	5 2.39 .23	5 2.39 .23	2 .96 .09	0 0.00 0.00	0 0.00 0.00	13 6.22 .61	3.18
SW	1 .48 .05	7 3.35 .33	3 1.44 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 5.26 .51	2.51
WSW	3 1.44 .14	7 3.35 .33	3 1.44 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 6.22 .61	2.43
W	2 .96 .09	2 .96 .09	3 1.44 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.35 .33	2.33
WNW	3 1.44 .14	5 2.39 .23	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 3.83 .37	1.82
NW	2 .96 .09	6 2.87 .28	2 .96 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 4.78 .47	2.12
NNW	3 1.44 .14	4 1.91 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.35 .33	1.83
N	1 .48 .05	3 1.44 .14	1 48 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 2.39 .23	2.32
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	26 12.44 1.21	95 45.45 4.42	86 41.15 4.00	2 .96 .09	0 0.00 0.00	0 0.00 0.00	209 100.00 9.73	2.76

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	2 .09	17 .79	49 2.28	26 1.21	24 1.12	0 0.00	118 5.49	5.10
NE	2 .09	28 1.30	42 1.96	12 .56	1 .05	0 0.00	85 3.96	3.59
ENE	3 .14	13 .61	38 1.77	8 .37	1 .05	0 0.00	63 2.93	3.95
E	2 .09	11 .51	24 1.12	14 .65	3 .14	0 0.00	54 2.51	4.30
ESE	4 .19	18 .84	14 .65	11 .51	0 0.00	0 0.00	47 2.19	3.60
SE	3 .14	35 1.63	25 1.16	6 .28	7 .33	1 .05	77 3.58	3.68
SSE	6 .28	60 2.79	103 4.80	44 2.05	4 .19	0 0.00	217 10.10	4.00
S	5 .23	77 3.58	155 7.22	79 3.68	53 2.47	8 .37	377 17.55	4.92
SSW	4 .19	32 1.49	68 3.17	67 3.12	19 .88	15 .70	205 9.54	5.26
SW	2 .09	19 .88	29 1.35	18 .84	23 1.07	12 .56	103 4.80	5.87
WSW	4 .19	28 1.30	14 .65	12 .56	7 .33	1 .05	66 3.07	4.08
W	5 .23	29 1.35	42 1.96	41 1.91	6 .28	0 0.00	123 5.73	4.44
WNW	6 .28	30 1.40	63 2.93	38 1.77	3 .14	0 0.00	140 6.52	4.18
NW	6 .28	32 1.49	50 2.33	66 3.07	28 1.30	14 .65	196 9.12	5.56
NNW	4 .19	15 .70	33 1.54	70 3.26	36 1.68	3 .14	161 7.50	5.93
N	5 .23	20 .93	25 1.16	41 1.91	22 1.02	3 .14	116 5.40	5.41
CALM	0 0.00						0 0.00	CALM
TOTAL	63 2.93	464 21.60	774 36.03	553 25.74	237 11.03	57 2.65	2148 100.00	4.80

NUMBER OF VALID OBSERVATIONS 2148 99.44 PCT.
NUMBER OF INVALID OBSERVATIONS 12 .56 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	0	0	1	0	2	5.80
	0.00	1.56	0.00	0.00	1.56	0.00	3.13	
	0.00	.05	0.00	0.00	.05	0.00	10	
NE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ESE	0	1	0	0	0	0	1	1.70
	0.00	1.56	0.00	0.00	0.00	0.00	1.56	
	0.00	.05	0.00	0.00	0.00	0.00	05	
SE	0	2	0	0	0	0	2	2.40
	0.00	3.13	0.00	0.00	0.00	0.00	3.13	
	0.00	.10	0.00	0.00	0.00	0.00	.10	
SSE	0	0	0	4	0	0	4	6.50
	0.00	0.00	0.00	6.25	0.00	0.00	6.25	
	0.00	0.00	0.00	.21	0.00	0.00	.21	
S	0	0	3	5	0	0	8	5.74
	0.00	0.00	4.69	7.81	0.00	0.00	12.50	
	0.00	0.00	.16	.26	0.00	0.00	.42	
SSW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
SW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WSW	0	1	4	0	0	0	5	3.96
	0.00	1.56	6.25	0.00	0.00	0.00	7.81	
	0.00	.05	.21	0.00	0.00	0.00	.26	
W	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WNW	1	0	0	0	0	0	1	.70
	1.56	0.00	0.00	0.00	0.00	0.00	1.56	
	.05	0.00	0.00	0.00	0.00	0.00	.05	
NW	0	0	0	3	1	0	4	6.82
	0.00	0.00	0.00	4.69	1.56	0.00	6.25	
	0.00	0.00	0.00	.16	.05	0.00	.21	
NNW	1	0	2	12	13	0	28	7.12
	1.56	0.00	3.13	18.75	20.31	0.00	43.75	
	.05	0.00	.10	.63	.68	0.00	1.46	
N	0	0	3	2	3	1	9	6.92
	0.00	0.00	4.69	3.13	4.69	1.56	14.06	
	0.00	0.00	.16	.10	.16	.05	.47	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	5	12	26	18	1	64	6.24
	3.13	7.81	18.75	40.63	28.13	1.56	100.00	
	.10	.26	.63	1.36	.94	.05	3.34	

KEY: XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	0	0	1	2	3	10.40
	0.00	0.00	0.00	0.00	.99	1.98	2.97	
	0.00	0.00	0.00	0.00	.05	.10	.16	
NE	0	1	0	0	0	0	1	2.10
	0.00	.99	0.00	0.00	0.00	0.00	.99	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	1	0	0	0	0	1	2.10
	0.00	.99	0.00	0.00	0.00	0.00	.99	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
ESE	0	1	0	0	0	0	1	2.20
	0.00	.99	0.00	0.00	0.00	0.00	.99	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
SE	0	3	0	0	0	0	3	2.13
	0.00	2.97	0.00	0.00	0.00	0.00	2.97	
	0.00	.16	0.00	0.00	0.00	0.00	.16	
SSE	0	1	1	0	0	0	2	3.70
	0.00	.99	.99	0.00	0.00	0.00	1.98	
	0.00	.05	.05	0.00	0.00	0.00	.10	
S	0	0	3	8	0	0	11	5.36
	0.00	0.00	2.97	7.92	0.00	0.00	10.89	
	0.00	0.00	.16	.42	0.00	0.00	.57	
SSW	0	0	0	6	0	1	7	7.13
	0.00	0.00	0.00	5.94	0.00	.99	6.93	
	0.00	0.00	0.00	.31	0.00	.05	.36	
SW	0	1	0	2	0	1	4	6.20
	0.00	.99	0.00	1.98	0.00	.99	3.96	
	0.00	.05	0.00	.10	0.00	05	.21	
WSW	1	0	0	4	1	0	6	5.15
	.99	0.00	0.00	3.96	.99	0.00	5.94	
	.05	0.00	0.00	.21	.05	0.00	.31	
W	0	1	3	1	0	0	5	3.60
	0.00	.99	2.97	.99	0.00	0.00	4.95	
	0.00	.05	.16	.05	0.00	0.00	.26	
WNW	0	1	0	2	3	0	6	6.55
	0.00	.99	0.00	1.98	2.97	0.00	5.94	
	0.00	.05	0.00	.10	.16	0.00	.31	
NW	1	4	5	9	2	4	25	5.98
	.99	3.96	4.95	8.91	1.98	3.96	24.75	
	.05	.21	.26	.47	.10	.21	1.30	
NNW	0	2	2	8	6	1	19	6.79
	0.00	1.98	1.98	7.92	5.94	.99	18.81	
	0.00	.10	.10	.42	.31	.05	.99	
N	0	0	0	3	4	0	7	7.09
	0.00	0.00	0.00	2.97	3.96	0.00	6.93	
	0.00	0.00	0.00	.16	.21	0.00	.36	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	16	14	43	17	9	101	5.96
	1.98	15.84	13.86	42.57	16.83	8.91	100.00	
	.10	83	.73	2.24	.89	.47	5.27	

KEY: XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-31 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 10 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .57 .05	0 0.00 0.00	0 0.00 0.00	2 1.15 .10	0 0.00 0.00	3 1.72 .16	6.77
NE	0 0.00 0.00	2 1.15 .10	0 0.00 0.00	1 .57 .05	0 0.00 0.00	0 0.00 0.00	3 1.72 .16	3.83
ENE	0 0.00 0.00	1 .57 .05	0 0.00 0.00	1 .57 .05	1 .57 .05	0 0.00 0.00	3 1.72 .16	5.70
E	0 0.00 0.00	1 .57 .05	0 0.00 0.00	2 1.15 .10	0 0.00 0.00	0 0.00 0.00	3 1.72 .16	5.50
ESE	0 0.00 0.00	1 .57 .05	0 0.00 0.00	1 .57 .05	0 0.00 0.00	0 0.00 0.00	2 1.15 .10	4.20
SE	1 .57 .05	0 0.00 0.00	4 2.30 .21	1 .57 .05	0 0.00 0.00	0 0.00 0.00	6 3.45 .31	4.08
SSE	0 0.00 0.00	0 0.00 0.00	6 3.45 .31	4 2.30 .21	0 0.00 0.00	0 0.00 0.00	10 5.75 .52	5.12
S	0 0.00 0.00	0 0.00 0.00	11 6.32 .57	3 1.72 .16	0 0.00 0.00	1 .57 .05	15 8.62 .78	5.17
SSW	0 0.00 0.00	1 .57 .05	2 1.15 .10	9 5.17 .47	0 0.00 0.00	3 1.72 .16	15 8.62 .78	6.28
SW	1 .57 .05	2 1.15 .10	2 1.15 .10	7 4.02 .36	0 0.00 0.00	0 0.00 0.00	12 6.90 .63	4.78
WSW	1 .57 .05	0 0.00 0.00	4 2.30 .21	5 2.87 .26	0 0.00 0.00	0 0.00 0.00	10 5.75 .52	4.64
W	0 0.00 0.00	2 1.15 .10	3 1.72 .16	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 2.87 .26	3.28
WNW	0 0.00 0.00	1 .57 .05	0 0.00 0.00	7 4.02 .36	2 1.15 .10	0 0.00 0.00	10 5.75 .52	6.66
NW	0 0.00 0.00	2 1.15 .10	3 1.72 .16	7 4.02 .36	2 1.15 .10	2 1.15 .10	16 9.20 .83	6.56
NNW	0 0.00 0.00	0 0.00 0.00	7 4.02 .36	14 8.05 .73	11 6.32 .57	1 .57 .05	33 18.97 1.72	6.87
N	0 0.00 0.00	2 1.15 .10	4 2.30 .21	9 5.17 .47	7 4.02 .36	6 3.45 .31	28 16.09 1.46	7.47
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 1.72 .16	16 9.20 .83	46 26.44 2.40	71 40.80 3.70	25 14.37 1.30	13 7.47 .68	174 100.00 9.07	6.03

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .13 .05	17 2.28 .89	15 2.02 .78	12 1.61 .63	7 .94 .36	6 .81 .31	58 7.80 3.02	5.25
NE	2 .27 .10	17 2.28 .89	5 .67 .26	9 1.21 .47	1 .13 .05	1 .13 .05	35 4.70 1.82	3.87
ENE	2 .27 .10	8 1.08 .42	5 .67 .26	3 .40 .16	3 .40 .16	0 0.00 0.00	21 2.82 1.09	3.95
E	3 .40 .16	5 .67 .26	8 1.08 .42	1 .13 .05	0 0.00 0.00	0 0.00 0.00	17 2.28 .89	3.09
ESE	0 0.00 0.00	5 .67 .26	14 1.88 .73	4 .54 .21	0 0.00 0.00	0 0.00 0.00	23 3.09 1.20	3.95
SE	1 .13 .05	2 .27 .10	18 2.42 .94	2 .27 .10	0 0.00 0.00	0 0.00 0.00	23 3.09 1.20	3.89
SSE	2 .27 .10	6 .81 .31	17 2.28 .89	13 1.75 .68	0 0.00 0.00	0 0.00 0.00	38 5.11 1.98	4.22
S	2 .27 .10	6 .81 .31	14 1.88 .73	23 3.09 1.20	7 .94 .36	3 .40 .16	55 7.39 2.87	5.82
SSW	1 .13 .05	1 .13 .05	20 2.69 1.04	26 3.49 1.36	14 1.88 .73	3 .40 .16	65 8.74 3.39	6.16
SW	1 .13 .05	8 1.08 .42	19 2.55 .99	9 1.21 .47	2 .27 .10	2 .27 .10	41 5.51 2.14	4.73
WSW	0 0.00 0.00	4 .54 .21	3 .40 .16	5 .67 .26	3 .40 .16	1 .13 .05	16 2.15 .83	5.81
W	0 0.00 0.00	7 .94 .36	0 0.00 0.00	4 .54 .21	5 .67 .26	4 .54 .21	20 2.69 1.04	6.33
WNW	2 .27 .10	3 .40 .16	11 1.48 .57	20 2.69 1.04	5 .67 .26	0 0.00 0.00	41 5.51 2.14	5.27
NW	1 .13 .05	8 1.08 .42	12 1.61 .63	33 4.44 1.72	13 1.75 .68	10 1.34 .52	77 10.35 4.01	6.55
NNW	2 .27 .10	12 1.61 .63	28 3.76 1.46	28 3.76 1.46	33 4.44 1.72	10 1.34 .52	113 15.19 5.89	6.35
N	2 .27 .10	10 1.34 .52	33 4.44 1.72	19 2.55 .99	25 3.36 1.30	12 1.61 .63	101 13.58 5.27	6.17
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	22 2.96 1.15	119 15.99 6.20	222 29.84 11.57	211 28.36 11.00	118 15.86 6.15	52 6.99 2.71	744 100.00 38.79	5.53

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	2	5	0	0	0	8	2.92
	.24	.47	1.18	0.00	0.00	0.00	1.89	
	.05	.10	.26	0.00	0.00	0.00	.42	
NE	1	3	1	0	0	0	5	2.14
	.24	.71	.24	0.00	0.00	0.00	1.18	
	.05	.16	.05	0.00	0.00	0.00	.26	
ENE	0	1	1	0	0	0	2	2.85
	0.00	.24	.24	0.00	0.00	0.00	.47	
	0.00	.05	.05	0.00	0.00	0.00	.10	
E	1	3	4	13	0	0	21	4.93
	.24	.71	.94	3.07	0.00	0.00	4.95	
	.05	.16	.21	.68	0.00	0.00	1.09	
ESE	0	1	18	10	0	0	29	4.70
	0.00	.24	4.25	2.36	0.00	0.00	6.84	
	0.00	.05	.94	.52	0.00	0.00	1.51	
SE	0	2	18	3	0	0	23	4.08
	0.00	.47	4.25	.71	0.00	0.00	5.42	
	0.00	.10	.94	.16	0.00	0.00	1.20	
SSE	1	4	21	12	3	0	41	4.81
	.24	.94	4.95	2.83	.71	0.00	9.67	
	.05	.21	1.09	.63	.16	0.00	2.14	
S	1	0	21	29	21	2	74	6.09
	.24	0.00	4.95	6.84	4.95	.47	17.45	
	.05	0.00	1.09	1.51	1.09	.10	3.86	
SSW	1	3	30	27	11	0	72	5.28
	.24	.71	7.08	6.37	2.59	0.00	16.98	
	.05	.16	1.56	1.41	.57	0.00	3.75	
SW	0	4	10	5	0	0	19	3.92
	0.00	.94	2.36	1.18	0.00	0.00	4.48	
	0.00	.21	.52	.26	0.00	0.00	.99	
WSW	1	1	3	2	0	0	7	3.83
	.24	.24	.71	.47	0.00	0.00	1.65	
	.05	.05	.16	.10	0.00	0.00	.36	
W	2	2	10	2	0	0	16	3.46
	.47	.47	2.36	.47	0.00	0.00	3.77	
	.10	.10	.52	.10	0.00	0.00	.83	
WNW	1	5	16	1	0	0	23	3.41
	.24	1.18	3.77	.24	0.00	0.00	5.42	
	.05	.26	.83	.05	0.00	0.00	1.20	
NW	0	13	19	6	1	1	40	4.22
	0.00	3.07	4.48	1.42	.24	.24	9.43	
	0.00	.68	.99	.31	.05	.05	2.09	
NNW	1	6	11	11	0	0	29	4.32
	.24	1.42	2.59	2.59	0.00	0.00	6.84	
	.05	.31	.57	.57	0.00	0.00	1.51	
N	0	6	9	0	0	0	15	3.18
	0.00	1.42	2.12	0.00	0.00	0.00	3.54	
	0.00	.31	.47	0.00	0.00	0.00	.78	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	11	56	197	121	36	3	424	4.67
	2.59	13.21	46.46	28.54	8.49	.71	100.00	
	.57	2.92	10.27	6.31	1.88	.16	22.11	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	10	6	0	0	0	16	2.66
	0.00	3.52	2.11	0.00	0.00	0.00	5.63	
	0.00	.52	.31	0.00	0.00	0.00	.83	
NE	1	4	1	0	0	0	6	2.28
	.35	1.41	.35	0.00	0.00	0.00	2.11	
	.05	.21	.05	0.00	0.00	0.00	.31	
ENE	0	4	1	0	0	0	5	2.84
	0.00	1.41	.35	0.00	0.00	0.00	1.76	
	0.00	.21	.05	0.00	0.00	0.00	.26	
E	0	5	6	1	0	0	12	3.18
	0.00	1.76	2.11	.35	0.00	0.00	4.23	
	0.00	.26	.31	.05	0.00	0.00	.63	
ESE	2	4	5	0	0	0	11	2.90
	.70	1.41	1.76	0.00	0.00	0.00	3.87	
	.10	.21	.26	0.00	0.00	0.00	.57	
SE	0	16	6	0	0	0	22	2.69
	0.00	5.63	2.11	0.00	0.00	0.00	7.75	
	0.00	.83	.31	0.00	0.00	0.00	1.15	
SSE	0	11	34	0	0	0	45	3.57
	0.00	3.87	11.97	0.00	0.00	0.00	15.85	
	0.00	.57	1.77	0.00	0.00	0.00	2.35	
S	0	12	29	2	0	0	43	3.43
	0.00	4.23	10.21	.70	0.00	0.00	15.14	
	0.00	.63	1.51	.10	0.00	0.00	2.24	
SSW	0	12	24	7	0	0	43	3.74
	0.00	4.23	8.45	2.46	0.00	0.00	15.14	
	0.00	.63	1.25	.36	0.00	0.00	2.24	
SW	0	1	3	0	0	0	4	3.57
	0.00	.35	1.06	0.00	0.00	0.00	1.41	
	0.00	.05	.16	0.00	0.00	0.00	.21	
WSW	2	4	2	0	0	0	8	2.19
	.70	1.41	.70	0.00	0.00	0.00	2.82	
	.10	.21	.10	0.00	0.00	0.00	.42	
W	4	5	6	0	0	0	15	2.52
	1.41	1.76	2.11	0.00	0.00	0.00	5.28	
	.21	.26	.31	0.00	0.00	0.00	.78	
WNW	2	6	5	0	0	0	13	2.48
	.70	2.11	1.76	0.00	0.00	0.00	4.58	
	.10	.31	.26	0.00	0.00	0.00	.68	
NW	1	13	4	0	0	0	18	2.67
	.35	4.58	1.41	0.00	0.00	0.00	6.34	
	.05	.68	.21	0.00	0.00	0.00	.94	
NNW	0	9	5	0	0	0	14	2.72
	0.00	3.17	1.76	0.00	0.00	0.00	4.93	
	0.00	.47	.26	0.00	0.00	0.00	.73	
N	0	4	5	0	0	0	9	3.09
	0.00	1.41	1.76	0.00	0.00	0.00	3.17	
	0.00	.21	.26	0.00	0.00	0.00	.47	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	12	120	142	10	0	0	284	3.12
	4.23	42.25	50.00	3.52	0.00	0.00	100.00	
	.63	6.26	7.40	.52	0.00	0.00	14.81	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15.07.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	3 2.36 .16	4 3.15 .21	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 5.51 .36	2.69
NE	0 0.00 0.00	3 2.36 .16	2 1.57 .10	1 .79 .05	0 0.00 0.00	0 0.00 0.00	6 4.72 .31	3.50
ENE	0 0.00 0.00	2 1.57 .10	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.36 16	2.83
E	0 0.00 0.00	0 0.00 0.00	5 3.94 .26	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.94 .26	4.10
ESE	0 0.00 0.00	0 0.00 0.00	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .79 05	4.00
SE	0 0.00 0.00	8 6.30 .42	15 11.81 .78	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	23 18.11 1.20	3.20
SSE	1 .79 .05	13 10.24 .68	8 6.30 .42	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 17.32 1.15	2.87
S	0 0.00 0.00	6 4.72 .31	8 6.30 .42	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 11.02 .73	3.24
SSW	0 0.00 0.00	2 1.57 .10	6 4.72 .31	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 6.30 .42	3.10
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
WSW	1 .79 .05	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.57 .10	1.30
W	2 1.57 .10	4 3.15 .21	2 1.57 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 6.30 .42	2.19
WNW	1 .79 .05	5 3.94 .26	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 4.72 .31	1.93
NW	1 .79 .05	7 5.51 .36	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 7.09 .47	2.13
NNW	2 1.57 .10	2 1.57 .10	1 .79 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.94 .26	2.00
N	0 0.00 0.00	3 2.36 .16	5 3.94 .26	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 6.30 .42	3.15
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	8 6.30 .42	59 46.46 3.08	59 46.46 3.08	1 .79 .05	0 0.00 0.00	0 0.00 0.00	127 100.00 6.62	2.88

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 10.00 METERS
TABLE GENERATED: 11/11/81. 15 07.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .10	34 1.77	30 1.56	12 .63	11 .57	8 .42	97 5.06	4.66
NE	4 .21	30 1.56	9 .47	11 .57	1 .05	1 .05	56 2.92	3.47
ENE	2 .10	16 .83	8 .42	4 .21	4 .21	0 0.00	34 1.77	3.78
E	4 .21	15 .78	23 1.20	17 .89	0 0.00	0 0.00	59 3.08	3.96
ESE	2 .10	13 .68	38 1.98	15 .78	0 0.00	0 0.00	68 3.55	4.05
SE	2 .10	33 1.72	61 3.18	6 .31	0 0.00	0 0.00	102 5.32	3.45
SSE	4 .21	35 1.82	87 4.54	33 1.72	3 .16	0 0.00	162 8.45	4.11
S	3 .16	24 1.25	89 4.64	70 3.65	28 1.46	6 .31	220 11.47	5.21
SSW	2 .10	19 .99	82 4.28	75 3.91	25 1.30	7 .36	210 10.95	5.29
SW	2 .10	16 .83	34 1.77	23 1.20	2 .10	3 .16	80 4.17	4.56
WSW	6 .31	11 .57	16 .83	16 .83	4 .21	1 .05	54 2.82	4.39
W	8 .42	21 1.09	24 1.25	7 .36	5 .26	4 .21	69 3.60	3.94
WNW	7 .36	21 1.09	32 1.67	30 1.56	10 .52	0 0.00	100 5.21	4.45
NW	4 .21	47 2.45	44 2.29	58 3.02	19 .99	17 .89	189 9.85	5.41
NNW	6 .31	31 1.62	56 2.92	73 3.81	63 3.28	12 .63	241 12.57	6.00
N	2 .10	25 1.30	59 3.08	33 1.72	39 2.03	19 99	177 9.23	5.91
CALM	0 0.00						0 0.00	CALM
TOTAL	60 3.13	391 20.39	692 36.08	483 25.18	214 11.16	78 4.07	1918 100.00	4.90

NUMBER OF VALID OBSERVATIONS 1918 85.93 PCT.
NUMBER OF INVALID OBSERVATIONS 314 14.07 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-32

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	0	0	2	0	0	3	3.83
	1.45	0.00	0.00	2.90	0.00	0.00	4.35	
	.05	0.00	0.00	.10	0.00	0.00	.16	
NE	2	0	1	3	1	0	7	4.57
	2.90	0.00	1.45	4.35	1.45	0.00	10.14	
	.10	0.00	.05	.16	.05	0.00	.36	
ENE	0	1	0	2	0	0	3	4.80
	0.00	1.45	0.00	2.90	0.00	0.00	4.35	
	0.00	.05	0.00	.10	0.00	0.00	.16	
E	0	0	0	1	0	0	1	6.20
	0.00	0.00	0.00	1.45	0.00	0.00	1.45	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
ESE	0	0	0	1	0	0	1	7.10
	0.00	0.00	0.00	1.45	0.00	0.00	1.45	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
SE	1	2	2	1	0	0	6	3.28
	1.45	2.90	2.90	1.45	0.00	0.00	8.70	
	.05	.10	.10	.05	0.00	0.00	.31	
SSE	0	1	1	3	1	0	6	5.93
	0.00	1.45	1.45	4.35	1.45	0.00	8.70	
	0.00	.05	.05	.16	.05	0.00	.31	
S	0	0	0	0	3	3	6	10.13
	0.00	0.00	0.00	0.00	4.35	4.35	8.70	
	0.00	0.00	0.00	0.00	.16	.16	.31	
SSW	0	0	0	0	0	1	1	11.50
	0.00	0.00	0.00	0.00	0.00	1.45	1.45	
	0.00	0.00	0.00	0.00	0.00	.05	.05	
SW	0	0	0	0	1	0	1	9.50
	0.00	0.00	0.00	0.00	1.45	0.00	1.45	
	0.00	0.00	0.00	0.00	.05	0.00	.05	
WSW	1	1	0	0	1	0	3	4.33
	1.45	1.45	0.00	0.00	1.45	0.00	4.35	
	.05	.05	0.00	0.00	.05	0.00	.16	
W	0	1	0	0	0	0	1	1.90
	0.00	1.45	0.00	0.00	0.00	0.00	1.45	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
WNW	0	0	0	0	2	0	2	8.10
	0.00	0.00	0.00	0.00	2.90	0.00	2.90	
	0.00	0.00	0.00	0.00	.10	0.00	.10	
NW	0	1	1	1	2	1	6	6.95
	0.00	1.45	1.45	1.45	2.90	1.45	8.70	
	0.00	.05	.05	.05	.10	.05	.31	
NNW	0	0	1	4	4	2	11	8.22
	0.00	0.00	1.45	5.80	5.80	2.90	15.94	
	0.00	0.00	.05	.21	.21	.10	.57	
N	1	1	0	1	2	5	10	8.79
	1.45	1.45	0.00	1.45	2.90	7.25	14.49	
	.05	.05	0.00	.05	.10	.26	.52	
CALM	1						1	CALM
	1.45						1.45	
	.05						.05	
TOTAL	7	8	6	19	17	12	69	6.66
	10.14	11.59	8.70	27.54	24.64	17.39	100.00	
	.36	41	.31	.98	.88	.62	3.58	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	0	5	2	1	9	7.18
	0.00	1.01	0.00	5.05	2.02	1.01	9.09	
	0.00	.05	0.00	.26	.10	.05	.47	
NE	0	1	3	0	0	0	4	3.42
	0.00	1.01	3.03	0.00	0.00	0.00	4.04	
	0.00	.05	.16	0.00	0.00	0.00	.21	
ENE	0	4	13	9	0	0	26	4.52
	0.00	4.04	13.13	9.09	0.00	0.00	26.26	
	0.00	.21	.67	.47	0.00	0.00	1.35	
E	0	0	1	1	0	0	2	5.25
	0.00	0.00	1.01	1.01	0.00	0.00	2.02	
	0.00	0.00	.05	.05	0.00	0.00	.10	
ESE	0	0	0	3	0	0	3	6.13
	0.00	0.00	0.00	3.03	0.00	0.00	3.03	
	0.00	0.00	0.00	.16	0.00	0.00	.16	
SE	0	2	2	1	0	0	5	4.00
	0.00	2.02	2.02	1.01	0.00	0.00	5.05	
	0.00	.10	.10	.05	0.00	0.00	.26	
SSE	0	0	0	1	0	0	1	5.40
	0.00	0.00	0.00	1.01	0.00	0.00	1.01	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
S	0	0	1	0	1	0	2	6.00
	0.00	0.00	1.01	0.00	1.01	0.00	2.02	
	0.00	0.00	.05	0.00	.05	0.00	.10	
SSW	1	0	0	0	0	0	1	1.40
	1.01	0.00	0.00	0.00	0.00	0.00	1.01	
	.05	0.00	0.00	0.00	0.00	0.00	.05	
SW	0	0	1	2	3	0	6	7.03
	0.00	0.00	1.01	2.02	3.03	0.00	6.06	
	0.00	0.00	.05	.10	.16	0.00	.31	
WSW	0	1	0	0	0	0	1	1.90
	0.00	1.01	0.00	0.00	0.00	0.00	1.01	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
W	0	0	1	3	0	0	4	5.97
	0.00	0.00	1.01	3.03	0.00	0.00	4.04	
	0.00	0.00	.05	.16	0.00	0.00	.21	
WNW	0	0	1	3	1	0	5	5.80
	0.00	0.00	1.01	3.03	1.01	0.00	5.05	
	0.00	0.00	.05	.16	.05	0.00	.26	
NW	0	0	2	4	0	2	8	8.01
	0.00	0.00	2.02	4.04	0.00	2.02	8.08	
	0.00	0.00	.10	.21	0.00	.10	.41	
NNW	0	0	1	4	6	3	14	8.41
	0.00	0.00	1.01	4.04	6.06	3.03	14.14	
	0.00	0.00	.05	.21	.31	.16	.73	
N	0	3	1	1	1	2	8	5.97
	0.00	3.03	1.01	1.01	1.01	2.02	8.08	
	0.00	.16	.05	.05	.05	.10	.41	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	1	12	27	37	14	8	99	5.96
	1.01	12.12	27.27	37.37	14.14	8.08	100.00	
	.05	.62	1.40	1.92	.73	.41	5.13	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	1 .73 .05	5 3.65 .26	4 2.92 .21	4 2.92 .21	14 10.22 .73	8.11
NE	0 0.00 0.00	2 1.46 .10	5 3.65 .26	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 5.11 .36	3.69
ENE	0 0.00 0.00	1 .73 .05	1 .73 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	2.75
E	0 0.00 0.00	0 0.00 0.00	1 .73 .05	2 1.46 .10	0 0.00 0.00	0 0.00 0.00	3 2.19 .16	5.43
ESE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	5.60
SE	0 0.00 0.00	1 .73 .05	0 0.00 0.00	0 0.00 0.00	1 .73 .05	0 0.00 0.00	2 1.46 .10	5.60
SSE	1 .73 .05	0 0.00 0.00	1 .73 .05	0 0.00 0.00	2 1.46 .10	0 0.00 0.00	4 2.92 .21	5.67
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.19 .16	0 0.00 0.00	1 .73 .05	4 2.92 .21	7.50
SSW	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	6 4.38 .31	5 3.65 .26	4 2.92 .21	17 12.41 .88	8.43
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.19 .16	1 .73 .05	0 0.00 0.00	4 2.92 .21	6.45
WSW	1 .73 .05	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	0 0.00 0.00	0 0.00 0.00	3 2.19 .16	4.80
W	0 0.00 0.00	6 4.38 .31	2 1.46 .10	1 .73 .05	1 .73 .05	0 0.00 0.00	10 7.30 .52	3.61
WNW	0 0.00 0.00	2 1.46 .10	3 2.19 .16	1 .73 .05	1 .73 .05	2 1.46 .10	9 6.57 .47	6.29
NW	0 0.00 0.00	1 .73 .05	1 .73 .05	6 4.38 .31	8 5.84 .41	5 3.65 .26	21 15.33 1.09	8.83
NNW	0 0.00 0.00	0 0.00 0.00	2 1.46 .10	1 .73 .05	3 2.19 .16	2 1.46 .10	8 5.84 .41	7.94
N	0 0.00 0.00	0 0.00 0.00	1 .73 .05	13 9.49 .67	6 4.38 .31	6 4.38 .31	26 18.98 1.35	7.92
CALM	1 .73 .05						1 .73 .05	CALM
TOTAL	3 2.19 .16	13 9.49 .67	20 14.60 1.04	45 32.85 2.33	32 23.36 1.66	24 17.52 1.24	137 100.00 7.10	7.06

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	4 .54 .21	15 2.04 .78	39 5.30 2.02	28 3.80 1.45	17 2.31 .88	103 13.99 5.34	7.36
NE	1 .14 .05	6 .82 .31	11 1.49 .57	9 1.22 .47	5 .68 .26	0 0.00 0.00	32 4.35 1.66	5.10
ENE	0 0.00 0.00	13 1.77 .67	9 1.22 .47	14 1.90 .73	5 .68 .26	0 0.00 0.00	41 5.57 2.12	4.83
E	0 0.00 0.00	4 .54 .21	11 1.49 .57	12 1.63 .62	8 1.09 .41	0 0.00 0.00	35 4.76 1.81	5.48
ESE	2 .27 .10	2 .27 .10	9 1.22 .47	4 .54 .21	1 .14 .05	0 0.00 0.00	18 2.45 .93	4.32
SE	0 0.00 0.00	0 0.00 0.00	4 .54 .21	2 .27 .10	5 .68 .26	0 0.00 0.00	11 1.49 .57	6.50
SSE	1 .14 .05	1 .14 .05	5 .68 .26	7 .95 .36	10 1.36 .52	3 .41 .16	27 3.67 1.40	7.12
S	0 0.00 0.00	2 .27 .10	5 .68 .26	15 2.04 .78	13 1.77 .67	28 3.80 1.45	63 8.56 3.26	9.22
SSW	0 0.00 0.00	3 .41 .16	12 1.63 .62	15 2.04 .78	14 1.90 .73	15 2.04 .78	59 8.02 3.06	7.82
SW	2 .27 .10	7 .95 .36	6 .82 .31	10 1.36 .52	3 .41 .16	3 .41 .16	31 4.21 1.61	5.37
WSW	1 .14 .05	7 .95 .36	4 .54 .21	9 1.22 .47	2 .27 .10	0 0.00 0.00	23 3.12 1.19	4.63
W	0 0.00 0.00	4 .54 .21	13 1.77 .67	21 2.85 1.09	7 .95 .36	0 0.00 0.00	45 6.11 2.33	5.58
WNW	0 0.00 0.00	3 .41 .16	6 .82 .31	13 1.77 .67	8 1.09 .41	22 2.99 1.14	52 7.07 2.69	8.29
NW	0 0.00 0.00	1 .14 .05	11 1.49 .57	11 1.49 .57	20 2.72 1.04	13 1.77 .67	56 7.61 2.90	8.04
NNW	0 0.00 0.00	2 .27 .10	7 .95 .36	14 1.90 .73	10 1.36 .52	13 1.77 .67	46 6.25 2.38	8.25
N	0 0.00 0.00	3 .41 .16	13 1.77 .67	27 3.67 1.40	35 4.76 1.81	16 2.17 .83	94 12.77 4.87	7.67
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	7 .95 .36	62 8.42 3.21	141 19.16 7.31	222 30.16 11.50	174 23.64 9.02	130 17.66 6.74	736 100.00 38.13	7.07

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	2	7	10	1	2	22	5.83
	0.00	.42	1.48	2.11	.21	.42	4.64	
	0.00	.10	.36	.52	.05	.10	1.14	
NE	0	2	2	10	2	0	16	5.78
	0.00	.42	.42	2.11	.42	0.00	3.38	
	0.00	.10	.10	.52	.10	0.00	.83	
ENE	0	0	5	5	2	0	12	5.56
	0.00	0.00	1.05	1.05	.42	0.00	2.53	
	0.00	0.00	.26	.26	.10	0.00	.62	
E	0	0	0	16	7	1	24	7.25
	0.00	0.00	0.00	3.38	1.48	.21	5.06	
	0.00	0.00	0.00	.83	.36	.05	1.24	
ESE	0	0	4	7	9	3	23	7.57
	0.00	0.00	.84	1.48	1.90	.63	4.85	
	0.00	0.00	.21	.36	.47	.16	1.19	
SE	0	1	1	5	7	1	15	7.28
	0.00	.21	.21	1.05	1.48	.21	3.16	
	0.00	.05	.05	.26	.36	.05	.78	
SSE	0	1	2	2	13	19	37	9.68
	0.00	.21	.42	.42	2.74	4.01	7.81	
	0.00	.05	.10	.10	.67	.98	1.92	
S	0	5	6	14	22	25	72	8.72
	0.00	1.05	1.27	2.95	4.64	5.27	15.19	
	0.00	.26	.31	.73	1.14	1.30	3.73	
SSW	0	2	10	23	26	24	85	8.68
	0.00	.42	2.11	4.85	5.49	5.06	17.93	
	0.00	.10	.52	1.19	1.35	1.24	4.40	
SW	0	1	3	11	3	1	19	6.36
	0.00	.21	.63	2.32	.63	.21	4.01	
	0.00	.05	.16	.57	.16	.05	.98	
WSW	0	2	2	5	4	0	13	6.27
	0.00	.42	.42	1.05	.84	0.00	2.74	
	0.00	.10	.10	.26	.21	0.00	.67	
W	0	1	9	6	4	3	23	6.18
	0.00	.21	1.90	1.27	.84	.63	4.85	
	0.00	.05	.47	.31	.21	.16	1.19	
WNW	0	1	5	8	14	0	28	6.98
	0.00	.21	1.05	1.69	2.95	0.00	5.91	
	0.00	.05	.26	.41	.73	0.00	1.45	
NW	0	0	8	16	17	1	42	6.93
	0.00	0.00	1.69	3.38	3.59	.21	8.86	
	0.00	0.00	.41	.83	.88	.05	2.18	
NNW	0	1	2	10	6	1	20	6.95
	0.00	.21	.42	2.11	1.27	.21	4 22	
	0.00	.05	.10	.52	.31	.05	1.04	
N	0	1	6	6	7	3	23	6.93
	0.00	.21	1.27	1.27	1.48	.63	4.85	
	0.00	.05	.31	.31	.36	.16	1.19	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	20	72	154	144	84	474	7.59
	0.00	4.22	15.19	32.49	30.38	17.72	100.00	
	0.00	1.04	3.73	7.98	7.46	4.35	24.56	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	2	7	1	0	10	6.42
	0.00	0.00	.74	2.58	.37	0.00	3.69	
	0.00	0.00	.10	.36	.05	0.00	.52	
NE	2	1	3	0	0	0	6	2.65
	.74	.37	1.11	0.00	0.00	0.00	2.21	
	.10	.05	.16	0.00	0.00	0.00	.31	
ENE	1	1	0	5	2	0	9	5.22
	.37	.37	0.00	1.85	.74	0.00	3.32	
	.05	.05	0.00	.26	.10	0.00	.47	
E	0	0	1	4	0	0	5	6.08
	0.00	0.00	.37	1.48	0.00	0.00	1.85	
	0.00	0.00	.05	.21	0.00	0.00	.26	
ESE	0	2	0	6	5	1	14	7.14
	0.00	.74	0.00	2.21	1.85	.37	5.17	
	0.00	.10	0.00	.31	.26	.05	.73	
SE	0	0	1	4	0	1	6	6.13
	0.00	0.00	.37	1.48	0.00	.37	2.21	
	0.00	0.00	.05	.21	0.00	.05	.31	
SSE	0	1	2	1	7	0	11	6.90
	0.00	.37	.74	.37	2.58	0.00	4.06	
	0.00	.05	.10	.05	.36	0.00	.57	
S	0	0	3	7	8	1	19	7.18
	0.00	0.00	1.11	2.58	2.95	.37	7.01	
	0.00	0.00	.16	.36	.41	.05	.98	
SSW	0	1	3	18	17	3	42	7.27
	0.00	.37	1.11	6.64	6.27	1.11	15.50	
	0.00	.05	.16	.93	.88	.16	2.18	
SW	0	1	2	15	14	0	32	7.09
	0.00	.37	.74	5.54	5.17	0.00	11.81	
	0.00	.05	.10	.78	.73	0.00	1.66	
WSW	0	4	7	14	4	0	29	5.41
	0.00	1.48	2.58	5.17	1.48	0.00	10.70	
	0.00	.21	.36	.73	.21	0.00	1.50	
W	0	0	6	8	4	1	19	6.26
	0.00	0.00	2.21	2.95	1.48	.37	7.01	
	0.00	0.00	.31	.41	.21	.05	.98	
WNW	0	0	3	12	4	0	19	6.70
	0.00	0.00	1.11	4.43	1.48	0.00	7.01	
	0.00	0.00	.16	.62	.21	0.00	.98	
NW	0	0	4	11	5	0	20	6.54
	0.00	0.00	1.48	4.06	1.85	0.00	7.38	
	0.00	0.00	.21	.57	.26	0.00	1.04	
NNW	0	0	0	11	5	1	17	7.14
	0.00	0.00	0.00	4.06	1.85	.37	6.27	
	0.00	0.00	0.00	.57	.26	.05	.88	
N	0	0	3	5	3	2	13	6.72
	0.00	0.00	1.11	1.85	1.11	.74	4.80	
	0.00	0.00	.16	.26	.16	.10	.67	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	11	40	128	79	10	271	6.57
	1.11	4.06	14.76	47.23	29.15	3.69	100.00	
	.16	.57	2.07	6.63	4.09	.52	14.04	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 1.39 .10	0 0.00 0.00	2 1.39 .10	1 .69 .05	0 0.00 0.00	5 3.47 .26	5.72
NE	0 0.00 0.00	1 .69 .05	1 .69 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	2.60
ENE	0 0.00 0.00	1 .69 .05	2 1.39 .10	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	5 3.47 .26	4.12
E	0 0.00 0.00	1 .69 .05	2 1.39 .10	5 3.47 .26	1 .69 .05	0 0.00 0.00	9 6.25 .47	5.53
ESE	0 0.00 0.00	4 2.78 .21	5 3.47 .26	1 .69 .05	0 0.00 0.00	0 0.00 0.00	10 6.94 .52	3.87
SE	1 .69 .05	1 .69 .05	3 2.08 .16	3 2.08 .16	2 1.39 .10	0 0.00 0.00	10 6.94 .52	5.02
SSE	2 1.39 .10	0 0.00 0.00	8 5.56 .41	4 2.78 .21	3 2.08 .16	2 1.39 .10	19 13.19 .98	5.77
S	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	11 7.64 .57	0 0.00 0.00	0 0.00 0.00	13 9.03 .67	5.86
SSW	1 .69 .05	0 0.00 0.00	3 2.08 .16	8 5.56 .41	12 8.33 .62	0 0.00 0.00	24 16.67 1.24	7.17
SW	0 0.00 0.00	1 .69 .05	2 1.39 .10	4 2.78 .21	3 2.08 .16	0 0.00 0.00	10 6.94 .52	6.00
WSW	0 0.00 0.00	1 .69 .05	3 2.08 .16	5 3.47 .26	0 0.00 0.00	0 0.00 0.00	9 6.25 .47	5.38
W	0 0.00 0.00	0 0.00 0.00	3 2.08 .16	3 2.08 .16	0 0.00 0.00	0 0.00 0.00	6 4.17 .31	4.97
WNW	0 0.00 0.00	1 .69 .05	4 2.78 .21	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	7 4.86 .36	4.56
NW	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	2 1.39 .10	3 2.08 .16	0 0.00 0.00	7 4.86 .36	6.40
NNW	1 .69 .05	0 0.00 0.00	0 0.00 0.00	3 2.08 .16	2 1.39 .10	0 0.00 0.00	6 4.17 .31	6.03
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	0 0.00 0.00	0 0.00 0.00	2 1.39 .10	6.15
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	5 3.47 .26	13 9.03 .67	40 27.78 2.07	57 39.58 2.95	27 18.75 1.40	2 1.39 .10	144 100.00 7.46	5.66

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JANUARY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.02.03.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.C	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .05	9 .47	25 1.30	70 3.63	37 1.92	24 1.24	166 8.60	7.04
NE	5 .26	13 .67	26 1.35	22 1.14	8 .41	0 0.00	74 3.83	4.71
ENE	1 .05	21 1.09	30 1.55	37 1.92	9 .47	0 0.00	98 5.08	4.79
E	0 0.00	5 .26	16 .83	41 2.12	16 .83	1 .05	79 4.09	6.07
ESE	2 .10	8 .41	18 .93	24 1.24	15 .78	4 .21	71 3.68	6.02
SE	2 .10	7 .36	13 .67	16 .83	15 .78	2 .10	55 2.85	5.79
SSE	4 .21	4 .21	19 .98	18 .93	36 1.87	24 1.24	105 5.44	7.62
S	0 0.00	7 .36	17 .88	50 2.59	47 2.44	58 3.01	179 9.27	8.51
SSW	2 .10	6 .31	30 1.55	70 3.63	74 3.83	47 2.44	229 11.87	8.01
SW	2 .10	10 .52	14 .73	45 2.33	28 1.45	4 .21	103 5.34	6.33
WSW	3 .16	16 .83	16 .83	35 1.81	11 .57	0 0.00	81 4.20	5.22
W	0 0.00	12 .62	34 1.76	42 2.18	16 .83	4 .21	108 5.60	5.59
WNW	0 0.00	7 .36	22 1.14	39 2.02	30 1.55	24 1.24	122 6.32	7.27
NW	0 0.00	3 .16	29 1.50	51 2.64	55 2.85	22 1.14	160 8.29	7.55
NNW	1 .05	3 .16	13 .67	47 2.44	36 1.87	22 1.14	122 6.32	7.77
N	1 .05	8 .41	24 1.24	55 2.85	54 2.80	34 1.76	176 9.12	7.51
CALM	2 .10						2 .10	CALM
TOTAL	26 1.35	139 7.20	346 17.93	662 34.30	487 25.23	270 13.99	1930 100.00	6.95

NUMBER OF VALID OBSERVATIONS 1930 86.47 PCT.
NUMBER OF INVALID OBSERVATIONS 302 13.53 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 1.05 .06	1 1.05 .06	4 4.21 .25	3 3.16 .19	4 4.21 .25	13 13.68 .80	8.15
NE	0 0.00 0.00	2 2.11 .12	1 1.05 .06	0 0.00 0.00	1 1.05 .06	1 1.05 .06	5 5.26 .31	5.60
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	1 1.05 .06	1 1.05 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.11 .12	2.95
ESE	1 1.05 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	1.40
SE	0 0.00 0.00	1 1.05 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	2.00
SSE	0 0.00 0.00	1 1.05 .06	1 1.05 .06	3 3.16 .19	0 0.00 0.00	0 0.00 0.00	5 5.26 .31	5.08
S	0 0.00 0.00	1 1.05 .06	2 2.11 .12	2 2.11 .12	0 0.00 0.00	0 0.00 0.00	5 5.26 .31	4.72
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	5 5.26 .31	6 6.32 .37	11.68
SW	0 0.00 0.00	6 6.32 .37	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	0 0.00 0.00	7 7.37 .43	3.01
WSW	0 0.00 0.00	2 2.11 .12	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	2 2.11 .12	5 5.26 .31	7.24
W	1 1.05 .06	0 0.00 0.00	1 1.05 .06	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	3 3.16 .19	4.80
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.11 .12	0 0.00 0.00	0 0.00 0.00	2 2.11 .12	7.20
NW	0 0.00 0.00	0 0.00 0.00	1 1.05 .06	4 4.21 .25	1 1.05 .06	0 0.00 0.00	6 6.32 .37	6.25
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 3.16 .19	8 8.42 .50	11 11.58 .68	22 23.16 1.36	9.90
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 5.26 .31	2 2.11 .12	5 5.26 .31	12 12.63 .74	9.35
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 2.11 .12	15 15.79 .93	8 8.42 .50	23 24.21 1.42	18 18.95 1.11	29 30.53 1.79	95 100.00 5.88	7.53

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	2 2.17 .12	0 0.00 0.00	4 4.35 .25	5 5.43 .31	11 11.96 .68	9.70
NE	0 0.00 0.00	1 1.09 .06	2 2.17 .12	0 0.00 0.00	1 1.09 .06	0 0.00 0.00	4 4.35 .25	4.85
ENE	0 0.00 0.00	0 0.00 0.00	1 1.09 .06	1 1.09 .06	0 0.00 0.00	0 0.00 0.00	2 2.17 .12	4.35
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.09 .06	0 0.00 0.00	0 0.00 0.00	1 1.09 .06	6.70
SE	0 0.00 0.00	1 1.09 .06	1 1.09 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.17 .12	3.60
SSE	1 1.09 .06	0 0.00 0.00	1 1.09 .06	1 1.09 .06	0 0.00 0.00	0 0.00 0.00	3 3.26 .19	4.10
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.09 .06	4 4.35 .25	0 0.00 0.00	5 5.43 .31	8.98
SSW	0 0.00 0.00	0 0.00 0.00	2 2.17 .12	0 0.00 0.00	3 3.26 .19	1 1.09 .06	6 6.52 .37	7.70
SW	0 0.00 0.00	0 0.00 0.00	4 4.35 .25	2 2.17 .12	4 4.35 .25	1 1.09 .06	11 11.96 .68	7.17
WSW	0 0.00 0.00	1 1.09 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.09 .06	2 2.17 .12	6.85
W	1 1.09 .06	1 1.09 .06	5 5.43 .31	2 2.17 .12	0 0.00 0.00	0 0.00 0.00	9 9.78 .56	4.19
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.17 .12	0 0.00 0.00	0 0.00 0.00	2 2.17 .12	6.40
NW	0 0.00 0.00	1 1.09 .06	1 1.09 .06	3 3.26 .19	1 1.09 .06	0 0.00 0.00	6 6.52 .37	5.62
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.09 .06	7 7.61 .43	1 1.09 .06	9 9.78 .56	8.91
N	0 0.00 0.00	0 0.00 0.00	3 3.26 .19	3 3.26 .19	8 8.70 .50	5 5.43 .31	19 20.65 1.18	8.62
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 2.17 .12	5 5.43 .31	22 23 91 1.36	17 18.48 1.05	32 34.78 1.98	14 15.22 .87	92 100.00 5.69	7.31

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	1 .92 .06	1 .92 .06	2 1.83 .12	1 .92 .06	5 4.59 .31	8.44
NE	0 0.00 0.00	0 0.00 0.00	2 1.83 .12	0 0.00 0.00	2 1.83 .12	0 0.00 0.00	4 3.67 .25	6.62
ENE	0 0.00 0.00	0 0.00 0.00	1 .92 .06	0 0.00 0.00	1 .92 .06	1 .92 .06	3 2.75 .19	7.83
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	1 .92 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .92 .06	3.30
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.83 .12	0 0.00 0.00	0 0.00 0.00	2 1.83 .12	5.95
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .92 .06	0 0.00 0.00	0 0.00 0.00	1 .92 .06	5.50
S	0 0.00 0.00	0 0.00 0.00	4 3.67 .25	4 3.67 .25	4 3.67 .25	0 0.00 0.00	12 11.01 .74	6.71
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.83 .12	4 3.67 .25	2 1.83 .12	8 7.34 .50	9.02
SW	0 0.00 0.00	0 0.00 0.00	5 4.59 .31	0 0.00 0.00	2 1.83 .12	2 1.83 .12	9 8.26 .56	7.34
WSW	0 0.00 0.00	1 .92 .06	3 2.75 .19	1 .92 .06	1 .92 .06	0 0.00 0.00	6 5.50 .37	4.83
W	0 0.00 0.00	2 1.83 .12	2 1.83 .12	5 4.59 .31	0 0.00 0.00	0 0.00 0.00	9 8.26 .56	4.49
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .92 .06	1 .92 .06	10.30
NW	0 0.00 0.00	2 1.83 .12	0 0.00 0.00	6 5.50 .37	2 1.83 .12	0 0.00 0.00	10 9.17 .62	6.15
NNW	0 0.00 0.00	0 0.00 0.00	1 .92 .06	7 6.42 .43	5 4.59 .31	5 4.59 .31	18 16.51 1.11	8.45
N	0 0.00 0.00	0 0.00 0.00	7 6.42 .43	4 3.67 .25	5 4.59 .31	4 3.67 .25	20 18.35 1.24	7.42
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	5 4.59 .31	27 24.77 1.67	33 30.28 2.04	28 25.69 1.73	16 14.68 .99	109 100.00 6.75	7.10

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	6 .89 .37	10 1.48 .62	20 2.96 1.24	5 .74 .31	7 1.04 .43	48 7.11 2.97	6.54
NE	0 0.00 0.00	9 1.33 .56	19 2.81 1.18	18 2.67 1.11	11 1.63 .68	7 1.04 .43	64 9.48 3.96	5.90
ENE	0 0.00 0.00	3 .44 .19	10 1.48 .62	13 1.93 .80	10 1.48 .62	3 .44 .19	39 5.78 2.41	6.49
E	0 0.00 0.00	2 .30 .12	7 1.04 .43	13 1.93 .80	3 .44 .19	0 0.00 0.00	25 3.70 1.55	5.62
ESE	0 0.00 0.00	0 0.00 0.00	8 1.19 .50	18 2.67 1.11	4 .59 .25	0 0.00 0.00	30 4.44 1.86	5.81
SE	0 0.00 0.00	5 .74 .31	8 1.19 .50	11 1.63 .68	0 0.00 0.00	0 0.00 0.00	24 3.56 1.49	4.68
SSE	0 0.00 0.00	2 .30 .12	5 .74 .31	7 1.04 .43	5 .74 .31	0 0.00 0.00	19 2.81 1.18	5.90
S	1 .15 .06	0 0.00 0.00	8 1.19 .50	23 3.41 1.42	22 3.26 1.36	7 1.04 .43	61 9.04 3.77	7.37
SSW	0 0.00 0.00	1 .15 .06	2 .30 .12	4 .59 .25	12 1.78 .74	7 1.04 .43	26 3.85 1.61	8.70
SW	0 0.00 0.00	0 0.00 0.00	2 .30 .12	6 .89 .37	2 .30 .12	5 .74 .31	15 2.22 .93	8.41
WSW	1 .15 .06	1 .15 .06	2 .30 .12	4 .59 .25	1 .15 .06	7 1.04 .43	16 2.37 .99	7.90
W	2 .30 .12	0 0.00 0.00	6 .89 .37	2 .30 .12	1 .15 .06	3 .44 .19	14 2.07 .87	5.94
WNW	0 0.00 0.00	7 1.04 .43	4 .59 25	3 .44 .19	6 .89 .37	1 .15 .06	21 3.11 1.30	5.32
NW	0 0.00 0.00	2 .30 .12	8 1.19 50	1 .15 .06	11 1.63 .68	18 2.67 1.11	40 5.93 2.48	9.47
NNW	0 0.00 0.00	6 .89 .37	12 1.78 74	19 2.81 1.18	13 1.93 .80	42 6.22 2.60	92 13.63 5.69	9.31
N	0 0.00 0.00	3 .44 .19	19 2.81 1.18	41 6.07 2.54	26 3.85 1.61	52 7.70 3.22	141 20.89 8.73	8.91
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 .59 .25	47 6.96 2.91	130 19.26 8.04	203 30.07 12.56	132 19.56 8.17	159 23.56 9.84	675 100.00 41.77	7.55

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	4	9	0	1	15	5.60
	0.00	.33	1.32	2.96	0.00	.33	4.93	
	0.00	.06	.25	.56	0.00	.06	.93	
NE	1	5	2	2	1	0	11	3.90
	.33	1.64	.66	.66	.33	0.00	3.62	
	.06	.31	.12	.12	.06	0.00	.68	
ENE	0	1	5	5	0	0	11	4.55
	0.00	.33	1.64	1.64	0.00	0.00	3.62	
	0.00	.06	.31	.31	0.00	0.00	.68	
E	0	0	0	11	4	0	15	6.55
	0.00	0.00	0.00	3.62	1.32	0.00	4.93	
	0.00	0.00	0.00	.68	.25	0.00	.93	
ESE	0	0	2	4	3	0	9	6.61
	0.00	0.00	.66	1.32	.99	0.00	2.96	
	0.00	0.00	.12	.25	.19	0.00	.56	
SE	0	0	2	2	0	0	4	5.20
	0.00	0.00	.66	.66	0.00	0.00	1.32	
	0.00	0.00	.12	.12	0.00	0.00	.25	
SSE	0	1	4	13	8	2	28	6.91
	0.00	.33	1.32	4.28	2.63	.66	9.21	
	0.00	.06	.25	.80	.50	.12	1.73	
S	1	1	3	10	28	13	56	8.35
	.33	.33	.99	3.29	9.21	4.28	18.42	
	.06	.06	.19	.62	1.73	.80	3.47	
SSW	0	1	3	6	5	1	16	6.49
	0.00	.33	.99	1.97	1.64	.33	5.26	
	0.00	.06	.19	.37	.31	.06	.99	
SW	0	1	5	8	7	0	21	6.35
	0.00	.33	1.64	2.63	2.30	0.00	6.91	
	0.00	.06	.31	.50	.43	0.00	1.30	
WSW	0	0	2	10	4	0	16	6.51
	0.00	0.00	.66	3.29	1.32	0.00	5.26	
	0.00	0.00	.12	.62	.25	0.00	.99	
W	0	1	2	2	6	0	11	7.00
	0.00	.33	.66	.66	1.97	0.00	3.62	
	0.00	.06	.12	.12	.37	0.00	.68	
WNW	0	3	6	4	3	0	16	5.01
	0.00	.99	1.97	1.32	.99	0.00	5.26	
	0.00	.19	.37	.25	.19	0.00	.99	
NW	1	0	6	4	2	1	14	5.58
	.33	0.00	1.97	1.32	.66	.33	4.61	
	.06	0.00	.37	.25	.12	.06	.87	
NNW	0	0	7	7	7	2	23	6.99
	0.00	0.00	2.30	2.30	2.30	.66	7.57	
	0.00	0.00	.43	.43	.43	.12	1.42	
N	1	0	4	18	3	11	37	7.86
	.33	0.00	1.32	5.92	.99	3.62	12.17	
	.06	0.00	.25	1.11	.19	.68	2.29	
CALM	1						1	CALM
	.33						.33	
	.06						.06	
TOTAL	5	15	57	115	81	31	304	6.73
	1.64	4.93	18.75	37.83	26.64	10.20	100.00	
	.31	.93	3.53	7.12	5.01	1.92	18.81	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	9	1	0	0	10	4.47
	0.00	0.00	4.15	.46	0.00	0.00	4.61	
	0.00	0.00	.56	.06	0.00	0.00	.62	
NE	0	1	1	1	0	0	3	3.83
	0.00	.46	.46	.46	0.00	0.00	1.38	
	0.00	.06	.06	.06	0.00	0.00	.19	
ENE	0	1	0	1	0	0	2	4.70
	0.00	.46	0.00	.46	0.00	0.00	.92	
	0.00	.06	0.00	.06	0.00	0.00	.12	
E	1	0	3	5	7	0	16	6.75
	.46	0.00	1.38	2.30	3.23	0.00	7.37	
	.06	0.00	.19	.31	.43	0.00	.99	
ESE	0	1	0	1	1	0	3	5.87
	0.00	.46	0.00	.46	.46	0.00	1.38	
	0.00	.06	0.00	.06	.06	0.00	.19	
SE	1	1	5	3	1	2	13	5.47
	.46	.46	2.30	1.38	.46	.92	5.99	
	.06	.06	.31	.19	.06	.12	.80	
SSE	1	0	0	1	5	3	10	8.54
	.45	0.00	0.00	.46	2.30	1.38	4.61	
	.05	0.00	0.00	.06	.31	.19	.62	
S	0	1	2	2	8	6	19	8.22
	0.00	.46	.92	.92	3.69	2.76	8.76	
	0.00	.06	.12	.12	.50	.37	1.18	
SSW	0	1	2	17	12	3	35	7.34
	0.00	.46	.92	7.83	5.53	1.38	16.13	
	0.00	.06	.12	1.05	.74	.19	2.17	
SW	0	1	4	14	11	0	30	6.78
	0.00	.46	1.84	6.45	5.07	0.00	13.82	
	0.00	.06	.25	.87	.68	0.00	1.86	
WSW	1	0	1	11	1	0	14	5.98
	.46	0.00	.46	5.07	.46	0.00	6.45	
	.06	0.00	.06	.68	.06	0.00	.87	
W	0	1	2	13	1	0	17	6.09
	0.00	.46	.92	5.99	.46	0.00	7.83	
	0.00	.06	.12	.80	.06	0.00	1.05	
WNW	0	1	3	10	3	0	17	6.20
	0.00	.46	1.38	4.61	1.38	0.00	7.83	
	0.00	.06	.19	.62	.19	0.00	1.05	
NW	0	0	1	3	2	0	6	6.88
	0.00	0.00	.46	1.38	.92	0.00	2.76	
	0.00	0.00	.06	.19	.12	0.00	.37	
NNW	0	0	2	2	3	0	7	6.59
	0.00	0.00	.92	.92	1.38	0.00	3.23	
	0.00	0.00	.12	.12	.19	0.00	.43	
N	0	1	5	4	3	1	14	6.45
	0.00	.46	2.30	1.84	1.38	.46	6.45	
	0.00	.06	.31	.25	.19	.06	.87	
CALM	1						1	CALM
	.46						.46	
	.06						.06	
TOTAL	5	10	40	89	58	15	217	6.61
	2.30	4.61	18.43	41.01	26.73	6.91	100.00	
	.31	.62	2.48	5.51	3.59	.93	13.43	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	1 .81 .06	2 1.61 .12	0 0.00 0.00	0 0.00 0.00	3 2.42 .19	5.83
NE	0 0.00 0.00	1 .81 .06	0 0.00 0.00	2 1.61 .12	0 0.00 0.00	0 0.00 0.00	3 2.42 .19	4.77
ENE	0 0.00 0.00	0 0.00 0.00	1 .81 .06	1 .81 .06	0 0.00 0.00	0 0.00 0.00	2 1.61 .12	4.75
E	0 0.00 0.00	0 0.00 0.00	1 .81 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .81 .06	4.50
ESE	0 0.00 0.00	1 .81 .06	0 0.00 0.00	2 1.61 .12	0 0.00 0.00	0 0.00 0.00	3 2.42 .19	5.87
SE	1 .81 .06	0 0.00 0.00	1 .81 .06	0 0.00 0.00	3 2.42 .19	2 1.61 .12	7 5.65 .43	7.97
SSE	0 0.00 0.00	0 0.00 0.00	3 2.42 .19	1 .81 .06	1 .81 .06	2 1.61 .12	7 5.65 .43	6.80
S	0 0.00 0.00	1 .81 .06	1 .81 .06	5 4.03 .31	5 4.03 .31	3 2.42 .19	15 12.10 .93	7.85
SSW	0 0.00 0.00	0 0.00 0.00	4 3.23 .25	4 3.23 .25	3 2.42 .19	1 .81 .06	12 9.68 .74	6.51
SW	0 0.00 0.00	2 1.61 .12	3 2.42 .19	2 1.61 .12	4 3.23 .25	2 1.61 .12	13 10.48 .80	6.95
WSW	0 0.00 0.00	0 0.00 0.00	3 2.42 .19	3 2.42 .19	3 2.42 .19	0 0.00 0.00	9 7.26 .56	6.14
W	0 0.00 0.00	0 0.00 0.00	6 4.84 .37	6 4.84 .37	0 0.00 0.00	0 0.00 0.00	12 9.68 .74	5.29
WNW	0 0.00 0.00	1 .81 .06	4 3.23 .25	4 3.23 .25	4 3.23 .25	0 0.00 0.00	13 10.48 .80	5.78
NW	0 0.00 0.00	0 0.00 0.00	3 2.42 .19	5 4.03 .31	4 3.23 .25	0 0.00 0.00	12 9.68 .74	6.25
NNW	0 0.00 0.00	1 .81 .06	3 2.42 .19	3 2.42 .19	1 .81 .06	0 0.00 0.00	8 6.45 .50	5.47
N	1 .81 .06	0 0.00 0.00	1 .81 .06	2 1.61 .12	0 0.00 0.00	0 0.00 0.00	4 3.23 .25	4.27
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.61 .12	7 5.65 .43	35 28.23 2.17	42 33.87 2.60	28 22.58 1.73	10 8.06 .62	124 100.00 7.67	6.31

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL FEBRUARY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.33.48.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	8 .50	28 1.73	37 2.29	14 .87	18 1.11	105 6.50	6.81
NE	1 .06	19 1.18	27 1.67	23 1.42	16 .99	8 .50	94 5.82	5.53
ENE	0 0.00	5 .31	18 1.11	21 1.30	11 .68	4 .25	59 3.65	6.00
E	1 .06	3 .19	12 .74	29 1.79	14 .87	0 0.00	59 3.65	6.05
ESE	1 .06	2 .12	11 .68	26 1.61	8 .50	0 0.00	48 2.97	5.84
SE	2 .12	8 .50	17 1.05	18 1.11	4 .25	4 .25	53 3.28	5.31
SSE	2 .12	4 .25	14 .87	27 1.67	19 1.18	7 .43	73 4.52	6.60
S	2 .12	4 .25	20 1.24	47 2.91	71 4.39	29 1.79	173 10.71	7.75
SSW	0 0.00	3 .19	13 .80	33 2.04	40 2.48	20 1.24	109 6.75	7.83
SW	0 0.00	10 .62	23 1.42	32 1.98	31 1.92	10 .62	106 6.56	6.79
WSW	2 .12	5 .31	11 .68	29 1.79	11 .68	10 .62	68 4.21	6.60
W	4 .25	5 .31	24 1.49	30 1.86	8 .50	4 .25	75 4.64	5.60
WNW	0 0.00	12 .74	17 1.05	25 1.55	16 .99	2 .12	72 4.46	5.69
NW	1 .06	5 .31	20 1.24	26 1.61	23 1.42	19 1.18	94 5.82	7.51
NNW	0 0.00	7 .43	25 1.55	42 2.60	44 2.72	61 3.77	179 11.08	8.70
N	2 .12	4 .25	39 2.41	77 4.76	47 2.91	78 4.83	247 15.28	8.42
CALM	2 .12						2 .12	CALM
TOTAL	20 1.24	104 6.44	319 19.74	522 32.30	377 23.33	274 16.96	1616 100.00	7.13

NUMBER OF VALID OBSERVATIONS 1616 79.22 PCT
NUMBER OF INVALID OBSERVATIONS 424 20.78 PCT
TOTAL NUMBER OF OBSERVATIONS 2040 100.00 PCT

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	1	0	11	0	0	12	5.60
	0.00	.46	0.00	5.09	0.00	0.00	5.56	
	0.00	.06	0.00	.68	0.00	0.00	.74	
NE	0	0	3	0	0	0	3	3.70
	0.00	0.00	1.39	0.00	0.00	0.00	1.39	
	0.00	0.00	.19	0.00	0.00	0.00	.19	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	0	0	0	1	0	1	9.30
	0.00	0.00	0.00	0.00	.46	0.00	.46	
	0.00	0.00	0.00	0.00	.06	0.00	.06	
ESE	0	1	0	0	0	0	1	1.70
	0.00	.46	0.00	0.00	0.00	0.00	.46	
	0.00	.06	0.00	0.00	0.00	0.00	.06	
SE	0	0	1	6	1	2	10	7.42
	0.00	0.00	.46	2.78	.46	.93	4.63	
	0.00	0.00	.06	.37	.06	.12	.62	
SSE	0	1	0	8	10	6	25	8.91
	0.00	.46	0.00	3.70	4.63	2.78	11.57	
	0.00	.06	0.00	.50	.62	.37	1.55	
S	0	0	0	9	10	6	25	8.51
	0.00	0.00	0.00	4.17	4.63	2.78	11.57	
	0.00	0.00	0.00	.56	.62	.37	1.55	
SSW	1	0	3	7	6	17	34	9.44
	.46	0.00	1.39	3.24	2.78	7.87	15.74	
	.06	0.00	.19	.43	.37	1.05	2.11	
SW	1	1	2	0	2	4	10	7.73
	.46	.46	.93	0.00	.93	1.85	4.63	
	.06	.06	.12	0.00	.12	.25	.62	
WSW	0	1	2	0	1	3	7	9.20
	0.00	.46	.93	0.00	.46	1.39	3.24	
	0.00	.06	.12	0.00	.06	.19	.43	
W	0	1	1	4	2	1	9	7.42
	0.00	.46	.46	1.85	.93	.46	4.17	
	0.00	.06	.06	.25	.12	.06	.56	
WNW	0	0	1	1	2	8	12	13.97
	0.00	0.00	.46	.46	.93	3.70	5.56	
	0.00	0.00	.06	.06	.12	.50	.74	
NW	1	0	6	4	6	10	27	9.22
	.46	0.00	2.78	1.85	2.78	4.63	12.50	
	.06	0.00	.37	.25	.37	.62	1.67	
NNW	0	0	0	3	9	9	21	9.53
	0.00	0.00	0.00	1.39	4.17	4.17	9.72	
	0.00	0.00	0.00	.19	.56	.56	1.30	
N	0	0	1	7	5	6	19	8.41
	0.00	0.00	.46	3.24	2.31	2.78	8.80	
	0.00	0.00	.06	.43	.31	.37	1.18	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	6	20	60	55	72	216	8.82
	1.39	2.78	9.26	27.78	25.46	33.33	100.00	
	.19	.37	1.24	3.72	3.41	4.46	13.37	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1	2	2	4	0	0	9	4.42
	1.04	2.08	2.08	4.17	0.00	0.00	9.37	
	.06	.12	.12	.25	0.00	0.00	.56	
NE	2	2	2	0	0	0	6	2.37
	2.08	2.08	2.08	0.00	0.00	0.00	6.25	
	.12	.12	.12	0.00	0.00	0.00	.37	
ENE	0	4	0	1	0	0	5	3.36
	0.00	4.17	0.00	1.04	0.00	0.00	5.21	
	0.00	.25	0.00	.06	0.00	0.00	.31	
E	0	1	0	0	0	0	1	1.60
	0.00	1.04	0.00	0.00	0.00	0.00	1.04	
	0.00	.06	0.00	0.00	0.00	0.00	.06	
ESE	0	0	0	0	0	4	4	12.77
	0.00	0.00	0.00	0.00	0.00	4.17	4.17	
	0.00	0.00	0.00	0.00	0.00	.25	.25	
SE	0	0	4	0	0	0	4	4.60
	0.00	0.00	4.17	0.00	0.00	0.00	4.17	
	0.00	0.00	.25	0.00	0.00	0.00	.25	
SSE	0	0	2	2	1	0	5	6.12
	0.00	0.00	2.08	2.08	1.04	0.00	5.21	
	0.00	0.00	.12	.12	.06	0.00	.31	
S	0	0	0	0	0	3	3	13.87
	0.00	0.00	0.00	0.00	0.00	3.12	3.12	
	0.00	0.00	0.00	0.00	0.00	.19	.19	
SSW	0	0	6	1	5	4	16	7.63
	0.00	0.00	6.25	1.04	5.21	4.17	16.67	
	0.00	0.00	.37	.06	.31	.25	.99	
SW	0	0	1	2	1	2	6	7.12
	0.00	0.00	1.04	2.08	1.04	2.08	6.25	
	0.00	0.00	.06	.12	.06	.12	.37	
WSW	0	0	1	1	2	2	6	8.25
	0.00	0.00	1.04	1.04	2.08	2.08	6.25	
	0.00	0.00	.06	.06	.12	.12	.37	
W	0	0	0	0	0	2	2	12.35
	0.00	0.00	0.00	0.00	0.00	2.08	2.08	
	0.00	0.00	0.00	0.00	0.00	.12	.12	
WNW	0	0	1	0	0	0	1	4.50
	0.00	0.00	1.04	0.00	0.00	0.00	1.04	
	0.00	0.00	.06	0.00	0.00	0.00	.06	
NW	0	1	2	1	1	2	7	8.69
	0.00	1.04	2.08	1.04	1.04	2.08	7.29	
	0.00	.06	.12	.06	.06	.12	.43	
NNW	0	0	0	3	4	3	10	9.17
	0.00	0.00	0.00	3.12	4.17	3.12	10.42	
	0.00	0.00	0.00	.19	.25	.19	.62	
N	1	0	0	5	2	3	11	7.39
	1.04	0.00	0.00	5.21	2.08	3.12	11.46	
	.06	0.00	0.00	.31	.12	.19	.68	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	4	10	21	20	16	25	96	7.20
	4.17	10.42	21.87	20.83	16.67	26.04	100.00	
	.25	.62	1.30	1.24	.99	1.55	5.94	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1	0	1	5	2	5	14	8.53
	.93	0.00	.93	4.63	1.85	4.63	12.96	
	.06	0.00	.06	.31	.12	.31	.87	
NE	1	3	1	0	0	0	5	2.60
	.93	2.78	.93	0.00	0.00	0.00	4.63	
	.06	.19	.06	0.00	0.00	0.00	.31	
ENE	1	1	2	0	0	0	4	2.80
	.93	.93	1.85	0.00	0.00	0.00	3.70	
	.06	.06	.12	0.00	0.00	0.00	.25	
E	0	0	0	0	0	1	1	14.80
	0.00	0.00	0.00	0.00	0.00	.93	.93	
	0.00	0.00	0.00	0.00	0.00	.06	.06	
ESE	0	2	1	0	0	1	4	5.22
	0.00	1.85	.93	0.00	0.00	.93	3.70	
	0.00	.12	.06	0.00	0.00	.06	.25	
SE	0	1	2	1	0	0	4	3.67
	0.00	.93	1.85	.93	0.00	0.00	3.70	
	0.00	.06	.12	.06	0.00	0.00	.25	
SSE	0	0	1	3	2	1	7	7.63
	0.00	0.00	.93	2.78	1.85	.93	6.48	
	0.00	0.00	.06	.19	.12	.06	.43	
S	0	0	1	3	3	3	10	8.34
	0.00	0.00	.93	2.78	2.78	2.78	9.26	
	0.00	0.00	.06	.19	.19	.19	.62	
SSW	0	0	1	3	2	3	9	8.47
	0.00	0.00	.93	2.78	1.85	2.78	8.33	
	0.00	0.00	.06	.19	.12	.19	.56	
SW	0	2	1	2	0	0	5	4.12
	0.00	1.85	.93	1.85	0.00	0.00	4.63	
	0.00	.12	.06	.12	0.00	0.00	.31	
WSW	0	1	0	1	0	0	2	4.30
	0.00	.93	0.00	.93	0.00	0.00	1.85	
	0.00	.06	0.00	.06	0.00	0.00	.12	
W	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WNW	0	0	0	1	1	1	3	10.27
	0.00	0.00	0.00	.93	.93	.93	2.78	
	0.00	0.00	0.00	.06	.06	.06	.19	
NW	0	0	1	1	1	3	6	9.55
	0.00	0.00	.93	.93	.93	2.78	5.56	
	0.00	0.00	.06	.06	.06	.19	.37	
NNW	0	0	1	3	9	3	16	8.67
	0.00	0.00	.93	2.78	8.33	2.78	14.81	
	0.00	0.00	.06	.19	.56	.19	.99	
N	1	0	3	8	1	5	18	7.31
	.93	0.00	2.78	7.41	.93	4.63	16.67	
	.06	0.00	.19	.50	.06	.31	1.11	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	4	10	16	31	21	26	108	7.36
	3.70	9.26	14.81	28.70	19.44	24.07	100.00	
	.25	.62	.99	1.92	1.30	1.61	6.69	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	1	7	27	25	20	80	8.18
	0.00	.16	1.15	4.44	4.11	3.29	13.16	
	0.00	.06	.43	1.67	1.55	1.24	4.95	
NE	0	1	9	4	6	1	21	6.25
	0.00	.16	1.48	.66	.99	.16	3.45	
	0.00	.06	.56	.25	.37	.06	1.30	
ENE	0	3	16	4	3	5	31	5.86
	0.00	.49	2.63	.66	.49	.82	5.10	
	0.00	.19	.99	.25	.19	.31	1.92	
E	2	6	10	5	7	8	38	6.59
	.33	.99	1.64	.82	1.15	1.32	6.25	
	.12	.37	.62	.31	.43	.50	2.35	
ESE	0	4	6	19	3	12	44	7.46
	0.00	.66	.99	3.12	.49	1.97	7.24	
	0.00	.25	.37	1.18	.19	.74	2.72	
SE	1	3	3	17	7	10	41	7.73
	.16	.49	.49	2.80	1.15	1.64	6.74	
	.06	.19	.19	1.05	.43	.62	2.54	
SSE	0	2	4	6	2	3	17	6.86
	0.00	.33	.66	.99	.33	.49	2.80	
	0.00	.12	.25	.37	.12	.19	1.05	
S	0	1	8	14	20	28	71	9.28
	0.00	.16	1.32	2.30	3.29	4.61	11.68	
	0.00	.06	.50	.87	1.24	1.73	4.40	
SSW	1	3	8	8	11	12	43	7.90
	.16	.49	1.32	1.32	1.81	1.97	7.07	
	.06	.19	.50	.50	.68	.74	2.66	
SW	0	2	1	2	3	8	16	9.49
	0.00	.33	.16	.33	.49	1.32	2.63	
	0.00	.12	.06	.12	.19	.50	.99	
WSW	1	4	3	3	4	0	15	5.12
	.16	.66	.49	.49	.66	0.00	2.47	
	.06	.25	.19	.19	.25	0.00	.93	
W	3	2	3	1	3	5	17	7.56
	.49	.33	.49	.16	.49	.82	2.80	
	.19	.12	.19	.06	.19	.31	1.05	
WNW	0	0	1	2	4	9	16	11.57
	0.00	0.00	.16	.33	.66	1.48	2.63	
	0.00	0.00	.06	.12	.25	.56	.99	
NW	0	1	3	7	12	16	39	8.91
	0.00	.16	.49	1.15	1.97	2.63	6.41	
	0.00	.06	.19	.43	.74	.99	2.41	
NNW	0	1	2	14	24	26	67	9.69
	0.00	.16	.33	2.30	3.95	4.28	11.02	
	0.00	.06	.12	.87	1.49	1.61	4.15	
N	1	0	6	16	16	13	52	8.08
	.16	0.00	.99	2.63	2.63	2.14	8.55	
	.06	0.00	.37	.99	.99	.80	3.22	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	9	34	90	149	150	176	608	8.12
	1.48	5.59	14.80	24.51	24.67	28.95	100.00	
	.56	2.11	5.57	9.23	9.29	10.90	37.65	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	2	4	4	1	11	6.87
	0.00	0.00	.57	1.14	1.14	.29	3.14	
	0.00	0.00	.12	.25	.25	.06	.68	
NE	0	1	4	0	0	0	5	3.26
	0.00	.29	1.14	0.00	0.00	0.00	1.43	
	0.00	.06	.25	0.00	0.00	0.00	.31	
ENE	0	2	0	0	1	0	3	4.50
	0.00	.57	0.00	0.00	.29	0.00	.86	
	0.00	.12	0.00	0.00	.06	0.00	.19	
E	0	2	5	6	3	2	18	6.32
	0.00	.57	1.43	1.71	.86	.57	5.14	
	0.00	.12	.31	.37	.19	.12	1.11	
ESE	0	4	4	4	1	2	15	5.27
	0.00	1.14	1.14	1.14	.29	.57	4.29	
	0.00	.25	.25	.25	.06	.12	.93	
SE	1	5	4	10	10	3	33	6.70
	.29	1.43	1.14	2.86	2.86	.86	9.43	
	.06	.31	.25	.62	.62	.19	2.04	
SSE	0	3	13	8	6	5	35	6.48
	0.00	.86	3.71	2.29	1.71	1.43	10.00	
	0.00	.19	.80	.50	.37	.31	2.17	
S	0	0	2	11	32	41	86	10.00
	0.00	0.00	.57	3.14	9.14	11.71	24.57	
	0.00	0.00	.12	.68	1.98	2.54	5.33	
SSW	0	0	2	5	9	31	47	10.84
	0.00	0.00	.57	1.43	2.57	8.86	13.43	
	0.00	0.00	.12	.31	.56	1.92	2.91	
SW	0	0	2	2	6	1	11	7.78
	0.00	0.00	.57	.57	1.71	.29	3.14	
	0.00	0.00	.12	.12	.37	.06	.68	
WSW	0	0	3	5	2	0	10	5.69
	0.00	0.00	.86	1.43	.57	0.00	2.86	
	0.00	0.00	.19	.31	.12	0.00	.62	
W	1	1	1	1	2	0	6	5.18
	.29	.29	.29	.29	.57	0.00	1.71	
	.06	.06	.06	.06	.12	0.00	.37	
WNW	0	1	0	6	0	0	7	5.80
	0.00	.29	0.00	1.71	0.00	0.00	2.00	
	0.00	.06	0.00	.37	0.00	0.00	.43	
NW	0	0	2	8	3	0	13	7.04
	0.00	0.00	.57	2.29	.86	0.00	3.71	
	0.00	0.00	.12	.50	.19	0.00	.80	
NNW	0	1	4	4	7	1	17	7.05
	0.00	.29	1.14	1.14	2.00	.29	4.86	
	0.00	.06	.25	.25	.43	.06	1.05	
N	0	0	3	14	15	1	33	7.25
	0.00	0.00	.86	4.00	4.29	.29	9.43	
	0.00	0.00	.19	.87	.93	.06	2.04	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	20	51	88	101	88	350	7.94
	.57	5.71	14.57	25.14	28.86	25.14	100.00	
	.12	1.24	3.16	5.45	6.25	5.45	21.67	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	2	1	2	1	0	6	4.53
	0.00	1.42	.71	1.42	.71	0.00	4.26	
	0.00	.12	.06	.12	.06	0.00	.37	
NE	0	1	1	1	0	0	3	4.13
	0.00	.71	.71	.71	0.00	0.00	2.13	
	0.00	.06	.06	.06	0.00	0.00	.19	
ENE	0	0	1	1	1	0	3	6.13
	0.00	0.00	.71	.71	.71	0.00	2.13	
	0.00	0.00	.06	.06	.06	0.00	.19	
E	0	0	1	2	0	0	3	6.43
	0.00	0.00	.71	1.42	0.00	0.00	2.13	
	0.00	0.00	.06	.12	0.00	0.00	.19	
ESE	0	0	0	1	0	2	3	9.60
	0.00	0.00	0.00	.71	0.00	1.42	2.13	
	0.00	0.00	0.00	.06	0.00	.12	.19	
SE	0	0	0	5	8	0	13	7.89
	0.00	0.00	0.00	3.55	5.67	0.00	9.22	
	0.00	0.00	0.00	.31	.50	0.00	.80	
SSE	0	0	3	5	11	2	21	7.51
	0.00	0.00	2.13	3.55	7.80	1.42	14.89	
	0.00	0.00	.19	.31	.68	.12	1.30	
S	0	1	1	13	15	2	32	7.48
	0.00	.71	.71	9.22	10.64	1.42	22.70	
	0.00	.06	.06	.80	.93	.12	1.98	
SSW	0	0	3	5	8	0	16	6.92
	0.00	0.00	2.13	3.55	5.67	0.00	11.35	
	0.00	0.00	.19	.31	.50	0.00	.99	
SW	0	2	1	2	2	0	7	5.43
	0.00	1.42	.71	1.42	1.42	0.00	4.96	
	0.00	.12	.06	.12	.12	0.00	.43	
WSW	0	1	2	1	0	0	4	4.12
	0.00	.71	1.42	.71	0.00	0.00	2.84	
	0.00	.06	.12	.06	0.00	0.00	.25	
W	0	0	2	0	0	0	2	4.75
	0.00	0.00	1.42	0.00	0.00	0.00	1.42	
	0.00	0.00	.12	0.00	0.00	0.00	.12	
WNW	0	1	0	2	6	0	9	7.69
	0.00	.71	0.00	1.42	4.26	0.00	6.38	
	0.00	.06	0.00	.12	.37	0.00	.56	
NW	0	0	1	1	1	1	4	7.95
	0.00	0.00	.71	.71	.71	.71	2.84	
	0.00	0.00	.06	.06	.06	.06	.25	
NNW	0	0	0	5	0	0	5	6.38
	0.00	0.00	0.00	3.55	0.00	0.00	3.55	
	0.00	0.00	0.00	.31	0.00	0.00	.31	
N	0	0	1	2	6	1	10	7.67
	0.00	0.00	.71	1.42	4.26	.71	7.09	
	0.00	0.00	.06	.12	.37	.06	.62	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	8	18	48	59	8	141	7.02
	0.00	5.67	12.77	34.04	41.84	5.67	100.00	
	0.00	.50	1.11	2.97	3.65	.50	8.73	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 1.04 .06	0 0.00 0.00	2 2.08 .12	0 0.00 0.00	0 0.00 0.00	3 3.12 .19	4.87
NE	1 1.04 .06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .06	1.50
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.08 .12	1 1.04 .06	0 0.00 0.00	3 3.12 .19	7.13
SSE	1 1.04 .06	1 1.04 .06	0 0.00 0.00	2 2.08 .12	7 7.29 .43	0 0.00 0.00	11 11.46 .68	7.08
S	0 0.00 0.00	0 0.00 0.00	1 1.04 .06	8 8.33 .50	12 12.50 .74	0 0.00 0.00	21 21.87 1.30	7.51
SSW	0 0.00 0.00	0 0.00 0.00	2 2.08 .12	5 5.21 .31	4 4.17 .25	0 0.00 0.00	11 11.46 .68	6.63
SW	0 0.00 0.00	0 0.00 0.00	3 3.12 .19	8 8.33 .50	1 1.04 .06	0 0.00 0.00	12 12.50 .74	5.98
WSW	0 0.00 0.00	1 1.04 .06	2 2.08 .12	2 2.08 .12	0 0.00 0.00	0 0.00 0.00	5 5.21 .31	4.44
W	2 2.08 .12	2 2.08 .12	1 1.04 .06	0 0.00 0.00	1 1.04 .06	0 0.00 0.00	6 6.25 .37	3.25
WNW	0 0.00 0.00	0 0.00 0.00	1 1.04 .06	3 3.12 .19	3 3.12 .19	0 0.00 0.00	7 7.29 .43	7.26
NW	0 0.00 0.00	0 0.00 0.00	1 1.04 .06	0 0.00 0.00	2 2.08 .12	0 0.00 0.00	3 3.12 .19	7.07
NNW	0 0.00 0.00	0 0.00 0.00	1 1.04 .06	4 4.17 .25	1 1.04 .06	0 0.00 0.00	6 6.25 .37	6.13
N	0 0.00 0.00	1 1.04 .06	2 2.08 .12	0 0.00 0.00	4 4.17 .25	0 0.00 0.00	7 7.29 .43	6.53
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 4.17 .25	6 6.25 .37	14 14.58 .87	36 37.50 2.23	36 37.50 2.23	0 0.00 0.00	96 100.00 5.94	6.40

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MARCH COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/10/81. 15.47.44.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .12	7 .43	13 .80	55 3.41	32 1.98	26 1.61	135 8.36	7.39
NE	4 .25	8 .50	20 1.24	5 .31	6 .37	1 .06	44 2.72	4.54
ENE	1 .06	10 .62	19 1.18	6 .37	5 .31	5 .31	46 2.85	5.25
E	2 .12	9 .56	16 .99	13 .80	11 .68	11 .68	62 3.84	6.60
ESE	0 0.00	11 .68	11 .68	24 1.49	4 .25	21 1.30	71 4.40	7.18
SE	2 .12	9 .56	14 .87	41 2.54	27 1.67	15 .93	108 6.69	7.12
SSE	1 .06	7 .43	23 1.42	34 2.11	39 2.41	17 1.05	121 7.49	7.32
S	0 0.00	2 .12	13 .80	58 3.59	92 5.70	83 5.14	248 15.36	9.09
SSW	2 .12	3 .19	25 1.55	34 2.11	45 2.79	67 4.15	176 10.90	8.82
SW	1 .06	7 .43	11 .68	18 1.11	15 .93	15 .93	67 4.15	7.28
WSW	1 .06	8 .50	13 .80	13 .80	9 .56	5 .31	49 3.03	6.02
W	6 .37	6 .37	8 .50	6 .37	8 .50	8 .50	42 2.60	6.67
WNW	0 0.00	2 .12	4 .25	15 .93	16 .99	18 1.11	55 3.41	9.98
NW	1 .06	2 .12	16 .99	22 1.36	26 1.61	32 1.98	99 6.13	8.68
NNW	0 0.00	2 .12	8 .50	36 2.23	54 3.34	42 2.60	142 8.79	8.93
N	3 .19	1 .06	16 .99	52 3.22	49 3.03	29 1.80	150 9.29	7.70
CALM	0 0.00						0 0.00	CALM
TOTAL	26 1.61	94 5.82	230 14.24	432 26.75	438 27.12	395 24.46	1615 100.00	7.87

NUMBER OF VALID OBSERVATIONS 1615 72.36 PCT.
NUMBER OF INVALID OBSERVATIONS 617 27.64 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	1 .31 .05	6 1.87 .29	5 1.56 .24	2 .62 .10	0 0.00 0.00	14 4.36 .68	5.15
NE	0 0.00 0.00	2 .62 .10	1 .31 .05	1 .31 .05	0 0.00 0.00	0 0.00 0.00	4 1.25 .19	4.02
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	0 0.00 0.00	1 .31 .05	0 0.00 0.00	3 .93 .15	0 0.00 0.00	4 1.25 .19	7.20
ESE	0 0.00 0.00	0 0.00 0.00	1 .31 .05	6 1.87 .29	2 .62 .10	0 0.00 0.00	9 2.80 .44	7.02
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 .93 .15	8 2.49 .39	2 .62 .10	13 4.05 .63	8.37
SSE	0 0.00 0.00	0 0.00 0.00	4 1.25 .19	0 0.00 0.00	9 2.80 .44	16 4.98 .78	29 9.03 1.41	10.17
S	0 0.00 0.00	0 0.00 0.00	4 1.25 .19	8 2.49 .39	13 4.05 .63	35 10.90 1.70	60 18.69 2.92	10.85
SSW	0 0.00 0.00	0 0.00 0.00	4 1.25 .19	8 2.49 .39	13 4.05 .63	15 4.67 .73	40 12.46 1.94	9.14
SW	0 0.00 0.00	2 .62 .10	3 .93 .15	1 .31 .05	3 .93 .15	16 4.98 .78	25 7.79 1.22	10.65
WSW	0 0.00 0.00	1 .31 .05	0 0.00 0.00	3 .93 .15	1 .31 .05	7 2.18 .34	12 3.74 .58	9.07
W	0 0.00 0.00	1 .31 .05	7 2.18 .34	5 1.56 .24	5 1.56 .24	0 0.00 0.00	18 5.61 .88	5.84
WNW	1 .31 .05	0 0.00 0.00	5 1.56 .24	2 .62 .10	4 1.25 .19	3 .93 .15	15 4.67 .73	6.90
NW	0 0.00 0.00	0 0.00 0.00	3 .93 .15	3 .93 .15	9 2.80 .44	19 5.92 .92	34 10.59 1.65	9.71
NNW	0 0.00 0.00	0 0.00 0.00	2 .62 .10	7 2.18 .34	9 2.80 .44	2 .62 .10	20 6.23 .97	7.89
N	0 0.00 0.00	1 .31 .05	2 .62 .10	13 4.05 .63	8 2.49 .39	0 0.00 0.00	24 7.48 1.17	6.69
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .31 .05	8 2.49 .39	43 13.40 2.09	65 20.25 3.16	89 27.73 4.33	115 35.83 5.59	321 100.00 15.61	8.82

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	1 1.15 .05	2 2.30 .10	9.35
NE	0 0.00 0.00	2 2.30 .10	1 1.15 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 3.45 .15	2.90
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	4 4.60 .19	0 0.00 0.00	5 5.75 .24	7.98
E	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	2 2.30 .10	2 2.30 .10	0 0.00 0.00	5 5.75 .24	6.66
ESE	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	4.20
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 8.05 .34	0 0.00 0.00	7 8.05 .34	8.29
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	0 0.00 0.00	5 5.75 .24	6 6.90 .29	12.22
S	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	0 0.00 0.00	3 3.45 .15	9 10.34 .44	13 14.94 .63	11.61
SSW	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	1 1.15 .05	1 1.15 .05	1 1.15 .05	4 4.60 .19	7.20
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	1 1.15 .05	3 3.45 .15	5 5.75 .24	11.18
WSW	0 0.00 0.00	1 1.15 .05	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	0 0.00 0.00	2 2.30 .10	5.05
W	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	1 1.15 .05	2 2.30 .10	0 0.00 0.00	4 4.60 .19	7.35
WNW	0 0.00 0.00	1 1.15 .05	1 1.15 .05	0 0.00 0.00	3 3.45 .15	3 3.45 .15	8 9.20 .39	8.54
NW	0 0.00 0.00	1 1.15 .05	1 1.15 .05	0 0.00 0.00	7 8.05 .34	2 2.30 .10	11 12.64 .53	7.99
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	1 1.15 .05	3 3.45 .15	5 5.75 .24	9.22
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.15 .05	3 3.45 .15	2 2.30 .10	6 6.90 .29	8.97
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	5 5.75 .24	8 9.20 .39	9 10.34 .44	36 41.38 1.75	29 33.33 1.41	87 100.00 4.23	8.82

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10 37 57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2 1.96 .10	1 .98 .05	4 3.92 .19	8.20
NE	1 .98 .05	1 .98 .05	1 .98 .05	4 3.92 .19	1 .98 .05	0 0.00 0.00	8 7.84 .39	5.37
ENE	0 0.00 0.00	1 .98 .05	1 .98 .05	0 0.00 0.00	1 .98 .05	0 0.00 0.00	3 2.94 .15	4.60
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	3 2.94 .15	4.93
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	6 5.88 .29	1 .98 .05	8 7.84 .39	8.95
SSE	0 0.00 0.00	0 0.00 0.00	1 .98 .05	0 0.00 0.00	4 3.92 .19	4 3.92 .19	9 8.82 .44	10.12
S	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	2 1.96 .10	8 7.84 .39	12 11.76 .58	10.22
SSW	1 .98 .05	0 0.00 0.00	2 1.96 .10	3 2.94 .15	4 3.92 .19	2 1.96 .10	12 11.76 .58	7.52
SW	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	3 2.94 .15	5.53
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2 1.96 .10	3 2.94 .15	11.53
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.94 .15	5 4.90 .24	0 0.00 0.00	8 7.84 .39	7.99
WNW	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	1 .98 .05	1 .98 .05	4 3.92 .19	7.70
NW	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2 1.96 .10	4 3.92 .19	2 1.96 .10	9 8.82 .44	8.71
NNW	0 0.00 0.00	1 .98 .05	2 1.96 .10	3 2.94 .15	1 .98 .05	0 0.00 0.00	7 6.86 .34	5.37
N	0 0.00 0.00	1 .98 .05	1 .98 .05	0 0.00 0.00	4 3.92 .19	3 2.94 .15	9 8.82 .44	9.21
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.96 .10	4 3.92 .19	15 14.71 .73	21 20.59 1.02	36 35.29 1.75	24 23.53 1.17	102 100.00 4.96	8.09

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10 37 57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	7 1.07 .34	12 1.83 .58	13 1.98 .63	2 .30 .10	34 5.18 1.65	7.29
NE	0 0.00 0.00	3 .46 .15	12 1.83 .58	18 2.74 .88	3 .46 .15	0 0.00 0.00	36 5.48 1.75	5.45
ENE	0 0.00 0.00	0 0.00 0.00	4 .61 .19	12 1.83 .58	3 .46 .15	1 .15 .05	20 3.04 .97	6.29
E	1 .15 .05	0 0.00 0.00	6 .91 .29	11 1.67 .53	3 .46 .15	3 .46 .15	24 3.65 1.17	6.38
ESE	0 0.00 0.00	0 0.00 0.00	6 .91 .29	13 1.98 .63	13 1.98 .63	9 1.37 .44	41 6.24 1.99	8.19
SE	0 0.00 0.00	2 .30 10	9 1.37 .44	6 .91 .29	31 4.72 1.51	22 3.35 1.07	70 10.65 3.40	8.69
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 .76 .24	17 2.59 .83	34 5.18 1.65	56 8.52 2.72	11.58
S	0 0.00 0.00	1 .15 .05	2 .30 .10	12 1.83 .58	25 3.81 1.22	48 7.31 2.33	88 13.39 4.28	10.49
SSW	0 0.00 0.00	0 0.00 0.00	1 .15 05	9 1.37 .44	19 2.89 .92	22 3.35 1.07	51 7.76 2.48	9.84
SW	0 0.00 0.00	0 0 00 0.00	3 .46 .15	2 .30 .10	6 .91 .29	4 .61 .19	15 2.28 .73	8.64
WSW	0 0.00 0.00	1 .15 .05	3 46 .15	4 .61 .19	2 .30 .10	7 1.07 .34	17 2.59 .83	8.01
W	0 0.00 0.00	1 .15 .05	3 .46 .15	8 1.22 .39	3 .46 .15	7 1.07 .34	22 3.35 1.07	7.81
WNW	0 0.00 0.00	1 .15 .05	3 .46 .15	5 .76 .24	12 1.83 .58	8 1.22 .39	29 4.41 1.41	8.80
NW	0 0.00 0.00	0 0.00 0 00	6 .91 .29	10 1.52 .49	13 1.98 .63	21 3.20 1.02	50 7.61 2.43	9.13
NNW	0 0.00 0.00	0 0 00 0.00	5 .76 .24	11 1.67 .53	24 3.65 1.17	9 1.37 .44	49 7.46 2.38	8.30
N	0 0.00 0 00	1 .15 05	4 .61 .19	8 1.22 .39	12 1.83 .58	30 4.57 1 46	55 8.37 2.67	10.00
CALM	0 0 00 0.00						0 0 00 0 00	CALM
TOTAL	1 15 05	10 1 52 49	74 11.26 3 60	146 22.22 7 10	199 30.29 9.67	227 34.55 11.04	657 100 00 31 94	8.90

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL APRIL COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .20 .05	1 .20 .05	3 .60 .15	3 .60 .15	5 1.01 .24	13 2.62 .63	8.59
NE	0 0.00 0.00	2 .40 .10	11 2.22 .53	3 .60 .15	0 0.00 0.00	0 0.00 0.00	16 3.23 .78	4.39
ENE	0 0.00 0.00	0 0.00 0.00	3 .60 .15	9 1.81 .44	4 .81 .19	0 0.00 0.00	16 3.23 .78	6.71
E	0 0.00 0.00	0 0.00 0.00	1 .20 .05	10 2.02 .49	12 2.42 .58	4 .81 .19	27 5.44 1.31	8.11
ESE	0 0.00 0.00	1 .20 .05	3 .60 .15	13 2.62 .63	20 4.03 .97	8 1.61 .39	45 9.07 2.19	8.20
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .20 .05	19 3.83 .92	16 3.23 .78	36 7.26 1.75	10.03
SSE	0 0.00 0.00	1 .20 .05	1 .20 .05	11 2.22 .53	38 7.66 1.85	33 6.65 1.60	84 16.94 4.08	9.77
S	0 0.00 0.00	0 0.00 0.00	3 .60 .15	12 2.42 .58	45 9.07 2.19	40 8.06 1.94	100 20.16 4.86	9.78
SSW	0 0.00 0.00	0 0.00 0.00	1 .20 .05	7 1.41 .34	25 5.04 1.22	6 1.21 .29	39 7.86 1.90	8.57
SW	0 0.00 0.00	0 0.00 0.00	2 .40 .10	8 1.61 .39	13 2.62 .63	4 .81 .19	27 5.44 1.31	8.13
WSW	0 0.00 0.00	0 0.00 0.00	2 .40 .10	5 1.01 .24	4 .81 .19	1 .20 .05	12 2.42 .58	7.15
W	0 0.00 0.00	1 .20 .05	2 .40 .10	1 .20 .05	1 .20 .05	0 0.00 0.00	5 1.01 .24	4.82
WNW	0 0.00 0.00	0 0.00 0.00	1 .20 .05	2 .40 .10	4 .81 .19	0 0.00 0.00	7 1.41 .34	7.41
NW	0 0.00 0.00	2 .40 .10	3 .60 .15	7 1.41 .34	5 1.01 .24	0 0.00 0.00	17 3.43 .83	6.18
NNW	0 0.00 0.00	1 .20 .05	5 1.01 .24	8 1.61 .39	16 3.23 .78	1 .20 .05	31 6.25 1.51	7.27
N	0 0.00 0.00	1 .20 .05	1 .20 .05	8 1.61 .39	7 1.41 .34	4 .81 .19	21 4.23 1.02	7.61
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	10 2.02 .49	40 8.06 1.94	108 21.77 5.25	216 43.55 10.50	122 24.60 5.93	496 100.00 24.11	8.55

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	1 .42 .05	5 2.09 .24	5 2.09 .24	0 0.00 0.00	11 4.60 .53	7.23
NE	1 .42 .05	0 0.00 0.00	3 1.26 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.67 .19	3.42
ENE	0 0.00 0.00	0 0.00 0.00	2 .84 .10	2 .84 .10	2 .84 .10	1 .42 .05	7 2.93 .34	6.89
E	1 .42 .05	1 .42 .05	2 .84 .10	3 1.26 .15	7 2.93 .34	0 0.00 0.00	14 5.86 .68	6.25
ESE	0 0.00 0.00	2 .84 .10	4 1.67 .19	4 1.67 .19	3 1.26 .15	0 0.00 0.00	13 5.44 .63	5.45
SE	0 0.00 0.00	0 0.00 0.00	1 .42 .05	8 3.35 .39	16 6.69 .78	2 .84 .10	27 11.30 1.31	8.09
SSE	0 0.00 0.00	1 .42 .05	0 0.00 0.00	17 7.11 .83	27 11.30 1.31	9 3.77 .44	54 22.59 2.63	8.25
S	0 0.00 0.00	0 0.00 0.00	2 .84 .10	14 5.86 .68	13 5.44 .63	2 .84 .10	31 12.97 1.51	7.70
SSW	1 .42 .05	1 .42 .05	3 1.26 .15	4 1.67 .19	4 1.67 .19	0 0.00 0.00	13 5.44 .63	5.89
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 3.77 .44	5 2.09 .24	0 0.00 0.00	14 5.86 .68	7.24
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
W	0 0.00 0.00	0 0.00 0.00	2 .84 .10	9 3.77 .44	2 .84 .10	0 0.00 0.00	13 5.44 .63	5.97
WNW	1 .42 .05	0 0.00 0.00	0 0.00 0.00	1 .42 .05	5 2.09 .24	0 0.00 0.00	7 2.93 .34	6.83
NW	0 0.00 0.00	0 0.00 0.00	1 .42 .05	5 2.09 .24	3 1.26 .15	0 0.00 0.00	9 3.77 .44	6.91
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.26 .15	2 .84 .10	0 0.00 0.00	5 2.09 .24	6.68
N	0 0.00 0.00	0 0.00 0.00	2 .84 .10	8 3.35 .39	4 1.67 .19	3 1.26 .15	17 7.11 .83	7.51
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 1.67 .19	5 2.09 24	23 9.62 1.12	92 38.49 4.47	98 41.00 4.76	17 7.11 .83	239 100.00 11.62	7.23

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .65 .05	1 .65 .05	5 3.23 .24	3 1.94 .15	0 0.00 0.00	10 6.45 .49	6.42
NE	0 0.00 0.00	0 0.00 0.00	1 .65 .05	3 1.94 .15	0 0.00 0.00-	0 0.00 0.00	4 2.58 .19	5.75
ENE	0 0.00 0.00	0 0.00 0.00	1 .65 .05	1 .65 .05	0 0.00 0.00	0 0.00 0.00	2 1.29 .10	4.60
E	0 0.00 0.00	1 .65 .05	0 0.00 0.00	2 1.29 .10	8 5.16 .39	0 0.00 0.00	11 7.10 .53	7.39
ESE	0 0.00 0.00	0 0.00 0.00	1 .65 .05	8 5.16 .39	3 1.94 .15	0 0.00 0.00	12 7.74 .58	6.58
SE	0 0.00 0.00	0 0.00 0.00	1 .65 .05	8 5.16 .39	6 3.87 .29	0 0.00 0.00	15 9.68 .73	7.00
SSE	0 0.00 0.00	0 0.00 0.00	1 .65 .05	14 9.03 .68	7 4.52 .34	1 .65 .05	23 14.84 1.12	7.17
S	0 0.00 0.00	1 .65 .05	0 0.00 0.00	17 10.97 .83	10 6.45 .49	0 0.00 0.00	28 18.06 1.36	7.01
SSW	0 0.00 0.00	0 0.00 0.00	3 1.94 .15	8 5.16 .39	4 2.58 .19	0 0.00 0.00	15 9.68 .73	6.37
SW	0 0.00 0.00	0 0.00 0.00	2 1.29 .10	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	4 2.58 .19	4.85
WSW	0 0.00 0.00	1 .65 .05	1 .65 .05	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	4 2.58 .19	4.67
W	0 0.00 0.00	1 .65 .05	3 1.94 .15	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	6 3.87 .29	4.80
WNW	0 0.00 0.00	1 .65 .05	0 0.00 0.00	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	3 1.94 .15	3.93
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.29 .10	0 0.00 0.00	0 0.00 0.00	2 1.29 .10	6.30
NNW	0 0.00 0.00	0 0.00 0.00	1 .65 .05	2 1.29 .10	2 1.29 .10	0 0.00 0.00	5 3.23 .24	6.68
N	1 .65 .05	1 .65 .05	0 0.00 0.00	5 3.23 .24	4 2.58 .19	0 0.00 0.00	11 7.10 .53	6.72
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .65 .05	7 4.52 .34	16 10.32 .78	83 53.55 4.04	47 30.32 2.28	1 .65 .05	155 100.00 7.54	6.56

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL APRIL COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.37.57.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	3 .15	16 .78	31 1.51	29 1.41	9 .44	88 4.28	7.12
NE	2 .10	10 .49	30 1.46	29 1.41	4 .19	0 0.00	75 3.65	4.95
ENE	0 0.00	1 .05	11 .53	25 1.22	14 .68	2 .10	53 2.58	6.50
E	2 .10	2 .10	11 .53	28 1.36	35 1.70	7 .34	85 4.13	7.10
ESE	0 0.00	3 .15	17 .83	46 2.24	41 1.99	17 .83	124 6.03	7.56
SE	0 0.00	2 .10	11 .53	27 1.31	93 4.52	43 2.09	176 8.56	8.70
SSE	0 0.00	2 .10	7 .34	48 2.33	102 4.96	102 4.96	261 12.69	9.73
S	0 0.00	2 .10	14 .68	63 3.06	111 5.40	142 6.90	332 16.14	9.82
SSW	2 .10	1 .05	15 .73	40 1.94	70 3.40	46 2.24	174 8.46	8.58
SW	0 0.00	2 .10	11 .53	25 1.22	28 1.36	27 1.31	93 4.52	8.69
WSW	0 0.00	4 .19	6 .29	14 .68	9 .44	17 .83	50 2.43	7.89
W	0 0.00	4 .19	18 .88	29 1.41	18 .88	7 .34	76 3.69	6.59
WNW	2 .10	3 .15	12 .58	12 .58	29 1.41	15 .73	73 3.55	7.80
NW	0 0.00	3 .15	15 .73	29 1.41	41 1.99	44 2.14	132 6.42	8.58
NNW	0 0.00	2 .10	15 .73	35 1.70	55 2.67	15 .73	122 5.93	7.71
N	1 .05	5 .24	10 .49	43 2.09	42 2.04	42 2.04	143 6.95	8.45
CALM	0 0.00						0 0.00	CALM
TOTAL	9 .44	49 2.38	219 10.65	524 25.47	721 35.05	535 26.01	2057 100.00	8.39

NUMBER OF VALID OBSERVATIONS 2057 95.23 PCT.
NUMBER OF INVALID OBSERVATIONS 103 4.77 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	8	7	6	1	22	6.02
	0.00	0.00	2.09	1.83	1.57	.26	5.74	
	0.00	0.00	.37	.33	.28	.05	1.03	
NE	0	2	7	4	0	0	13	4.32
	0.00	.52	1.83	1.04	0.00	0.00	3.39	
	0.00	.09	.33	.19	0.00	0.00	.61	
ENE	0	0	5	3	1	0	9	5.06
	0.00	0.00	1.31	.78	.26	0.00	2.35	
	0.00	0.00	.23	.14	.05	0.00	.42	
E	0	2	5	4	2	0	13	5.05
	0.00	.52	1.31	1.04	.52	0.00	3.39	
	0.00	.09	.23	.19	.09	0.00	.61	
ESE	0	2	9	3	2	1	17	5.24
	0.00	.52	2.35	.78	.52	.26	4.44	
	0.00	.09	.42	.14	.09	.05	.79	
SE	0	1	4	16	3	3	27	6.61
	0.00	.26	1.04	4.18	.78	.78	7.05	
	0.00	.05	.19	.75	.14	.14	1.26	
SSE	0	2	9	3	9	5	28	6.95
	0.00	.52	2.35	.78	2.35	1.31	7.31	
	0.00	.09	.42	.14	.42	.23	1.31	
S	0	0	2	20	23	26	71	9.19
	0.00	0.00	.52	5.22	6.01	6.79	18.54	
	0.00	0.00	.09	.93	1.07	1.21	3.32	
SSW	0	1	4	7	26	39	77	10.27
	0.00	.26	1.04	1.83	6.79	10.18	20.10	
	0.00	.05	.19	.33	1.21	1.82	3.60	
SW	0	1	2	9	4	5	21	7.66
	0.00	.26	.52	2.35	1.04	1.31	5.48	
	0.00	.05	.09	.42	.19	.23	.98	
WSW	0	2	0	0	0	0	2	2.90
	0.00	.52	0.00	0.00	0.00	0.00	.52	
	0.00	.09	0.00	0.00	0.00	0.00	.09	
W	0	3	0	1	0	0	4	3.47
	0.00	.78	0.00	.26	0.00	0.00	1.04	
	0.00	.14	0.00	.05	0.00	0.00	.19	
WNW	0	2	0	0	0	0	2	2.65
	0.00	.52	0.00	0.00	0.00	0.00	.52	
	0.00	.09	0.00	0.00	0.00	0.00	.09	
NW	0	0	2	10	4	0	16	6.31
	0.00	0.00	.52	2.61	1.04	0.00	4.18	
	0.00	0.00	.09	.47	.19	0.00	.75	
NNW	0	3	7	17	2	0	29	5.70
	0.00	.78	1.83	4.44	.52	0.00	7.57	
	0.00	.14	.33	.79	.09	0.00	1.35	
N	0	1	7	16	6	2	32	6.55
	0.00	.26	1.83	4.18	1.57	.52	8.36	
	0.00	.05	.33	.75	.28	.09	1.49	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	22	71	120	88	82	383	7.49
	0.00	5.74	18.54	31.33	22.98	21.41	100.00	
	0.00	1.03	3.32	5.60	4.11	3.83	17.89	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	3	2	0	1	6	5.80
	0.00	0.00	3.26	2.17	0.00	1.09	6.52	
	0.00	0.00	.14	.09	0.00	.05	.28	
NE	0	1	1	1	0	0	3	4.43
	0.00	1.09	1.09	1.09	0.00	0.00	3.26	
	0.00	.05	.05	.05	0.00	0.00	.14	
ENE	0	0	2	0	1	0	3	5.60
	0.00	0.00	2.17	0.00	1.09	0.00	3.26	
	0.00	0.00	.09	0.00	.05	0.00	.14	
E	0	0	1	0	1	2	4	9.63
	0.00	0.00	1.09	0.00	1.09	2.17	4.35	
	0.00	0.00	.05	0.00	.05	.09	.19	
ESE	0	0	1	2	1	2	6	8.43
	0.00	0.00	1.09	2.17	1.09	2.17	6.52	
	0.00	0.00	.05	.09	.05	.09	.28	
SE	0	0	1	5	1	2	9	7.60
	0.00	0.00	1.09	5.43	1.09	2.17	9.78	
	0.00	0.00	.05	.23	.05	.09	.42	
SSE	0	0	2	0	0	2	4	7.72
	0.00	0.00	2.17	0.00	0.00	2.17	4.35	
	0.00	0.00	.09	0.00	0.00	.09	.19	
S	0	1	1	6	2	11	21	9.27
	0.00	1.09	1.09	6.52	2.17	11.96	22.83	
	0.00	.05	.05	.28	.09	.51	.98	
SSW	0	0	2	0	3	5	10	9.98
	0.00	0.00	2.17	0.00	3.26	5.43	10.87	
	0.00	0.00	.09	0.00	.14	.23	.47	
SW	0	0	0	1	2	1	4	9.20
	0.00	0.00	0.00	1.09	2.17	1.09	4.35	
	0.00	0.00	0.00	.05	.09	.05	.19	
WSW	0	0	0	0	0	1	1	10.30
	0.00	0.00	0.00	0.00	0.00	1.09	1.09	
	0.00	0.00	0.00	0.00	0.00	.05	.05	
W	0	0	2	0	0	0	2	4.45
	0.00	0.00	2.17	0.00	0.00	0.00	2.17	
	0.00	0.00	.09	0.00	0.00	0.00	.09	
WNW	0	0	1	0	0	0	1	4.90
	0.00	0.00	1.09	0.00	0.00	0.00	1.09	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
NW	0	2	2	0	1	1	6	5.42
	0.00	2.17	2.17	0.00	1.09	1.09	6.52	
	0.00	.09	.09	0.00	.05	.05	.28	
NNW	0	0	4	0	3	0	7	6.31
	0.00	0.00	4.35	0.00	3.26	0.00	7.61	
	0.00	0.00	.19	0.00	.14	0.00	.33	
N	0	1	0	1	1	2	5	8.12
	0.00	1.09	0.00	1.09	1.09	2.17	5.43	
	0.00	.05	0.00	.05	.05	.09	.23	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	5	23	18	16	30	92	7.89
	0.00	5.43	25.00	19.57	17.39	32.61	100.00	
	0.00	.23	1.07	.84	.75	1.40	4.30	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81 10.41.53

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	1	2	3	0	0	6	4.80
	0.00	.78	1.55	2.33	0.00	0.00	4.65	
	0.00	.05	.09	.14	0.00	0.00	.28	
NE	0	0	1	1	0	0	2	4.50
	0.00	0.00	.78	.78	0.00	0.00	1.55	
	0.00	0.00	.05	.05	0.00	0.00	.09	
ENE	0	0	1	0	0	1	2	7.60
	0.00	0.00	.78	0.00	0.00	.78	1.55	
	0.00	0.00	.05	0.00	0.00	.05	.09	
E	0	1	2	3	1	0	7	5.46
	0.00	.78	1.55	2.33	.78	0.00	5.43	
	0.00	.05	.09	.14	.05	0.00	.33	
ESE	0	0	2	1	1	0	4	6.02
	0.00	0.00	1.55	.78	.78	0.00	3.10	
	0.00	0.00	.09	.05	.05	0.00	.19	
SE	0	0	2	3	0	0	5	5.40
	0.00	0.00	1.55	2.33	0.00	0.00	3.88	
	0.00	0.00	.09	.14	0.00	0.00	.23	
SSE	0	0	0	3	0	1	4	7.20
	0.00	0.00	0.00	2.33	0.00	.78	3.10	
	0.00	0.00	0.00	.14	0.00	.05	.19	
S	1	1	6	8	8	15	39	8.48
	.78	.78	4.65	6.20	6.20	11.63	30.23	
	.05	.05	.28	.37	.37	.70	1.82	
SSW	0	0	1	3	3	10	17	10.00
	0.00	0.00	.78	2.33	2.33	7.75	13.18	
	0.00	0.00	.05	.14	.14	.47	.79	
SW	1	0	1	2	1	1	6	7.10
	.78	0.00	.78	1.55	.78	.78	4.65	
	.05	0.00	.05	.09	.05	.05	.28	
WSW	0	0	0	0	1	0	1	7.60
	0.00	0.00	0.00	0.00	.78	0.00	.78	
	0.00	0.00	0.00	0.00	.05	0.00	.05	
W	0	1	3	0	0	0	4	2.97
	0.00	.78	2.33	0.00	0.00	0.00	3.10	
	0.00	.05	.14	0.00	0.00	0.00	.19	
WNW	0	0	2	0	1	0	3	5.73
	0.00	0.00	1.55	0.00	.78	0.00	2.33	
	0.00	0.00	.09	0.00	.05	0.00	.14	
NW	0	1	1	5	0	0	7	5.43
	0.00	.78	.78	3.88	0.00	0.00	5.43	
	0.00	.05	.05	.23	0.00	0.00	.33	
NNW	1	0	2	3	3	0	9	6.08
	.78	0.00	1.55	2.33	2.33	0.00	6.98	
	.05	0.00	.09	.14	.14	0.00	.42	
N	0	1	0	1	8	3	13	8.65
	0.00	.78	0.00	.78	6.20	2.33	10.08	
	0.00	.05	0.00	.05	.37	.14	.61	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	6	26	36	27	31	129	7.41
	2.33	4.65	20.16	27.91	20.93	24.03	100.00	
	.14	.28	1.21	1.68	1.26	1.45	6.03	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	2	9	18	11	7	47	7.29
	0.00	.36	1.64	3.28	2.01	1.28	8.58	
	0.00	.09	.42	.84	.51	.33	2.20	
NE	0	4	12	13	6	0	35	5.32
	0.00	.73	2.19	2.37	1.09	0.00	6.39	
	0.00	.19	.56	.61	.28	0.00	1.63	
ENE	0	5	7	8	13	3	36	6.62
	0.00	.91	1.28	1.46	2.37	.55	6.57	
	0.00	.23	.33	.37	.61	.14	1.68	
E	1	1	7	13	4	1	27	5.91
	.18	.18	1.28	2.37	.73	.18	4.93	
	.05	.05	.33	.61	.19	.05	1.26	
ESE	0	3	9	15	8	0	35	5.93
	0.00	.55	1.64	2.74	1.46	0.00	6.39	
	0.00	.14	.42	.70	.37	0.00	1.63	
SE	1	1	8	21	8	3	42	6.39
	.18	.18	1.46	3.83	1.46	.55	7.66	
	.05	.05	.37	.98	.37	.14	1.96	
SSE	0	1	9	9	8	3	30	6.59
	0.00	.18	1.64	1.64	1.46	.55	5.47	
	0.00	.05	.42	.42	.37	.14	1.40	
S	1	2	6	21	42	51	123	9.63
	.18	.36	1.09	3.83	7.66	9.31	22.45	
	.05	.09	.28	.98	1.96	2.38	5.74	
SSW	0	0	3	11	9	25	48	9.79
	0.00	0.00	.55	2.01	1.64	4.56	8.76	
	0.00	0.00	.14	.51	.42	1.17	2.24	
SW	1	1	1	3	2	1	9	6.04
	.18	.18	.18	.55	.36	.18	1.64	
	.05	.05	.05	.14	.09	.05	.42	
WSW	1	0	5	3	3	0	12	5.37
	.18	0.00	.91	.55	.55	0.00	2.19	
	.05	0.00	.23	.14	.14	0.00	.56	
W	1	4	10	1	1	0	17	3.99
	.18	.73	1.82	.18	.18	0.00	3.10	
	.05	.19	.47	.05	.05	0.00	.79	
WNW	1	1	3	4	1	1	11	5.66
	.18	.18	.55	.73	.18	.18	2.01	
	.05	.05	.14	.19	.05	.05	.51	
NW	0	2	0	3	4	3	12	7.75
	0.00	.36	0.00	.55	.73	.55	2.19	
	0.00	.09	0.00	.14	.19	.14	.56	
NNW	0	0	3	9	16	1	29	7.69
	0.00	0.00	.55	1.64	2.92	.18	5.29	
	0.00	0.00	.14	.42	.75	.05	1.35	
N	1	3	5	15	8	3	35	6.67
	.18	.55	.91	2.74	1.46	.55	6.39	
	.05	.14	.23	.70	.37	.14	1.63	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	8	30	97	167	144	102	548	7.40
	1.46	5.47	17.70	30.47	26.28	18.61	100.00	
	.37	1.40	4.53	7.80	6.73	4.76	25.60	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1	2	3	6	13	3	28	7.22
	.17	.34	.51	1.02	2.22	.51	4.78	
	.05	.09	.14	.28	.61	.14	1.31	
NE	0	5	14	8	5	0	32	5.02
	0.00	.85	2.39	1.37	.85	0.00	5.46	
	0.00	.23	.65	.37	.23	0.00	1.49	
ENE	1	2	7	17	3	0	30	5.53
	.17	.34	1.19	2.90	.51	0.00	5.12	
	.05	.09	.33	.79	.14	0.00	1.40	
E	0	1	3	8	12	2	26	7.33
	0.00	.17	.51	1.37	2.05	.34	4.44	
	0.00	.05	.14	.37	.56	.09	1.21	
ESE	0	1	1	11	12	0	25	7.17
	0.00	.17	.17	1.88	2.05	0.00	4.27	
	0.00	.05	.05	.51	.56	0.00	1.17	
SE	1	2	9	12	19	3	46	6.80
	.17	.34	1.54	2.05	3.24	.51	7.85	
	.05	.09	.42	.56	.89	.14	2.15	
SSE	0	3	9	23	27	4	66	7.11
	0.00	.51	1.54	3.92	4.61	.68	11.26	
	0.00	.14	.42	1.07	1.26	.19	3.08	
S	0	4	10	21	98	51	184	9.14
	0.00	.68	1.71	3.58	16.72	8.70	31.40	
	0.00	.19	.47	.98	4.58	2.38	8.59	
SSW	1	2	4	12	13	5	37	7.07
	.17	.34	.68	2.05	2.22	.85	6.31	
	.05	.09	.19	.56	.61	.23	1.73	
SW	0	1	5	10	5	4	25	6.90
	0.00	.17	.85	1.71	.85	.68	4.27	
	0.00	.05	.23	.47	.23	.19	1.17	
WSW	0	3	2	4	3	0	12	5.64
	0.00	.51	.34	.68	.51	0.00	2.05	
	0.00	.14	.09	.19	.14	0.00	.56	
W	0	1	3	6	0	0	10	5.32
	0.00	.17	.51	1.02	0.00	0.00	1.71	
	0.00	.05	.14	.28	0.00	0.00	.47	
WNW	0	1	3	1	1	1	7	5.69
	0.00	.17	.51	.17	.17	.17	1.19	
	0.00	.05	.14	.05	.05	.05	.33	
NW	0	2	1	8	1	0	12	5.48
	0.00	.34	.17	1.37	.17	0.00	2.05	
	0.00	.09	.05	.37	.05	0.00	.56	
NNW	0	0	1	11	9	1	22	7.19
	0.00	0.00	.17	1.88	1.54	.17	3.75	
	0.00	0.00	.05	.51	.42	.05	1.03	
N	1	1	0	2	15	5	24	8.38
	.17	.17	0.00	.34	2.56	.85	4.10	
	.05	.05	0.00	.09	.70	.23	1.12	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	5	31	75	160	236	79	586	7.49
	.85	5.29	12.80	27.30	40.27	13.48	100.00	
	.23	1.45	3.50	7.47	11.02	3.69	27.37	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	0	3	3	3	0	9	6.11
	0.00	0.00	1.31	1.31	1.31	0.00	3.93	
	0.00	0.00	.14	.14	.14	0.00	.42	
NE	0	1	4	3	0	0	8	4.51
	0.00	.44	1.75	1.31	0.00	0.00	3.49	
	0.00	.05	.19	.14	0.00	0.00	.37	
ENE	0	3	4	10	9	1	27	6.43
	0.00	1.31	1.75	4.37	3.93	.44	11.79	
	0.00	.14	.19	.47	.42	.05	1.26	
E	0	1	2	12	8	0	23	6.70
	0.00	.44	.87	5.24	3.49	0.00	10.04	
	0.00	.05	.09	.56	.37	0.00	1.07	
ESE	0	0	4	8	7	0	19	6.65
	0.00	0.00	1.75	3.49	3.06	0.00	8.30	
	0.00	0.00	.19	.37	.33	0.00	.89	
SE	0	0	4	13	5	0	22	6.33
	0.00	0.00	1.75	5.68	2.18	0.00	9.61	
	0.00	0.00	.19	.61	.23	0.00	1.03	
SSE	0	2	4	7	6	0	19	5.88
	0.00	.87	1.75	3.06	2.62	0.00	8.30	
	0.00	.09	.19	.33	.28	0.00	.89	
S	0	5	5	13	9	0	32	6.00
	0.00	2.18	2.18	5.68	3.93	0.00	13.97	
	0.00	.23	.23	61	.42	0.00	1.49	
SSW	0	1	5	6	9	0	21	6.50
	0.00	.44	2.18	2.62	3.93	0.00	9.17	
	0.00	.05	.23	.28	.42	0.00	.98	
SW	0	1	4	2	0	0	7	4.19
	0.00	.44	1.75	.87	0.00	0.00	3.06	
	0.00	.05	.19	.09	0.00	0.00	.33	
WSW	0	0	1	3	0	0	4	4.82
	0.00	0.00	.44	1.31	0.00	0.00	1.75	
	0.00	0.00	.05	.14	0.00	0.00	.19	
W	0	0	0	5	0	0	5	6.10
	0.00	0.00	0.00	2.18	0.00	0.00	2.18	
	0.00	0.00	0.00	.23	0.00	0.00	.23	
WNW	0	0	0	3	1	0	4	6.57
	0.00	0.00	0.00	1.31	.44	0.00	1.75	
	0.00	0.00	0.00	.14	.05	0.00	.19	
NW	0	0	3	1	0	0	4	5.05
	0.00	0.00	1.31	.44	0.00	0.00	1.75	
	0.00	0.00	.14	.05	0.00	0.00	.19	
NNW	1	0	2	7	0	0	10	4.88
	.44	0.00	.87	3.06	0.00	0.00	4.37	
	.05	0.00	.09	.33	0.00	0.00	.47	
N	0	0	0	9	4	2	15	7.53
	0.00	0.00	0.00	3.93	1.75	.87	6.55	
	0.00	0.00	0.00	.42	.19	.09	.70	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	1	14	45	105	61	3	229	6.17
	44	6.11	19.65	45.85	26.64	1.31	100.00	
	.05	65	2.10	4.90	2.85	.14	10.70	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	3 1.72 .14	4 2.30 .19	3 1.72 .14	1 .57 .05	11 6.32 .51	6.71
NE	0 0.00 0.00	2 1.15 .09	13 7.47 .61	4 2.30 .19	0 0.00 0.00	0 0.00 0.00	19 10.92 .89	4.42
ENE	1 .57 .05	1 .57 .05	3 1.72 .14	4 2.30 .19	0 0.00 0.00	0 0.00 0.00	9 5.17 .42	4.62
E	0 0.00 0.00	1 .57 .05	7 4.02 .33	6 3.45 .28	0 0.00 0.00	0 0.00 0.00	14 8.05 .65	4.69
ESE	0 0.00 0.00	0 0.00 0.00	2 1.15 .09	4 2.30 .19	1 .57 .05	0 0.00 0.00	7 4.02 .33	6.04
SE	0 0.00 0.00	1 .57 .05	8 4.60 .37	8 4.60 .37	3 1.72 .14	0 0.00 0.00	20 11.49 .93	5.54
SSE	1 .57 .05	1 .57 .05	5 2.87 .23	8 4.60 .37	3 1.72 .14	0 0.00 0.00	18 10.34 .84	5.32
S	0 0.00 0.00	0 0.00 0.00	1 .57 .05	7 4.02 .33	5 2.87 .23	0 0.00 0.00	13 7.47 .61	6.83
SSW	0 0.00 0.00	2 1.15 .09	1 .57 .05	8 4.60 .37	6 3.45 .28	0 0.00 0.00	17 9.77 .79	6.34
SW	0 0.00 0.00	1 .57 .05	2 1.15 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.72 .14	3.90
WSW	0 0.00 0.00	1 .57 .05	1 .57 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.15 .09	3.20
W	1 .57 .05	1 .57 .05	6 3.45 .28	1 .57 .05	0 0.00 0.00	0 0.00 0.00	9 5.17 .42	3.81
WNW	0 0.00 0.00	0 0.00 0.00	1 .57 .05	5 2.87 .23	0 0.00 0.00	0 0.00 0.00	6 3.45 .28	5.48
NW	0 0.00 0.00	0 0.00 0.00	2 1.15 .09	4 2.30 .19	2 1.15 .09	0 0.00 0.00	8 4.60 .37	6.27
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 3.45 .28	1 .57 .05	0 0.00 0.00	7 4.02 .33	6.54
N	0 0.00 0.00	0 0.00 0.00	2 1.15 .09	3 1.72 .14	6 3.45 .28	0 0.00 0.00	11 6.32 .51	7.15
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 1.72 .14	11 6.32 .51	57 32.76 2.66	72 41.38 3.36	30 17.24 1.40	1 .57 .05	174 100.00 8.13	5.58

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL MAY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.41.53.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .05	5 .23	31 1.45	43 2.01	36 1.68	13 .61	129 6.03	6.74
NE	0 0.00	15 .70	52 2.43	34 1.59	11 .51	0 0.00	112 5.23	4.87
ENE	2 .09	11 .51	29 1.35	42 1.96	27 1.26	5 .23	116 5.42	6.01
E	1 .05	7 .33	27 1.26	46 2.15	28 1.31	5 .23	114 5.32	6.25
ESE	0 0.00	6 .28	28 1.31	44 2.06	32 1.49	3 .14	113 5.28	6.37
SE	2 .09	5 .23	36 1.68	78 3.64	39 1.82	11 .51	171 7.99	6.46
SSE	1 .05	9 .42	38 1.77	53 2.48	53 2.48	15 .70	169 7.89	6.68
S	2 .09	13 .61	31 1.45	96 4.48	187 8.73	154 7.19	483 22.56	8.95
SSW	1 .05	6 .28	20 .93	47 2.20	69 3.22	84 3.92	227 10.60	8.97
SW	2 .09	5 .23	15 .70	27 1.26	14 .65	12 .56	75 3.50	6.78
WSW	1 .05	6 .28	9 .42	10 .47	7 .33	1 .05	34 1.59	5.34
W	2 .09	10 .47	24 1.12	14 .65	1 .05	0 0.00	51 2.38	4.32
WNW	1 .05	4 .19	10 .47	13 .61	4 .19	2 .09	34 1.59	5.55
NW	0 0.00	7 .33	11 .51	31 1.45	12 .56	4 .19	65 3.04	6.16
NNW	2 .09	3 .14	19 .89	53 2.48	34 1.59	2 .09	113 5.28	6.55
N	2 .09	7 .33	14 .65	47 2.20	48 2.24	17 .79	135 6.31	7.32
CALM	0 0.00						0 0.00	CALM
TOTAL	20 .93	119 5.56	394 18.40	678 31.67	602 28.12	328 15.32	2141 100.00	7.18

NUMBER OF VALID OBSERVATIONS 2141 95.92 PCT.
NUMBER OF INVALID OBSERVATIONS 91 4.08 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL JUNE COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 60.00 METERS
TABLE GENERATED 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	3	8	10	5	1	27	5.84
	0.00	.79	2.11	2.64	1.32	.26	7.12	
	0.00	.15	.39	.49	25	.05	1.33	
NE	0	1	12	0	0	0	13	4.12
	0.00	.26	3.17	0.00	0.00	0.00	3.43	
	0.00	.05	.59	0.00	0.00	0.00	.64	
ENE	1	3	8	3	0	0	15	4.02
	.26	.79	2.11	.79	0.00	0.00	3.96	
	.05	.15	.39	.15	0.00	0.00	.74	
E	0	1	2	1	0	0	4	4.07
	0.00	.26	.53	.26	0.00	0.00	1.06	
	0.00	.05	.10	.05	0.00	0.00	.20	
ESE	0	1	7	0	0	0	8	3.70
	0.00	.26	1.85	0.00	0.00	0.00	2.11	
	0.00	.05	.34	0.00	0.00	0.00	.39	
SE	0	2	2	2	0	0	6	4.18
	0.00	.53	.53	.53	0.00	0.00	1.58	
	0.00	.10	.10	.10	0.00	0.00	.30	
SSE	0	3	7	13	5	0	28	5.65
	0.00	.79	1.85	3.43	1.32	0.00	7.39	
	0.00	.15	.34	.64	.25	0.00	1.38	
S	1	5	11	21	24	12	74	7.29
	26	1.32	2.90	5.54	6.33	3.17	19.53	
	.05	.25	.54	1.03	1.18	.59	3.64	
SSW	0	0	15	15	32	45	107	8.90
	0.00	0.00	3.96	3.96	8.44	11.87	28.23	
	0.00	0.00	.74	.74	1.58	2.22	5.27	
SW	0	2	5	8	9	5	29	7.36
	0.00	.53	1.32	2.11	2.37	1.32	7.65	
	0.00	.10	.25	.39	.44	.25	1.43	
WSW	0	3	1	0	2	1	7	5.69
	0.00	.79	.26	0.00	.53	.26	1.85	
	0.00	.15	.05	0.00	.10	.05	.34	
W	0	4	6	4	2	0	16	4.54
	0.00	1.06	1.58	1.06	.53	0.00	4.22	
	0.00	.20	.30	.20	.10	0.00	.79	
WNW	0	0	0	7	1	0	8	6.61
	0.00	0.00	0.00	1.85	.26	0.00	2.11	
	0.00	0.00	0.00	.34	.05	0.00	.39	
NW	1	1	1	2	1	0	6	5.03
	.26	.26	.26	.53	.26	0.00	1.58	
	.05	.05	.05	.10	.05	0.00	.30	
NNW	0	1	1	6	5	3	16	8.03
	0.00	.26	.26	1.58	1.32	.79	4.22	
	0.00	.05	.05	.30	.25	.15	.79	
N	0	1	5	3	4	2	15	6.94
	0.00	.26	1.32	.79	1.06	.53	3.96	
	0.00	.05	.25	.15	.20	.10	.74	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	31	91	95	90	69	379	6.95
	.79	8.18	24.01	25.07	23.75	18.21	100.00	
	.15	1.53	4.48	4.68	4.43	3.40	18.66	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	0	1	0	1	0	2	5.60
	0.00	0.00	1.14	0.00	1.14	0.00	2.27	
	0.00	0.00	.05	0.00	.05	0.00	.10	
NE	0	2	0	0	1	0	3	4.33
	0.00	2.27	0.00	0.00	1.14	0.00	3.41	
	0.00	.10	0.00	0.00	.05	0.00	.15	
ENE	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
E	0	0	1	0	0	0	1	4.80
	0.00	0.00	1.14	0.00	0.00	0.00	1.14	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
ESE	0	0	0	1	0	0	1	6.50
	0.00	0.00	0.00	1.14	0.00	0.00	1.14	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
SE	0	0	0	1	1	0	2	7.75
	0.00	0.00	0.00	1.14	1.14	0.00	2.27	
	0.00	0.00	0.00	.05	.05	0.00	.10	
SSE	0	0	1	0	2	0	3	7.37
	0.00	0.00	1.14	0.00	2.27	0.00	3.41	
	0.00	0.00	.05	0.00	.10	0.00	.15	
S	0	1	0	5	5	7	18	8.73
	0.00	1.14	0.00	5.68	5.68	7.95	20.45	
	0.00	.05	0.00	.25	.25	.34	.89	
SSW	0	0	2	3	8	5	18	8.51
	0.00	0.00	2.27	3.41	9.09	5.68	20.45	
	0.00	0.00	.10	.15	.39	.25	.89	
SW	0	0	1	2	3	1	7	8.39
	0.00	0.00	1.14	2.27	3.41	1.14	7.95	
	0.00	0.00	.05	.10	.15	.05	.34	
WSW	0	1	1	0	2	1	5	7.78
	0.00	1.14	1.14	0.00	2.27	1.14	5.68	
	0.00	.05	.05	0.00	.10	.05	.25	
W	0	1	2	2	0	0	5	4.46
	0.00	1.14	2.27	2.27	0.00	0.00	5.68	
	0.00	.05	.10	.10	0.00	0.00	.25	
WNW	0	0	1	3	0	0	4	5.52
	0.00	0.00	1.14	3.41	0.00	0.00	4.55	
	0.00	0.00	.05	.15	0.00	0.00	.20	
NW	0	1	2	2	3	0	8	5.95
	0.00	1.14	2.27	2.27	3.41	0.00	9.09	
	0.00	.05	.10	.10	.15	0.00	.39	
NNW	0	0	1	3	3	0	7	7.11
	0.00	0.00	1.14	3.41	3.41	0.00	7.95	
	0.00	0.00	.05	15	.15	0.00	.34	
N	0	0	2	0	2	0	4	6.92
	0.00	0.00	2.27	0.00	2.27	0.00	4.55	
	0.00	0.00	.10	0.00	.10	0.00	.20	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	6	15	22	31	14	88	7.39
	0.00	6.82	17.05	25.00	35.23	15.91	100.00	
	0.00	.30	.74	1.08	1.53	.69	4.33	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	2 2.08 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 2.08 .10	4.80
NE	0 0.00 0.00	0 0.00 0.00	2 2.08 .10	1 1.04 .05	0 0.00 0.00	0 0.00 0.00	3 3.12 .15	4.30
ENE	0 0.00 0.00	1 1.04 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	2.90
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	5.10
SE	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	4.50
SSE	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	3 3.12 .15	6 6.25 .30	0 0.00 0.00	10 10.42 .49	7.36
S	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	6 6.25 .30	6 6.25 .30	8 8.33 .39	21 21.87 1.03	9.12
SSW	0 0.00 0.00	1 1.04 .05	2 2.08 .10	5 5.21 .25	12 12.50 .59	6 6.25 .30	26 27.08 1.28	8.17
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	0 0.00 0.00	4 4.17 .20	5 5.21 .25	10.70
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	1 1.04 .05	14.90
W	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	2 2.08 .10	9.80
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 3.12 .15	1 1.04 .05	0 0.00 0.00	4 4.17 .20	6.55
NW	0 0.00 0.00	0 0.00 0.00	4 4.17 .20	5 5.21 .25	3 3.12 .15	0 0.00 0.00	12 12.50 .59	6.29
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 4.17 .20	2 2.08 .10	0 0.00 0.00	6 6.25 .30	7.03
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.04 .05	1 1.04 .05	10.70
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	2 2.08 .10	14 14.58 .69	29 30.21 1.43	30 31.25 1.48	21 21.87 1.03	96 100.00 4.73	7.87

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .41 .10	7 1.43 .34	3 .61 .15	1 .20 .05	1 .20 .05	14 2.87 .69	4.85
NE	0 0.00 0.00	1 .20 .05	6 1.23 .30	1 .20 .05	0 0.00 0.00	0 0.00 0.00	8 1.64 .39	4.01
ENE	0 0.00 0.00	4 .82 .20	10 2.05 .49	2 .41 .10	2 .41 .10	0 0.00 0.00	18 3.69 .89	4.23
E	0 0.00 0.00	3 .61 .15	8 1.64 .39	4 .82 .20	1 .20 .05	2 .41 .10	18 3.69 .89	5.13
ESE	0 0.00 0.00	4 .82 .20	10 2.05 .49	6 1.23 .30	4 .82 .20	1 .20 .05	25 5.12 1.23	5.47
SE	0 0.00 0.00	3 .61 .15	11 2.25 .54	8 1.64 .39	0 0.00 0.00	1 .20 .05	23 4.71 1.13	4.90
SSE	0 0.00 0.00	2 .41 .10	11 2.25 .54	8 1.64 .39	13 2.66 .64	1 .20 .05	35 7.17 1.72	6.29
S	2 .41 .10	4 .82 .20	8 1.64 .39	35 7.17 1.72	42 8.61 2.07	50 10.25 2.46	141 28.89 6.94	8.59
SSW	0 0.00 0.00	4 .82 .20	9 1.84 .44	27 5.53 1.33	32 6.56 1.58	20 4.10 .98	92 18.85 4.53	8.03
SW	0 0.00 0.00	1 .20 .05	6 1.23 .30	4 .82 .20	4 .82 .20	5 1.02 .25	20 4.10 .98	7.26
WSW	0 0.00 0.00	1 .20 .05	1 .20 .05	7 1.43 .34	0 0.00 0.00	0 0.00 0.00	9 1.84 .44	5.28
W	1 .20 .05	1 .20 .05	1 .20 .05	5 1.02 .25	0 0.00 0.00	2 .41 .10	10 2.05 .49	6.64
WNW	1 .20 .05	1 .20 .05	1 .20 .05	2 .41 .10	1 .20 .05	2 .41 .10	8 1.64 .39	7.20
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	10 2.05 .49	1 .20 .05	2 .41 .10	13 2.66 .64	7.52
NNW	1 .20 .05	0 0.00 0.00	3 .61 .15	18 3.69 .89	6 1.23 .30	0 0.00 0.00	28 5.74 1.38	6.53
N	0 0.00 0.00	0 0.00 0.00	5 1.02 .25	18 3.69 .89	3 .61 .15	0 0.00 0.00	26 5.33 1.28	6.08
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	5 1.02 .25	31 6.35 1.53	97 19.88 4.78	158 32.38 7.78	110 22.54 5.42	87 17.83 4.28	488 100.00 24.03	7.06

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL JUNE COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10 54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 .34 .10	3 .51 .15	3 .51 .15	4 .68 .20	0 0.00 0.00	12 2.05 .59	6.12
NE	2 .34 .10	0 0.00 0.00	4 .68 .20	5 .85 .25	0 0.00 0.00	1 .17 .05	12 2.05 .59	4.96
ENE	0 0.00 0.00	0 0.00 0.00	11 1.88 .54	6 1.03 .30	0 0.00 0.00	0 0.00 0.00	17 2.91 .84	4.91
E	0 0.00 0.00	0 0.00 0.00	5 .85 .25	7 1.20 .34	1 .17 .05	0 0.00 0.00	13 2.22 .64	5.83
ESE	0 0.00 0.00	0 0.00 0.00	4 .68 .20	10 1.71 .49	3 .51 .15	0 0.00 0.00	17 2.91 .84	6.17
SE	0 0.00 0.00	2 .34 .10	5 .85 .25	10 1.71 .49	3 .51 .15	2 .34 .10	22 3.76 1.08	6.32
SSE	0 0.00 0.00	1 .17 .05	4 .68 .20	14 2.39 .69	29 4.96 1.43	9 1.54 .44	57 9.74 2.81	7.90
S	0 0.00 0.00	6 1.03 .30	7 1.20 .34	43 7.35 2.12	98 16.75 4.83	37 6.32 1.82	191 32.65 9.40	8.43
SSW	0 0.00 0.00	1 .17 .05	9 1.54 .44	27 4.62 1.33	65 11.11 3.20	13 2.22 .64	115 19.66 5.66	8.21
SW	0 0.00 0.00	1 .17 .05	2 .34 .10	17 2.91 .84	13 2.22 .64	7 1.20 .34	40 6.84 1.97	7.72
WSW	0 0.00 0.00	1 .17 .05	9 1.54 .44	5 .85 .25	1 .17 .05	0 0.00 0.00	16 2.74 .79	4.88
W	1 .17 .05	0 0.00 0.00	3 .51 .15	2 .34 .10	1 .17 .05	1 .17 .05	8 1.37 .39	5.35
WNW	0 0.00 0.00	0 0.00 0.00	3 .51 .15	9 1.54 .44	7 1.20 .34	2 .34 .10	21 3.59 1.03	7.02
NW	0 0.00 0.00	0 0.00 0.00	2 .34 .10	3 .51 .15	5 .85 .25	2 .34 .10	12 2.05 .59	7.84
NNW	0 0.00 0.00	0 0.00 0.00	3 .51 .15	8 1.37 .39	2 .34 .10	6 1.03 .30	19 3.25 .94	7.68
N	0 0.00 0.00	1 .17 .05	5 .85 .25	3 .51 .15	4 .68 .20	0 0.00 0.00	13 2.22 .64	6.06
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 .51 .15	15 2.56 .74	79 13.50 3.89	172 29.40 8.47	236 40.34 11.62	80 13.68 3.94	585 100.00 28.80	7.59

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL JUNE COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	3 1.32 .15	2 .88 .10	2 .88 .10	0 0.00 0.00	7 3.08 .34	6.37
NE	1 .44 .05	2 .88 .10	7 3.08 .34	2 .88 .10	0 0.00 0.00	0 0.00 0.00	12 5.29 .59	3.70
ENE	0 0.00 0.00	0 0.00 0.00	2 .88 .10	7 3.08 .34	2 .88 .10	0 0.00 0.00	11 4.85 .54	6.52
E	0 0.00 0.00	1 .44 .05	0 0.00 0.00	7 3.08 .34	0 0.00 0.00	0 0.00 0.00	8 3.52 .39	5.74
ESE	0 0.00 0.00	1 .44 .05	1 .44 .05	12 5.29 .59	1 .44 .05	0 0.00 0.00	15 6.61 .74	6.13
SE	0 0.00 0.00	0 0.00 0.00	4 1.76 .20	11 4.85 .54	0 0.00 0.00	0 0.00 0.00	15 6.61 .74	5.65
SSE	0 0.00 0.00	0 0.00 0.00	4 1.76 .20	8 3.52 .39	4 1.76 .20	0 0.00 0.00	16 7.05 .79	6.21
S	0 0.00 0.00	1 .44 .05	3 1.32 .15	25 11.01 1.23	16 7.05 .79	0 0.00 0.00	45 19.82 2.22	6.96
SSW	0 0.00 0.00	1 .44 .05	1 .44 .05	15 6.61 .74	10 4.41 .49	0 0.00 0.00	27 11.89 1.33	7.11
SW	2 .88 .10	0 0.00 0.00	7 3.08 .34	9 3.96 .44	5 2.20 .25	0 0.00 0.00	23 10.13 1.13	5.69
WSW	0 0.00 0.00	2 .88 .10	3 1.32 .15	5 2.20 .25	2 .88 .10	0 0.00 0.00	12 5.29 .59	5.30
W	0 0.00 0.00	0 0.00 0.00	4 1.76 .20	6 2.64 .30	0 0.00 0.00	0 0.00 0.00	10 4.41 .49	5.82
WNW	0 0.00 0.00	0 0.00 0.00	2 .88 .10	3 1.32 .15	1 .44 .05	0 0.00 0.00	6 2.64 .30	5.62
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .88 .10	0 0.00 0.00	0 0.00 0.00	2 .88 .10	6.60
NNW	0 0.00 0.00	1 .44 .05	1 .44 .05	3 1.32 .15	1 .44 .05	0 0.00 0.00	6 2.64 .30	5.27
N	0 0.00 0.00	0 0.00 0.00	4 1.76 .20	4 1.76 .20	4 1.76 .20	0 0.00 0.00	12 5.29 .59	6.67
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 1.32 .15	9 3.96 .44	46 20.26 2.26	121 53.30 5.96	48 21.15 2.36	0 0.00 0.00	227 100.00 11.18	6.16

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .60 .05	4 2.38 .20	10 5.95 .49	2 1.19 .10	1 .60 .05	18 10.71 .89	5.94
NE	0 0.00 0 00	1 .60 .05	12 7.14 .59	3 1.79 .15	0 0.00 0.00	0 0.00 0.00	16 9.52 .79	4.17
ENE	1 .60 .05	0 0 00 0.00	3 1.79 .15	1 .60 .05	0 0.00 0.00	0 0.00 0.00	5 2.98 .25	3.90
E	0 0.00 0.00	4 2.38 .20	0 0 00 0.00	3 1.79 .15	1 .60 .05	0 0.00 0.00	8 4.76 .39	4.55
ESE	1 .60 .05	1 .60 .05	1 .60 .05	3 1.79 .15	1 .60 .05	0 0.00 0.00	7 4.17 .34	4.80
SE	1 .60 .05	2 1.19 .10	2 1.19 .10	6 3.57 30	5 2.98 .25	0 0.00 0.00	16 9.52 .79	5.74
SSE	0 0.00 0.00	1 .60 .05	2 1.19 .10	10 5.95 .49	1 .60 .05	0 0.00 0.00	14 8.33 .69	6.16
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	17 10.12 .84	6 3.57 .30	0 0.00 0.00	23 13.69 1.13	7.18
SSW	1 .60 .05	1 .60 .05	1 .60 .05	7 4.17 .34	0 0.00 0.00	0 0.00 0.00	10 5.95 .49	5.27
SW	0 0.00 0.00	0 0.00 0.00	2 1.19 .10	4 2.38 .20	0 0.00 0.00	0 0.00 0.00	6 3.57 .30	5.12
WSW	1 .60 .05	0 0.00 0.00	1 .60 .05	3 1.79 .15	1 .60 .05	0 0.00 0.00	6 3.57 .30	5.47
W	2 1.19 .10	0 0.00 0.00	1 .60 .05	5 2.98 .25	0 0.00 0.00	0 0.00 0.00	8 4.76 .39	4.95
WNW	1 .60 .05	0 0.00 0.00	0 0.00 0.00	5 2.98 .25	0 0.00 0.00	0 0.00 0.00	6 3.57 .30	5.38
NW	1 .60 .05	0 0.00 0.00	2 1.19 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.79 .15	2.63
NNW	0 0.00 0.00	0 0.00 0.00	3 1.79 .15	5 2.98 .25	0 0.00 0.00	0 0.00 0.00	8 4.76 .39	5.57
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 2.98 .25	9 5.36 .44	0 0.00 0.00	14 8.33 .69	8.19
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	9 5.36 .44	11 6.55 .54	34 20.24 1.67	87 51.79 4.28	26 15.48 1.28	1 .60 .05	168 100.00 8.27	5.72

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JUNE COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 10.54.26.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00	8 .39	28 1.38	28 1.38	15 .74	3 .15	82 4.04	5.75
NE	3 .15	7 .34	43 2.12	12 .59	1 .05	1 .05	67 3.30	4.21
ENE	2 .10	8 .39	34 1.67	19 .94	4 .20	0 0.00	67 3.30	4.69
E	0 0.00	9 .44	16 .79	22 1.08	3 .15	2 .10	52 2.56	5.22
ESE	1 .05	7 .34	23 1 13	33 1.62	9 .44	1 .05	74 3.64	5.52
SE	1 .05	9 .44	25 1.23	38 1.87	9 .44	3 .15	85 4.19	5.57
SSE	0 0.00	7 .34	30 1.48	56 2.76	60 2.95	10 .49	163 8.03	6.81
S	3 .15	17 .84	30 1.48	152 7.48	197 9.70	114 5.61	513 25.26	8.16
SSW	1 .05	8 .39	39 1.92	99 4.87	159 7.83	89 4.38	395 19.45	8.22
SW	2 .10	4 .20	23 1.13	45 2.22	34 1.67	22 1.08	130 6.40	7.24
WSW	1 .05	8 .39	16 .79	20 .98	8 .39	3 .15	56 2.76	5.64
W	4 .20	6 .30	18 .89	24 1.18	3 .15	4 .20	59 2.90	5.45
WNW	2 .10	1 .05	7 .34	32 1.58	11 .54	4 .20	57 2.81	6.53
NW	2 .10	2 .10	11 .54	24 1.18	13 .64	4 .20	56 2.76	6.54
NNW	1 .05	2 .10	12 .59	47 2.31	19 .94	9 .44	90 4.43	6.95
N	0 0.00	2 .10	21 1.03	33 1.62	26 1.28	3 .15	85 4.19	6.76
CALM	0 0.00						0 0.00	CALM
TOTAL	23 1.13	105 5.17	376 18.51	684 33.68	571 28.11	272 13.39	2031 100.00	7.03

NUMBER OF VALID OBSERVATIONS 2031 94.03 PCT.
NUMBER OF INVALID OBSERVATIONS 129 5.97 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	2	10	2	0	14	6.66
	0.00	0.00	.51	2.54	.51	0.00	3.55	
	0.00	0.00	.10	.49	.10	0.00	.68	
NE	0	0	3	7	1	0	11	5.51
	0.00	0.00	.76	1.78	.25	0.00	2.79	
	0.00	0.00	.15	.34	.05	0.00	.54	
ENE	0	2	5	12	3	0	22	5.86
	0.00	.51	1.27	3.05	.76	0.00	5.58	
	0.00	.10	24	.59	.15	0.00	1.07	
E	0	2	4	8	0	0	14	4.96
	0.00	.51	1.02	2.03	0.00	0.00	3.55	
	0.00	.10	.20	.39	0.00	0.00	.68	
ESE	0	6	12	6	0	0	24	4.08
	0.00	1.52	3.05	1.52	0.00	0.00	6.09	
	0.00	.29	.59	.29	0.00	0.00	1.17	
SE	0	2	2	0	0	1	5	5.04
	0.00	.51	.51	0.00	0.00	.25	1.27	
	0.00	.10	.10	0.00	0.00	.05	.24	
SSE	0	1	4	14	0	1	20	5.53
	0.00	.25	1.02	3.55	0.00	.25	5.08	
	0.00	.05	.20	.68	0.00	.05	.98	
S	0	0	9	42	28	18	97	7.93
	0.00	0.00	2.28	10.66	7.11	4.57	24.62	
	0.00	0.00	.44	2.05	1.37	.88	4.74	
SSW	1	2	10	53	28	17	111	7.58
	.25	.51	2.54	13.45	7.11	4.31	28.17	
	.05	.10	.49	2.59	1.37	.83	5.42	
SW	0	0	10	13	5	0	28	5.90
	0.00	0.00	2.54	3.30	1.27	0.00	7.11	
	0.00	0.00	.49	.63	.24	0.00	1.37	
WSW	0	1	2	3	1	0	7	5.69
	0.00	.25	.51	.76	.25	0.00	1.78	
	0.00	.05	.10	.15	.05	0.00	.34	
W	0	1	7	3	5	0	16	5.31
	0.00	.25	1.78	.76	1.27	0.00	4.06	
	0.00	.05	.34	.15	.24	0.00	.78	
WNW	0	1	4	3	1	0	9	5.37
	0.00	.25	1.02	.76	.25	0.00	2.28	
	0.00	.05	.20	.15	.05	0.00	.44	
NW	0	1	3	1	0	0	5	4.34
	0.00	.25	.76	.25	0.00	0.00	1.27	
	0.00	.05	.15	.05	0.00	0.00	.24	
NNW	1	0	0	0	0	0	1	1.30
	.25	0.00	0.00	0.00	0.00	0.00	.25	
	.05	0.00	0.00	0.00	0.00	0.00	.05	
N	0	1	0	8	1	0	10	5.61
	0.00	.25	0.00	2.03	.25	0.00	2.54	
	0.00	.05	0.00	.39	.05	0.00	.49	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	20	77	183	75	37	394	6.63
	.51	5.08	19.54	46.45	19.04	9.39	100.00	
	.10	.98	3.76	8.94	3.66	1.81	19.24	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	0	5	2	1	9	7.09
	0.00	1.00	0.00	5.00	2.00	1.00	9.00	
	0.00	.05	0.00	.24	.10	.05	.44	
NE	0	1	1	1	0	0	3	3.53
	0.00	1.00	1.00	1.00	0.00	0.00	3.00	
	0.00	.05	.05	.05	0.00	0.00	.15	
ENE	0	1	0	0	0	0	1	1.60
	0.00	1.00	0.00	0.00	0.00	0.00	1.00	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
E	0	0	0	2	0	0	2	6.15
	0.00	0.00	0.00	2.00	0.00	0.00	2.00	
	0.00	0.00	0.00	.10	0.00	0.00	.10	
ESE	0	1	1	1	0	0	3	4.30
	0.00	1.00	1.00	1.00	0.00	0.00	3.00	
	0.00	.05	.05	.05	0.00	0.00	.15	
SE	0	0	1	1	0	0	2	5.35
	0.00	0.00	1.00	1.00	0.00	0.00	2.00	
	0.00	0.00	.05	.05	0.00	0.00	.10	
SSE	0	2	3	5	1	0	11	5.43
	0.00	2.00	3.00	5.00	1.00	0.00	11.00	
	0.00	.10	.15	.24	.05	0.00	.54	
S	0	1	4	14	11	4	34	7.25
	0.00	1.00	4.00	14.00	11.00	4.00	34.00	
	0.00	.05	.20	.68	.54	.20	1.66	
SSW	0	1	4	8	9	1	23	6.99
	0.00	1.00	4.00	8.00	9.00	1.00	23.00	
	0.00	.05	.20	.39	.44	.05	1.12	
SW	0	0	1	2	0	0	3	6.17
	0.00	0.00	1.00	2.00	0.00	0.00	3.00	
	0.00	0.00	.05	.10	0.00	0.00	.15	
WSW	0	0	1	1	0	0	2	5.50
	0.00	0.00	1.00	1.00	0.00	0.00	2.00	
	0.00	0.00	.05	.05	0.00	0.00	.10	
W	0	0	0	2	1	0	3	6.80
	0.00	0.00	0.00	2.00	1.00	0.00	3.00	
	0.00	0.00	0.00	.10	.05	0.00	.15	
WNW	0	0	1	0	0	0	1	3.30
	0.00	0.00	1.00	0.00	0.00	0.00	1.00	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
NW	0	0	0	1	0	0	1	6.40
	0.00	0.00	0.00	1.00	0.00	0.00	1.00	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
NNW	0	0	1	1	0	0	2	5.00
	0.00	0.00	1.00	1.00	0.00	0.00	2.00	
	0.00	0.00	.05	.05	0.00	0.00	.10	
N	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	8	18	44	24	6	100	6.48
	0.00	8.00	18.00	44.00	24.00	6.00	100.00	
	0.00	.39	.88	2.15	1.17	.29	4.88	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL JULY COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	0	0	4	1	1	6	7.17
	0.00	0.00	0.00	4.21	1.05	1.05	6.32	
	0.00	0.00	0.00	.20	.05	.05	.29	
NE	0	0	0	3	0	0	3	6.00
	0.00	0.00	0.00	3.16	0.00	0.00	3.16	
	0.00	0.00	0.00	.15	0.00	0.00	.15	
ENE	0	0	1	3	0	0	4	6.02
	0.00	0.00	1.05	3.16	0.00	0.00	4.21	
	0.00	0.00	.05	.15	0.00	0.00	.20	
E	1	0	1	1	0	0	3	3.93
	1.05	0.00	1.05	1.05	0.00	0.00	3.16	
	.05	0.00	.05	.05	0.00	0.00	.15	
ESE	0	0	1	0	0	0	1	4.80
	0.00	0.00	1.05	0.00	0.00	0.00	1.05	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
SE	0	0	1	1	0	1	3	8.30
	0.00	0.00	1.05	1.05	0.00	1.05	3.16	
	0.00	0.00	.05	.05	0.00	.05	.15	
SSE	0	3	1	3	0	0	7	4.34
	0.00	3.16	1.05	3.16	0.00	0.00	7.37	
	0.00	.15	.05	.15	0.00	0.00	.34	
S	0	2	2	17	3	1	25	6.28
	0.00	2.11	2.11	17.89	3.16	1.05	26.32	
	0.00	.10	.10	.83	.15	.05	1.22	
SSW	0	2	3	7	8	0	20	6.48
	0.00	2.11	3.16	7.37	8.42	0.00	21.05	
	0.00	.10	.15	.34	.39	0.00	.98	
SW	0	0	0	3	2	0	5	7.26
	0.00	0.00	0.00	3.16	2.11	0.00	5.26	
	0.00	0.00	0.00	.15	.10	0.00	.24	
WSW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
W	0	3	0	0	0	0	3	2.37
	0.00	3.16	0.00	0.00	0.00	0.00	3.16	
	0.00	.15	0.00	0.00	0.00	0.00	.15	
WNW	0	1	1	1	1	0	4	5.42
	0.00	1.05	1.05	1.05	1.05	0.00	4.21	
	0.00	.05	.05	.05	.05	0.00	.20	
NW	1	0	0	2	0	0	3	4.67
	1.05	0.00	0.00	2.11	0.00	0.00	3.16	
	.05	0.00	0.00	.10	0.00	0.00	.15	
NNW	1	1	0	0	0	0	2	1.95
	1.05	1.05	0.00	0.00	0.00	0.00	2.11	
	.05	.05	0.00	0.00	0.00	0.00	.10	
N	1	1	1	0	0	3	6	6.47
	1.05	1.05	1.05	0.00	0.00	3.16	6.32	
	.05	.05	.05	0.00	0.00	.15	.29	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	4	13	12	45	15	6	95	5.95
	4.21	13.68	12.63	47.37	15.79	6.32	100.00	
	.20	.63	.59	2.20	.73	.29	4.64	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	0	4	8	7	1	20	6.97
	0.00	0.00	.87	1.74	1.53	.22	4.36	
	0.00	0.00	.20	.39	.34	.05	.98	
NE	0	0	3	11	1	0	15	5.77
	0.00	0.00	.65	2.40	.22	0.00	3.27	
	0.00	0.00	.15	.54	.05	0.00	.73	
ENE	0	3	14	19	3	2	41	5.71
	0.00	.65	3.05	4.14	.65	.44	8.93	
	0.00	.15	.68	.93	.15	.10	2.00	
E	0	9	15	13	0	0	37	4.53
	0.00	1.96	3.27	2.83	0.00	0.00	8.06	
	0.00	.44	.73	.63	0.00	0.00	1.81	
ESE	2	7	14	6	4	1	34	4.48
	.44	1.53	3.05	1.31	.87	.22	7.41	
	.10	.34	.68	.29	.20	.05	1.66	
SE	1	2	7	5	8	1	24	5.90
	.22	.44	1.53	1.09	1.74	.22	5.23	
	.05	.10	.34	.24	.39	.05	1.17	
SSE	0	5	7	8	3	0	23	4.82
	0.00	1.09	1.53	1.74	.65	0.00	5.01	
	0.00	.24	.34	.39	.15	0.00	1.12	
S	0	6	8	48	21	22	105	7.30
	0.00	1.31	1.74	10.46	4.58	4.79	22.88	
	0.00	.29	.39	2.34	1.03	1.07	5.13	
SSW	0	4	11	28	24	5	72	6.88
	0.00	.87	2.40	6.10	5.23	1.09	15.69	
	0.00	.20	.54	1.37	1.17	.24	3.52	
SW	0	1	6	4	1	0	12	5.08
	0.00	.22	1.31	.87	.22	0.00	2.61	
	0.00	.05	.29	.20	.05	0.00	.59	
WSW	0	0	4	3	3	0	10	6.09
	0.00	0.00	.87	.65	.65	0.00	2.18	
	0.00	0.00	.20	.15	.15	0.00	.49	
W	1	1	3	3	5	2	15	6.85
	.22	.22	.65	.65	1.09	.44	3.27	
	.05	.05	.15	.15	.24	.10	.73	
WNW	0	0	1	2	9	0	12	7.83
	0.00	0.00	.22	.44	1.96	0.00	2.61	
	0.00	0.00	.05	.10	.44	0.00	.59	
NW	0	1	1	5	7	0	14	7.04
	0.00	.22	.22	1.09	1.53	0.00	3.05	
	0.00	.05	.05	.24	.34	0.00	.68	
NNW	1	0	0	4	3	1	9	6.58
	.22	0.00	0.00	.87	.65	.22	1.96	
	.05	0.00	0.00	.20	.15	.05	.44	
N	0	1	3	6	3	3	16	7.08
	0.00	.22	.65	1.31	.65	.65	3.49	
	0.00	.05	.15	.29	.15	.15	.78	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	5	40	101	173	102	38	459	6.28
	1.09	8.71	22.00	37.69	22.22	8.28	100.00	
	24	1.95	4.93	8.45	4.98	1.86	22.41	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	1	9	3	0	14	6.49
	0.00	.22	.22	2.01	.67	0.00	3.12	
	0.00	.05	.05	.44	.15	0.00	.68	
NE	0	4	4	7	1	0	16	4.68
	0.00	.89	.89	1.56	.22	0.00	3.57	
	0.00	.20	.20	.34	.05	0.00	.78	
ENE	0	1	6	13	2	1	23	5.98
	0.00	.22	1.34	2.90	.45	.22	5.13	
	0.00	.05	.29	.63	.10	.05	1.12	
E	0	3	14	19	7	3	46	6.07
	0.00	.67	3.12	4.24	1.56	.67	10.27	
	0.00	.15	.68	.93	.34	.15	2.25	
ESE	0	4	6	5	7	1	23	6.08
	0.00	.89	1.34	1.12	1.56	.22	5.13	
	0.00	.20	.29	.24	.34	.05	1.12	
SE	0	3	8	23	5	0	39	5.81
	0.00	.67	1.79	5.13	1.12	0.00	8.71	
	0.00	.15	.39	1.12	.24	0.00	1.90	
SSE	0	2	11	27	12	0	52	6.25
	0.00	.45	2.46	6.03	2.68	0.00	11.61	
	0.00	.10	.54	1.32	.59	0.00	2.54	
S	0	1	7	72	45	4	129	7.08
	0.00	.22	1.56	16.07	10.04	.89	28.79	
	0.00	.05	.34	3.52	2.20	.20	6.30	
SSW	0	0	4	25	23	1	53	7.30
	0.00	0.00	.89	5.58	5.13	.22	11.83	
	0.00	0.00	.20	1.22	1.12	.05	2.59	
SW	0	2	4	5	4	0	15	5.88
	0.00	.45	.89	1.12	.89	0.00	3.35	
	0.00	.10	.20	.24	.20	0.00	.73	
WSW	0	0	3	3	5	0	11	6.70
	0.00	0.00	.67	.67	1.12	0.00	2.46	
	0.00	0.00	.15	.15	.24	0.00	.54	
W	0	0	1	3	1	0	5	6.38
	0.00	0.00	.22	.67	.22	0.00	1.12	
	0.00	0.00	.05	.15	.05	0.00	.24	
WNW	0	0	0	2	1	0	3	7.37
	0.00	0.00	0.00	.45	.22	0.00	.67	
	0.00	0.00	0.00	.10	.05	0.00	.15	
NW	1	0	0	4	1	0	6	5.75
	.22	0.00	0.00	.89	.22	0.00	1.34	
	.05	0.00	0.00	.20	.05	0.00	.29	
NNW	1	0	0	4	0	0	5	4.86
	.22	0.00	0.00	.89	0.00	0.00	1.12	
	.05	0.00	0.00	.20	0.00	0.00	.24	
N	0	0	1	3	4	0	8	7.45
	0.00	0.00	.22	.67	.89	0.00	1.79	
	0.00	0.00	.05	.15	.20	0.00	.39	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	21	70	224	121	10	448	6.49
	.45	4.69	15.62	50.00	27.01	2.23	100.00	
	.10	1.03	3.42	10.94	5.91	.49	21.88	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	3	7	1	9	20	8.48
	0.00	0.00	.85	1.97	.28	2.54	5.63	
	0.00	0.00	.15	.34	.05	.44	.98	
NE	0	0	4	3	0	0	7	4.79
	0.00	0.00	1.13	.85	0.00	0.00	1.97	
	0.00	0.00	.20	.15	0.00	0.00	.34	
ENE	0	0	2	2	2	0	6	5.67
	0.00	0.00	.56	.56	.56	0.00	1.69	
	0.00	0.00	.10	.10	.10	0.00	.29	
E	0	0	1	17	12	0	30	7.13
	0.00	0.00	.28	4.79	3.38	0.00	8.45	
	0.00	0.00	.05	.83	.59	0.00	1.46	
ESE	0	2	7	7	13	1	30	6.58
	0.00	.56	1.97	1.97	3.66	.28	8.45	
	0.00	.10	.34	.34	.63	.05	1.46	
SE	0	1	10	21	7	0	39	5.95
	0.00	.28	2.82	5.92	1.97	0.00	10.99	
	0.00	.05	.49	1.03	.34	0.00	1.90	
SSE	0	0	9	19	8	0	36	6.43
	0.00	0.00	2.54	5.35	2.25	0.00	10.14	
	0.00	0.00	.44	.93	.39	0.00	1.76	
S	0	2	10	57	27	0	96	6.67
	0.00	.56	2.82	16.06	7.61	0.00	27.04	
	0.00	.10	.49	2.78	1.32	0.00	4.69	
SSW	0	0	0	19	15	1	35	7.35
	0.00	0.00	0.00	5.35	4.23	.28	9.86	
	0.00	0.00	0.00	.93	.73	.05	1.71	
SW	0	0	2	20	2	2	26	6.64
	0.00	0.00	.56	5.63	.56	.56	7.32	
	0.00	0.00	.10	.98	.10	.10	1.27	
WSW	0	0	2	9	1	0	12	6.07
	0.00	0.00	.56	2.54	.28	0.00	3.38	
	0.00	0.00	.10	.44	.05	0.00	.59	
W	0	0	0	2	0	0	2	6.15
	0.00	0.00	0.00	.56	0.00	0.00	.56	
	0.00	0.00	0.00	.10	0.00	0.00	.10	
WNW	0	0	2	0	0	0	2	4.90
	0.00	0.00	.56	0.00	0.00	0.00	56	
	0.00	0.00	.10	0.00	0.00	0.00	.10	
NW	0	0	1	0	2	0	3	7.27
	0.00	0.00	.28	0.00	.56	0.00	.85	
	0.00	0.00	.05	0.00	.10	0.00	.15	
NNW	0	0	2	2	0	0	4	4.80
	0.00	0.00	.56	.56	0.00	0.00	1.13	
	0.00	0.00	.10	.10	0.00	0.00	20	
N	0	0	1	3	3	0	7	7.34
	0.00	0.00	.28	85	.85	0.00	1.97	
	0.00	0.00	.05	.15	.15	0.00	.34	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	5	56	188	93	13	355	6.68
	0.00	1.41	15.77	52.96	26.20	3.66	100.00	
	0.00	.24	2.73	9.18	4.54	.63	17.33	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL JULY COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	1 .51 .05	0 0.00 0.00	4 2.03 .20	2 1.02 .10	1 .51 .05	8 4.06 .39	7.14
NE	0 0.00 0.00	0 0.00 0.00	4 2.03 .20	7 3.55 .34	0 0.00 0.00	0 0.00 0.00	11 5.58 .54	5.55
ENE	0 0.00 0.00	1 .51 .05	2 1.02 .10	8 4.06 .39	7 3.55 .34	1 .51 .05	19 9.64 .93	7.16
E	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	6 3.05 .29	11 5.58 .54	0 0.00 0.00	19 9.64 .93	7.40
ESE	0 0.00 0.00	1 .51 .05	4 2.03 .20	5 2.54 .24	3 1.52 .15	1 .51 .05	14 7.11 .68	6.04
SE	0 0.00 0.00	0 0.00 0.00	3 1.52 .15	8 4.06 .39	3 1.52 .15	1 .51 .05	15 7.61 .73	6.56
SSE	0 0.00 0.00	0 0.00 0.00	3 1.52 .15	7 3.55 .34	13 6.60 .63	0 0.00 0.00	23 11.68 1.12	7.10
S	0 0.00 0.00	1 .51 .05	1 .51 .05	10 5.08 .49	13 6.60 .63	0 0.00 0.00	25 12.69 1.22	7.38
SSW	0 0.00 0.00	1 .51 .05	2 1.02 .10	10 5.08 .49	6 3.05 .29	2 1.02 .10	21 10.66 1.03	6.98
SW	0 0.00 0.00	0 0.00 0.00	1 .51 .05	14 7.11 .68	7 3.55 .34	1 .51 .05	23 11.68 1.12	6.91
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	5.70
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .51 .05	1 .51 .05	0 0.00 0.00	2 1.02 .10	7.25
WNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	1 .51 .05	0 0.00 0.00	3 1.52 .15	6.33
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	5.30
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	0 0.00 0.00	0 0.00 0.00	2 1.02 .10	6.35
N	0 0.00 0.00	0 0.00 0.00	1 .51 .05	4 2.03 .20	2 1.02 .10	1 .51 .05	8 4.06 .39	7.57
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	5 2.54 .24	23 11.68 1.12	92 46.70 4.49	69 35.03 3.37	8 4.06 .39	197 100.00 9.62	6.90

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL JULY COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.42.02.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00	3 .15	10 .49	47 2.29	18 .88	13 .63	91 4.44	7.22
NE	0 0.00	5 .24	19 .93	39 1.90	3 .15	0 0.00	66 3.22	5.23
ENE	0 0.00	8 .39	30 1.46	57 2.78	17 .83	4 .20	116 5.66	6.00
E	1 .05	14 .68	37 1.81	66 3.22	30 1.46	3 .15	151 7.37	5.93
ESE	2 .10	21 1.03	45 2.20	30 1.46	27 1.32	4 .20	129 6.30	5.35
SE	1 .05	8 .39	32 1.56	59 2.88	23 1.12	4 .20	127 6.20	5.98
SSE	0 0.00	13 .63	38 1.86	83 4.05	37 1.81	1 .05	172 8.40	6.00
S	0 0.00	13 .63	41 2.00	260 12.70	148 7.23	49 2.39	511 24.95	7.20
SSW	1 .05	10 .49	34 1.66	150 7.32	113 5.52	27 1.32	335 16.36	7.22
SW	0 0.00	3 .15	24 1.17	61 2.98	21 1.03	3 .15	112 5.47	6.26
WSW	0 0.00	1 .05	12 .59	21 1.03	10 .49	0 0.00	44 2.15	6.13
W	1 .05	5 .24	11 .54	14 .68	13 .63	2 .10	46 2.25	5.95
WNW	0 0.00	2 .10	9 .44	10 .49	13 .63	0 0.00	34 1.66	6.42
NW	2 .10	2 .10	5 .24	15 .73	10 .49	0 0.00	34 1.66	6.11
NNW	4 .20	1 .05	3 .15	13 .63	3 .15	1 .05	25 1.22	5.22
N	1 .05	3 .15	7 .34	24 1.17	13 .63	7 .34	55 2.69	6.91
CALM	0 0.00						0 0.00	CALM
TOTAL	13 .63	112 5.47	357 17.43	949 46.34	499 24.37	118 5.76	2048 100.00	6.52

NUMBER OF VALID OBSERVATIONS 2048 91.76 PCT.
NUMBER OF INVALID OBSERVATIONS 184 8.24 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .35 .05	1 .35 .05	0 0.00 0.00	1 .35 .05	3 1.04 .14	0 0.00 0.00	6 2.08 .29	5.73
NE	1 .35 .05	0 0.00 0.00	3 1.04 .14	5 1.74 .24	0 0.00 0.00	0 0.00 0.00	9 3.12 .43	4.94
ENE	1 .35 .05	0 0.00 0.00	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 .69 .10	2.95
E	1 .35 .05	0 0.00 0.00	1 .35 .05	1 .35 .05	1 .35 .05	0 0.00 0.00	4 1.39 .19	5.72
ESE	0 0.00 0.00	2 .69 .10	2 .69 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.39 .19	3.07
SE	0 0.00 0.00	4 1.39 .19	6 2.08 .29	1 .35 .05	1 .35 .05	0 0.00 0.00	12 4.17 .58	4.32
SSE	0 0.00 0.00	2 .69 .10	4 1.39 .19	9 3.12 .43	5 1.74 .24	1 .35 .05	21 7.29 1.01	6.46
S	1 .35 .05	4 1.39 .19	12 4.17 .58	28 9.72 1.34	24 8.33 1.15	20 6.94 .96	89 30.90 4.27	7.49
SSW	0 0.00 0.00	1 .35 .05	8 2.78 .38	45 15.62 2.16	22 7.64 1.06	3 1.04 .14	79 27.43 3.79	6.99
SW	1 .35 .05	2 .69 .10	5 1.74 .24	6 2.08 .29	3 1.04 .14	0 0.00 0.00	17 5.90 .82	5.09
WSW	0 0.00 0.00	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .35 .05	3.00
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
WNW	0 0.00 0.00	3 1.04 .14	2 .69 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.74 .24	3.42
NW	0 0.00 0.00	0 0.00 0.00	2 .69 .10	2 .69 .10	3 1.04 .14	2 .69 .10	9 3.12 .43	7.64
NNW	0 0.00 0.00	3 1.04 .14	4 1.39 .19	8 2.78 .38	3 1.04 .14	1 .35 .05	19 6.60 .91	6.06
N	1 .35 .05	3 1.04 .14	1 .35 .05	4 1.39 .19	2 .69 .10	0 0.00 0.00	11 3.82 .53	4.78
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	7 2.43 .34	26 9.03 1.25	51 17.71 2.45	110 38.19 5.28	67 23.26 3.22	27 9.37 1.30	288 100.00 13.83	6.49

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.56 .10	0 0.00 0.00	2 1.56 .10	8.90
NE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ENE	0 0.00 0.00	0 0.00 0.00	1 .78 .05	0 0.00 0.00	1 .78 .05	0 0.00 0.00	2 1.56 .10	6.05
E	0 0.00 0.00	0 0.00 0.00	1 .78 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .78 .05	4.50
ESE	0 0.00 0.00	1 .78 .05	2 1.56 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.34 .14	3.63
SE	0 0.00 0.00	2 1.56 .10	3 2.34 .14	3 2.34 .14	0 0.00 0.00	0 0.00 0.00	8 6.25 .38	4.35
SSE	0 0.00 0.00	0 0.00 0.00	1 .78 .05	0 0.00 0.00	1 .78 .05	1 .78 .05	3 2.34 .14	8.53
S	0 0.00 0.00	0 0.00 0.00	11 8.59 .53	11 8.59 .53	15 11.72 .72	8 6.25 .38	45 35.16 2.16	7.47
SSW	0 0.00 0.00	0 0.00 0.00	3 2.34 .14	16 12.50 .77	9 7.03 .43	3 2.34 .14	31 24.22 1.49	7.33
SW	0 0.00 0.00	1 .78 .05	4 3.13 .19	5 3.91 .24	3 2.34 14	0 0.00 0.00	13 10.16 .62	6.01
WSW	0 0.00 0.00	1 .78 .05	1 .78 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.56 .10	2.85
W	0 0.00 0.00	3 2.34 .14	2 1.56 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.91 .24	2.62
WNW	1 .78 .05	1 .78 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.56 .10	1.85
NW	0 0.00 0.00	1 .78 .05	1 .78 .05	0 0.00 0.00	2 1.56 .10	0 0.00 0.00	4 3.13 .19	5.80
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .78 .05	1 .78 .05	0 0.00 0.00	2 1.56 .10	8.25
N	0 0.00 0.00	0 0.00 0.00	3 2.34 .14	1 .78 .05	0 0.00 0.00	1 .78 .05	5 3.91 .24	5.44
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .78 .05	10 7.81 .48	33 25.78 1.59	37 28.91 1.78	34 26.56 1.63	13 10.16 62	128 100.00 6.15	6.54

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	0	1	3	1	0	5	6.68
	0.00	0.00	.69	2.07	.69	0.00	3.45	
	0.00	0.00	.05	.14	.05	0.00	.24	
NE	0	0	2	0	0	0	2	4.25
	0.00	0.00	1.38	0.00	0.00	0.00	1.38	
	0.00	0.00	.10	0.00	0.00	0.00	.10	
ENE	0	1	2	6	0	0	9	5.49
	0.00	.69	1.38	4.14	0.00	0.00	6.21	
	0.00	.05	.10	.29	0.00	0.00	.43	
E	0	0	0	0	1	0	1	8.00
	0.00	0.00	0.00	0.00	.69	0.00	.69	
	0.00	0.00	0.00	0.00	.05	0.00	.05	
ESE	0	1	1	2	0	0	4	5.05
	0.00	.69	.69	1.38	0.00	0.00	2.76	
	0.00	.05	.05	.10	0.00	0.00	.19	
SE	1	0	4	0	0	0	5	3.58
	.69	0.00	2.76	0.00	0.00	0.00	3.45	
	.05	0.00	.19	0.00	0.00	0.00	.24	
SSE	0	0	5	5	1	2	13	6.32
	0.00	0.00	3.45	3.45	.69	1.38	8.97	
	0.00	0.00	.24	.24	.05	.10	.62	
S	0	0	2	12	11	8	33	8.27
	0.00	0.00	1.38	8.28	7.59	5.52	22.76	
	0.00	0.00	.10	.58	.53	.38	1.59	
SSW	0	0	3	15	12	5	35	7.77
	0.00	0.00	2.07	10.34	8.28	3.45	24.14	
	0.00	0.00	.14	.72	.58	.24	1.68	
SW	0	1	4	3	6	2	16	7.24
	0.00	.69	2.76	2.07	4.14	1.38	11.03	
	0.00	.05	.19	.14	.29	.10	.77	
WSW	0	0	1	2	2	0	5	6.62
	0.00	0.00	.69	1.38	1.38	0.00	3.45	
	0.00	0.00	.05	.10	.10	0.00	.24	
W	0	0	2	0	2	0	4	6.70
	0.00	0.00	1.38	0.00	1.38	0.00	2.76	
	0.00	0.00	.10	0.00	.10	0.00	.19	
WNW	1	1	0	1	0	0	3	3.80
	.69	.69	0.00	.69	0.00	0.00	2.07	
	.05	.05	0.00	.05	0.00	0.00	.14	
NW	0	0	0	1	0	0	1	7.30
	0.00	0.00	0.00	.69	0.00	0.00	.69	
	0.00	0.00	0.00	.05	0.00	0.00	.05	
NNW	0	1	1	1	0	1	4	6.42
	0.00	.69	.69	.69	0.00	.69	2.76	
	0.00	.05	.05	.05	0.00	.05	.19	
N	0	1	3	0	1	0	5	4.76
	0.00	.69	2.07	0.00	.69	0.00	3.45	
	0.00	.05	.14	0.00	.05	0.00	.24	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	6	31	51	37	18	145	6.95
	1.38	4.14	21.38	35.17	25.52	12.41	100.00	
	.10	.29	1.49	2.45	1.78	.86	6.96	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	2	12	14	4	3	35	5.97
	0.00	.42	2.53	2.95	.84	.63	7.37	
	0.00	.10	.58	.67	.19	.14	1.68	
NE	0	4	11	25	2	1	43	5.54
	0.00	.84	2.32	5.26	.42	.21	9.05	
	0.00	.19	.53	1.20	.10	.05	2.07	
ENE	0	3	9	25	3	0	40	5.61
	0.00	.63	1.89	5.26	.63	0.00	8.42	
	0.00	.14	.43	1.20	.14	0.00	1.92	
E	2	4	9	17	7	0	39	5.35
	.42	.84	1.89	3.58	1.47	0.00	8.21	
	.10	.19	.43	.82	.34	0.00	1.87	
ESE	1	2	6	7	3	0	19	5.34
	.21	.42	1.26	1.47	.63	0.00	4.00	
	.05	.10	.29	.34	.14	0.00	.91	
SE	0	2	8	8	3	0	21	5.50
	0.00	.42	1.68	1.68	.63	0.00	4.42	
	0.00	.10	.38	.38	.14	0.00	1.01	
SSE	0	4	10	20	6	5	45	6.26
	0.00	.84	2.11	4.21	1.26	1.05	9.47	
	0.00	.19	.48	.96	.29	.24	2.16	
S	0	2	12	41	24	17	96	7.36
	0.00	.42	2.53	8.63	5.05	3.58	20.21	
	0.00	.10	.58	1.97	1.15	.82	4.61	
SSW	0	1	14	29	16	6	66	6.84
	0.00	.21	2.95	6.11	3.37	1.26	13.89	
	0.00	.05	.67	1.39	.77	.29	3.17	
SW	1	4	11	6	4	2	28	5.32
	.21	.84	2.32	1.26	.84	.42	5.89	
	.05	.19	.53	.29	.19	.10	1.34	
WSW	0	2	1	2	2	0	7	5.56
	0.00	.42	.21	.42	.42	0.00	1.47	
	0.00	.10	.05	.10	.10	0.00	.34	
W	0	3	1	1	1	0	6	4.50
	0.00	.63	.21	.21	.21	0.00	1.26	
	0.00	.14	.05	.05	.05	0.00	.29	
WNW	0	0	1	1	1	0	3	6.00
	0.00	0.00	.21	.21	.21	0.00	63	
	0.00	0.00	.05	.05	.05	0.00	.14	
NW	0	1	1	2	4	0	8	6.70
	0.00	.21	.21	.42	.84	0.00	1.68	
	0.00	.05	.05	.10	.19	0.00	.38	
NNW	0	0	2	2	3	1	8	6.90
	0.00	0.00	.42	.42	.63	.21	1.68	
	0.00	0.00	.10	.10	.14	.05	.38	
N	0	2	2	3	2	2	11	7.22
	0.00	.42	.42	.63	.42	.42	2.32	
	0.00	.10	.10	.14	.10	.10	.53	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	4	36	110	203	85	37	475	6.23
	.84	7.58	23.16	42.74	17.89	7.79	100.00	
	.19	1.73	5.28	9.75	4.08	1.78	22.81	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT 60.00 METERS
TABLE GENERATED: 11/11/81. 13 51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	8	12	3	1	25	6.06
	0.00	.18	1.40	2.10	.53	.18	4.38	
	0.00	.05	.38	.58	.14	.05	1.20	
NE	0	3	8	4	0	1	16	4.56
	0.00	.53	1.40	.70	0.00	.18	2.80	
	0.00	.14	.38	.19	0.00	.05	.77	
ENE	0	3	8	11	1	0	23	5.23
	0.00	.53	1.40	1.93	.18	0.00	4.03	
	0.00	.14	.38	.53	.05	0.00	1.10	
E	0	2	5	12	2	3	24	6.30
	0.00	.35	.88	2.10	.35	.53	4.20	
	0.00	.10	.24	.58	.10	.14	1.15	
ESE	0	2	2	11	3	0	18	5.81
	0.00	.35	.35	1.93	.53	0.00	3.15	
	0.00	.10	.10	.53	.14	0.00	.86	
SE	0	3	7	20	1	0	31	5.21
	0.00	.53	1.23	3.50	.18	0.00	5.43	
	0.00	.14	.34	.96	.05	0.00	1.49	
SSE	0	2	10	31	20	4	67	6.94
	0.00	.35	1.75	5.43	3.50	.70	11.73	
	0.00	.10	.48	1.49	.96	.19	3.22	
S	0	0	11	92	38	58	199	8.11
	0.00	0.00	1.93	16.11	6.65	10.16	34.85	
	0.00	0.00	.53	4.42	1.83	2.79	9.56	
SSW	0	1	17	51	10	12	91	6.82
	0.00	.18	2.98	8.93	1.75	2.10	15.94	
	0.00	.05	.82	2.45	.48	.58	4.37	
SW	0	1	13	4	2	0	20	4.83
	0.00	.18	2.28	.70	.35	0.00	3.50	
	0.00	.05	.62	.19	.10	0.00	.96	
WSW	0	1	2	1	2	0	6	5.40
	0.00	.18	.35	.18	.35	0.00	1.05	
	0.00	.05	.10	.05	.10	0.00	.29	
W	0	0	1	1	0	0	2	4.90
	0.00	0.00	.18	.18	0.00	0.00	.35	
	0.00	0.00	.05	.05	0.00	0.00	.10	
WNW	0	1	3	3	1	1	9	6.16
	0.00	.18	.53	.53	.18	.18	1.58	
	0.00	.05	.14	.14	.05	.05	.43	
NW	1	0	3	2	0	1	7	5.64
	.18	0.00	.53	.35	0.00	.18	1.23	
	.05	0.00	.14	.10	0.00	.05	.34	
NNW	0	1	0	6	3	1	11	6.77
	0.00	.18	0.00	1.05	.53	.18	1.93	
	0.00	.05	0.00	.29	.14	.05	.53	
N	0	0	4	10	5	3	22	7.10
	0.00	0.00	.70	1.75	.88	.53	3.85	
	0.00	0.00	.19	.48	.24	.14	1.06	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	1	21	102	271	91	85	571	6.88
	.18	3.68	17.86	47.46	15.94	14.89	100.00	
	.05	1.01	4.90	13.02	4.37	4.08	27.43	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	3	2	0	1	6	5.77
	0.00	0.00	.98	.65	0.00	.33	1.96	
	0.00	0.00	.14	.10	0.00	.05	.29	
NE	0	2	4	4	0	0	10	4.28
	0.00	.65	1.31	1.31	0.00	0.00	3.27	
	0.00	.10	.19	.19	0.00	0.00	.48	
ENE	0	0	0	3	4	1	8	8.61
	0.00	0.00	0.00	.98	1.31	.33	2.61	
	0.00	0.00	0.00	.14	.19	.05	.38	
E	0	1	1	7	4	1	14	6.85
	0.00	.33	.33	2.29	1.31	.33	4.58	
	0.00	.05	.05	.34	.19	.05	.67	
ESE	0	0	2	1	4	1	8	7.87
	0.00	0.00	.65	.33	1.31	.33	2.61	
	0.00	0.00	.10	.05	.19	.05	.38	
SE	0	2	2	13	12	1	30	7.17
	0.00	.65	.65	4.25	3.92	.33	9.80	
	0.00	.10	.10	.62	.58	.05	1.44	
SSE	1	1	3	25	7	8	45	7.38
	.33	.33	.98	8.17	2.29	2.61	14.71	
	.05	.05	.14	1.20	.34	.38	2.16	
S	0	3	4	40	25	20	92	7.98
	0.00	.98	1.31	13.07	8.17	6.54	30.07	
	0.00	.14	.19	1.92	1.20	.96	4.42	
SSW	0	0	5	15	3	4	27	6.91
	0.00	0.00	1.63	4.90	.98	1.31	8.82	
	0.00	0.00	.24	.72	.14	.19	1.30	
SW	2	1	6	8	0	2	19	5.37
	.65	.33	1.96	2.61	0.00	.65	6.21	
	.10	.05	.29	.38	0.00	.10	.91	
WSW	0	1	3	2	0	0	6	4.63
	0.00	.33	.98	.65	0.00	0.00	1.96	
	0.00	.05	.14	.10	0.00	0.00	.29	
W	0	2	3	5	0	1	11	5.46
	0.00	.65	.98	1.63	0.00	.33	3.59	
	0.00	.10	.14	.24	0.00	.05	.53	
WNW	0	0	1	0	0	0	1	4.20
	0.00	0.00	.33	0.00	0.00	0.00	.33	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
NW	1	2	4	2	0	1	10	4.89
	.33	.65	1.31	.65	0.00	.33	3.27	
	.05	.10	.19	.10	0.00	.05	.48	
NNW	1	0	3	6	1	0	11	5.66
	.33	0.00	.98	1.96	.33	0.00	3.59	
	.05	0.00	.14	.29	.05	0.00	.53	
N	0	0	2	5	0	1	8	6.39
	0.00	0.00	.65	1.63	0.00	.33	2.61	
	0.00	0.00	.10	.24	0.00	.05	.38	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	5	15	46	138	60	42	306	6.96
	1.63	4.90	15.03	45.10	19.61	13.73	100.00	
	.24	.72	2.21	6.63	2.88	2.02	14.70	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0	0	2	3	0	0	5	5.46
	0.00	0.00	1.18	1.78	0.00	0.00	2.96	
	0.00	0.00	.10	.14	0.00	0.00	.24	
NE	0	1	5	0	0	0	6	3.93
	0.00	.59	2.96	0.00	0.00	0.00	3.55	
	0.00	.05	.24	0.00	0.00	0.00	.29	
ENE	0	0	7	2	0	0	9	4.56
	0.00	0.00	4.14	1.18	0.00	0.00	5.33	
	0.00	0.00	.34	.10	0.00	0.00	.43	
E	0	1	4	5	3	0	13	5.75
	0.00	.59	2.37	2.96	1.78	0.00	7.69	
	0.00	.05	.19	.24	.14	0.00	.62	
ESE	0	0	2	5	1	1	9	6.80
	0.00	0.00	1.18	2.96	.59	.59	5.33	
	0.00	0.00	.10	.24	.05	.05	.43	
SE	0	0	1	8	6	4	19	7.94
	0.00	0.00	.59	4.73	3.55	2.37	11.24	
	0.00	0.00	.05	.38	.29	.19	.91	
SSE	0	0	4	1	3	3	11	7.57
	0.00	0.00	2.37	.59	1.78	1.78	6.51	
	0.00	0.00	.19	.05	.14	.14	.53	
S	0	0	2	5	6	16	29	9.78
	0.00	0.00	1.18	2.96	3.55	9.47	17.16	
	0.00	0.00	.10	.24	.29	.77	1.39	
SSW	1	0	0	7	4	15	27	9.59
	.59	0.00	0.00	4.14	2.37	8.88	15.98	
	.05	0.00	0.00	.34	.19	.72	1.30	
SW	0	2	2	5	1	0	10	5.42
	0.00	1.18	1.18	2.96	.59	0.00	5.92	
	0.00	.10	.10	.24	.05	0.00	.48	
WSW	0	0	2	1	0	0	3	4.53
	0.00	0.00	1.18	.59	0.00	0.00	1.78	
	0.00	0.00	.10	.05	0.00	0.00	.14	
W	1	0	3	1	0	0	5	3.76
	.59	0.00	1.78	.59	0.00	0.00	2.96	
	.05	0.00	.14	.05	0.00	0.00	.24	
WNW	0	1	1	6	0	0	8	5.80
	0.00	.59	.59	3.55	0.00	0.00	4.73	
	0.00	.05	.05	.29	0.00	0.00	.38	
NW	0	0	1	1	1	0	3	6.43
	0.00	0.00	.59	.59	.59	0.00	1.78	
	0.00	0.00	.05	.05	.05	0.00	.14	
NNW	0	0	3	3	0	0	6	5.02
	0.00	0.00	1.78	1.78	0.00	0.00	3.55	
	0.00	0.00	.14	.14	0.00	0.00	.29	
N	1	0	2	3	0	0	6	4.60
	.59	0.00	1.18	1.78	0.00	0.00	3.55	
	.05	0.00	.10	.14	0.00	0.00	.29	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	5	41	56	25	39	169	7.19
	1.78	2.96	24.26	33.14	14.79	23.08	100.00	
	.14	.24	1.97	2.69	1.20	1.87	8.12	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL AUGUST COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.51.50.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1	4	26	35	13	5	84	6.05
	.05	.19	1.25	1.68	.62	.24	4.03	
NE	1	10	33	38	2	2	86	5.01
	.05	.48	1.59	1.83	.10	.10	4.13	
ENE	1	7	28	47	9	1	93	5.61
	.05	.34	1.34	2.26	.43	.05	4.47	
E	3	8	21	42	18	4	96	5.89
	.14	.38	1.01	2.02	.86	.19	4.61	
ESE	1	8	17	26	11	2	65	5.75
	.05	.38	.82	1.25	.53	.10	3.12	
SE	1	13	31	53	23	5	126	5.93
	.05	.62	1.49	2.55	1.10	.24	6.05	
SSE	1	9	37	91	43	24	205	6.86
	.05	.43	1.78	4.37	2.07	1.15	9.85	
S	1	9	54	229	143	147	583	7.92
	.05	.43	2.59	11.00	6.87	7.06	28.00	
SSW	1	3	50	178	76	48	356	7.22
	.05	.14	2.40	8.55	3.65	2.31	17.10	
SW	4	12	45	37	19	6	123	5.55
	.19	.58	2.16	1.78	.91	.29	5.91	
WSW	0	6	10	8	6	0	30	5.15
	0.00	.29	.48	.38	.29	0.00	1.44	
W	1	8	12	8	3	1	33	4.72
	.05	.38	.58	.38	.14	.05	1.59	
WNW	2	7	8	11	2	1	31	5.04
	.10	.34	.38	.53	.10	.05	1.49	
NW	2	4	12	10	10	4	42	6.20
	.10	.19	.58	.48	.48	.19	2.02	
NNW	1	5	13	27	11	4	61	6.22
	.05	.24	.62	1.30	.53	.19	2.93	
N	2	6	17	26	10	7	68	6.15
	.10	29	.82	1.25	.48	.34	3.27	
CALM	0						0	CALM
	0.00						0.00	
TOTAL	23	119	414	866	399	261	2082	6.70
	1.10	5.72	19.88	41.59	19.16	12.54	100.00	

NUMBER OF VALID OBSERVATIONS 2082 93.28 PCT.
NUMBER OF INVALID OBSERVATIONS 150 6.72 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

WOLF CREEK

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.55.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .35 05	0 0.00 0.00	6 2.11 .29	10 3.51 .48	4 1.40 .19	2 .70 .10	23 8.07 1.10	6.66
NE	0 0.00 0.00	3 1.05 .14	6 2.11 .29	4 1.40 .19	1 .35 .05	0 0.00 0.00	14 4.91 .67	4.56
ENE	0 0.00 0.00	1 .35 .05	0 0.00 0.00	2 .70 .10	4 1.40 .19	1 .35 .05	8 2.81 .38	7 92
E	0 0.00 0.00	0 0.00 0 00	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .35 .05	3.40
ESE	0 0.00 0.00	4 1.40 .19	2 .70 .10	5 1.75 .24	0 0.00 0.00	0 0.00 0.00	11 3.86 .53	4.35
SE	2 .70 .10	5 1.75 .24	10 3.51 .48	6 2.11 .29	0 0.00 0.00	3 1.05 .14	26 9.12 1.25	4.73
SSE	2 .70 .10	2 .70 .10	15 5.26 .72	7 2.46 .34	0 0.00 0.00	5 1.75 .24	31 10.88 1.49	5.23
S	0 0.00 0.00	4 1.40 .19	13 4.56 .62	11 3.86 .53	14 4.91 .67	1 .35 .05	43 15.09 2.06	6.01
SSW	1 .35 .05	9 3.16 .43	10 3.51 .48	12 4.21 .58	8 2.81 .38	0 0.00 0.00	40 14.04 1.92	5.35
SW	0 0.00 0.00	6 2.11 .29	4 1.40 .19	2 .70 .10	0 0.00 0.00	0 0.00 0.00	12 4.21 .58	3.49
WSW	0 0.00 0.00	3 1.05 .14	1 .35 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.40 .19	2.70
W	1 .35 .05	3 1.05 .14	9 3.16 .43	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	13 4.56 .62	3.40
WNW	0 0.00 0.00	3 1.05 .14	2 .70 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.75 .24	3.02
NW	0 0.00 0.00	1 .35 .05	0 0.00 0.00	1 .35 .05	0 0.00 0.00	0 0.00 0.00	2 .70 .10	4.35
NNW	0 0.00 0.00	1 .35 .05	1 .35 .05	5 1.75 .24	4 1.40 .19	0 0.00 0.00	11 3.86 .53	6.58
N	0 0.00 0.00	0 0.00 0.00	1 .35 .05	15 5.26 .72	14 4.91 .67	11 3.86 .53	41 14.39 1.97	8.30
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	7 2.46 .34	45 15.79 2.16	81 28.42 3.88	80 28.07 3.84	49 17.19 2.35	23 8.07 1.10	285 100.00 13.66	5.69

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENFRATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	4 3.28 .19	1 .82 .05	3 2.46 .14	0 0.00 0.00	8 6.56 .38	6.05
NE	0 0.00 0.00	0 0.00 0.00	4 3.28 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.28 .19	3.90
ENE	0 0.00 0.00	2 1.64 .10	4 3.28 .19	3 2.46 .14	1 .82 .05	0 0.00 0.00	10 8.20 .48	4.76
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.64 .10	0 0.00 0.00	0 0.00 0.00	2 1.64 .10	6.50
ESE	0 0.00 0.00	0 0.00 0.00	4 3.28 .19	2 1.64 .10	0 0.00 0.00	0 0.00 0.00	6 4.92 .29	4.42
SE	0 0.00 0.00	1 .82 .05	1 .82 .05	3 2.46 .14	0 0.00 0.00	1 .82 .05	6 4.92 .29	5.77
SSE	0 0.00 0.00	2 1.64 .10	6 4.92 .29	3 2.46 .14	5 4.10 .24	1 .82 .05	17 13.93 .81	6.16
S	0 0.00 0.00	2 1.64 .10	11 9.02 .53	6 4.92 .29	3 2.46 .14	4 3.28 .19	26 21.31 1.25	6.04
SSW	0 0.00 0.00	1 .82 .05	5 4.10 .24	5 4.10 .24	3 2.46 .14	3 2.46 .14	17 13.93 .81	6.85
SW	0 0.00 0.00	1 .82 .05	3 2.46 .14	2 1.64 .10	0 0.00 0.00	0 0.00 0.00	6 4.92 .29	4 68
WSW	0 0.00 0.00	1 .82 .05	1 .82 .05	1 .82 .05	0 0.00 0.00	0 0.00 0.00	3 2.46 .14	4.40
W	0 0.00 0.00	2 1.64 .10	2 1.64 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.28 .19	2 85
WNW	0 0.00 0.00	0 0.00 0.00	1 .82 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .82 .05	4.40
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
NNW	0 0.00 0.00	1 .82 .05	1 .82 .05	2 1.64 .10	3 2.46 .14	0 0.00 0.00	7 5.74 .34	5.94
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.64 .10	1 .82 .05	2 1.64 .10	5 4.10 .24	8.40
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	13 10 66 62	47 38.52 2.25	32 26.23 1.53	19 15.57 .91	11 9.02 .53	122 100.00 5.85	5.78

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	0	4	1	7	1	13	7.43
	0.00	0.00	3.74	.93	6.54	.93	12.15	
	0.00	0.00	.19	.05	.34	.05	.62	
NE	0	0	3	2	1	0	6	5.40
	0.00	0.00	2.80	1.87	.93	0.00	5.61	
	0.00	0.00	.14	.10	.05	0.00	.29	
ENE	0	1	0	0	1	0	2	6.20
	0.00	.93	0.00	0.00	.93	0.00	1.87	
	0.00	.05	0.00	0.00	.05	0.00	.10	
E	0	1	0	1	1	0	3	4.90
	0.00	93	0.00	93	.93	0.00	2.80	
	0.00	.05	0.00	05	.05	0.00	.14	
ESE	0	1	1	0	1	0	3	5.10
	0.00	.93	.93	0.00	.93	0.00	2.80	
	0.00	.05	.05	0.00	.05	0.00	.14	
SE	0	2	4	2	0	0	8	3.89
	0.00	1.87	3.74	1.87	0.00	0.00	7.48	
	0.00	.10	.19	.10	0.00	0.00	.38	
SSE	1	1	7	6	0	2	17	5.36
	.93	.93	6.54	5.61	0.00	1.87	15.89	
	.05	.05	.34	.29	0.00	.10	.81	
S	0	2	8	9	3	2	24	6.02
	0.00	1.87	7.48	8.41	2.80	1.87	22.43	
	0.00	.10	.38	.43	.14	.10	1.15	
SSW	1	1	1	4	2	1	10	6.45
	.93	.93	.93	3.74	1.87	.93	9.35	
	.05	.05	.05	.19	.10	.05	.48	
SW	0	1	1	4	1	0	7	5.80
	0.00	.93	.93	3.74	.93	0.00	6.54	
	0.00	.05	.05	.19	.05	0.00	.34	
WSW	0	0	1	0	0	0	1	4.40
	0.00	0.00	.93	0.00	0.00	0.00	.93	
	0.00	0.00	.05	0.00	0.00	0.00	.05	
W	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WNW	0	1	1	0	0	0	2	3.00
	0.00	.93	.93	0.00	0.00	0.00	1.87	
	0.00	.05	.05	0.00	0.00	0.00	.10	
NW	0	0	1	1	2	0	4	7.17
	0.00	0.00	.93	.93	1.87	0.00	3.74	
	0.00	0.00	.05	.05	.10	0.00	.19	
NNW	0	1	0	2	2	0	5	6.24
	0.00	.93	0.00	1.87	1.87	0.00	4.67	
	0.00	.05	0.00	.10	.10	0.00	.24	
N	0	1	0	0	1	0	2	5.90
	0.00	.93	0.00	0.00	.93	0.00	1.87	
	0.00	.05	0.00	0.00	.05	0.00	.10	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	13	32	32	22	6	107	5.84
	1.87	12.15	29.91	29.91	20.56	5.61	100.00	
	.10	.62	1.53	1.53	1.05	.29	5.13	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	2	8	8	8	10	38	7.13
	.37	.37	1.47	1.47	1.47	1.84	6.99	
	.10	.10	.38	.38	.38	.48	1.82	
NE	0	10	7	4	5	1	27	4.70
	0.00	1.84	1.29	.74	.92	.18	4.96	
	0.00	.48	.34	.19	.24	.05	1.29	
ENE	0	4	5	11	6	0	26	5.88
	0.00	.74	.92	2.02	1.10	0.00	4.78	
	0.00	.19	.24	.53	.29	0.00	1.25	
E	0	5	8	23	9	2	47	6.10
	0.00	.92	1.47	4.23	1.65	.37	8.64	
	0.00	.24	.38	1.10	.43	.10	2.25	
ESE	0	5	15	8	4	0	32	4.97
	0.00	.92	2.76	1.47	.74	0.00	5.88	
	0.00	.24	.72	.38	.19	0.00	1.53	
SE	1	6	7	21	0	1	36	4.92
	.18	1.10	1.29	3.86	0.00	.18	6.62	
	.05	.29	.34	1.01	0.00	.05	1.73	
SSE	1	7	12	11	6	7	44	6.20
	.18	1.29	2.21	2.02	1.10	1.29	8.09	
	.05	.34	.58	.53	.29	.34	2.11	
S	1	6	18	24	18	19	86	7.23
	.18	1.10	3.31	4.41	3.31	3.49	15.81	
	.05	.29	.86	1.15	.86	.91	4.12	
SSW	1	10	10	17	2	3	43	5.45
	.18	1.84	1.84	3.12	.37	.55	7.90	
	.05	.48	.48	.81	.10	.14	2.06	
SW	0	2	8	10	1	0	21	5.23
	0.00	.37	1.47	1.84	.18	0.00	3.86	
	0.00	.10	.38	.48	.05	0.00	1.01	
WSW	0	3	2	2	2	0	9	4.97
	0.00	.55	.37	.37	.37	0.00	1.65	
	0.00	.14	.10	.10	.10	0.00	.43	
W	1	4	2	0	2	0	9	3.69
	.18	.74	.37	0.00	.37	0.00	1.65	
	.05	.19	.10	0.00	.10	0.00	.43	
WNW	0	1	3	2	0	0	6	4.32
	0.00	.18	.55	.37	0.00	0.00	1.10	
	0.00	.05	.14	.10	0.00	0.00	.29	
NW	0	4	3	11	3	2	23	5.95
	0.00	.74	.55	2.02	.55	.37	4.23	
	0.00	.19	.14	.53	.14	.10	1.10	
NNW	0	1	2	30	10	2	45	6.86
	0.00	.18	.37	5.51	1.84	.37	8.27	
	0.00	.05	.10	1.44	.48	.10	2.16	
N	0	2	5	28	14	3	52	6.97
	0.00	.37	.92	5.15	2.57	.55	9.56	
	0.00	.10	.24	1.34	.67	.14	2.49	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	7	72	115	210	90	50	544	6.11
	1.29	13.24	21.14	38.60	16.54	9.19	100.00	
	.34	3.45	5.51	10.07	4.31	2.40	26.08	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .24 .05	3 .71 .14	2 .48 .10	3 .71 14	2 .48 .10	11 2.61 .53	6.83
NE	0 0.00 0.00	3 .71 .14	5 1.19 .24	5 1.19 .24	0 0.00 0.00	0 0.00 0.00	13 3.09 .62	4.71
ENE	0 0.00 0.00	2 .48 .10	7 1.66 .34	2 .48 .10	8 1.90 .38	3 .71 .14	22 5.23 1.05	6.99
E	0 0.00 0.00	4 .95 .19	9 2.14 .43	9 2.14 .43	7 1.66 .34	1 .24 .05	30 7.13 1.44	5.71
ESE	0 0.00 0.00	4 .95 .19	3 .71 .14	8 1.90 .38	0 0.00 0.00	0 0.00 0.00	15 3.56 .72	4.80
SE	1 .24 .05	3 .71 .14	17 4.04 .81	15 3.56 .72	9 2.14 .43	4 .95 .19	49 11.64 2.35	5.95
SSE	0 0.00 0.00	3 .71 .14	11 2.61 .53	31 7.36 1.49	18 4.28 .86	9 2.14 .43	72 17.10 3.45	7.06
S	1 .24 .05	7 1.66 .34	10 2.38 .48	39 9.26 1.87	15 3.56 .72	18 4.28 .86	90 21.38 4.31	7.10
SSW	0 0.00 0.00	2 .48 .10	9 2.14 .43	21 4.99 1.01	2 .48 .10	1 .24 .05	35 8.31 1.68	5.79
SW	0 0.00 0.00	5 1.19 .24	8 1.90 .38	5 1.19 .24	2 .48 .10	0 0.00 0.00	20 4.75 .96	4.47
WSW	0 0.00 0.00	0 0.00 0.00	3 .71 .14	3 .71 .14	0 0.00 0.00	0 0.00 0.00	6 1.43 .29	4.38
W	2 .48 .10	1 .24 .05	2 .48 .10	1 .24 .05	0 0.00 0.00	0 0.00 0.00	6 1.43 .29	2.92
WNW	0 0.00 0.00	0 0.00 0.00	1 .24 .05	0 0.00 0.00	1 .24 .05	0 0.00 0.00	2 .48 .10	6.45
NW	1 .24 .05	3 .71 .14	4 .95 .19	1 .24 .05	1 .24 .05	1 .24 .05	11 2.61 .53	4.68
NNW	1 .24 .05	0 0.00 0.00	5 1.19 .24	3 .71 .14	2 .48 .10	0 0.00 0.00	11 2.61 .53	5.55
N	2 .48 .10	4 .95 .19	1 .24 .05	6 1.43 .29	11 2.61 .53	4 .95 .19	28 6.65 1.34	7.07
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	8 1.90 .38	42 9.98 2.01	98 23.28 4.70	151 35.87 7.24	79 18.76 3.79	43 10.21 2.06	421 100.00 20.18	6.25

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.24 .19	5 1.55 .24	4 1.24 .19	13 4.04 .62	8.48
NE	0 0.00 0.00	1 .31 .05	2 .62 .10	3 .93 .14	1 .31 .05	0 0.00 0.00	7 2.17 .34	5.33
ENE	0 0.00 0.00	1 .31 .05	3 .93 .14	2 .62 .10	4 1.24 .19	4 1.24 .19	14 4.35 .67	7.64
E	0 0.00 0.00	0 0.00 0.00	4 1.24 .19	7 2.17 .34	4 1.24 .19	0 0.00 0.00	15 4.66 .72	6.19
ESE	0 0.00 0.00	1 .31 .05	2 .62 .10	17 5.28 .81	1 .31 .05	0 0.00 0.00	21 6.52 1.01	6.15
SE	0 0.00 0.00	1 .31 .05	7 2.17 .34	31 9.63 1.49	10 3.11 .48	0 0.00 0.00	49 15.22 2.35	6.31
SSE	0 0.00 0.00	3 .93 .14	5 1.55 .24	25 7.76 1.20	12 3.73 .58	0 0.00 0.00	45 13.98 2.16	6.18
S	0 0.00 0.00	4 1.24 .19	16 4.97 .77	34 10.56 1.63	10 3.11 .48	0 0.00 0.00	64 19.88 3.07	5.87
SSW	2 .62 .10	1 .31 .05	9 2.80 .43	8 2.48 .38	3 .93 .14	0 0.00 0.00	23 7.14 1.10	5.26
SW	0 0.00 0.00	4 1.24 .19	4 1.24 .19	8 2.48 .38	0 0.00 0.00	0 0.00 0.00	16 4.97 .77	4.99
WSW	0 0.00 0.00	2 .62 .10	4 1.24 .19	1 .31 .05	0 0.00 0.00	0 0.00 0.00	7 2.17 .34	3.79
W	0 0.00 0.00	2 .62 .10	1 .31 .05	2 .62 .10	0 0.00 0.00	0 0.00 0.00	5 1.55 .24	4.10
WNW	1 .31 .05	1 .31 .05	0 0.00 0.00	2 .62 .10	0 0.00 0.00	0 0.00 0.00	4 1.24 .19	3.77
NW	0 0.00 0.00	3 .93 .14	3 .93 .14	2 .62 .10	0 0.00 0.00	0 0.00 0.00	8 2.48 .38	4.45
NNW	1 .31 .05	3 .93 .14	1 .31 .05	1 .31 .05	3 .93 .14	0 0.00 0.00	9 2.80 .43	4.66
N	0 0.00 0.00	4 1.24 .19	1 .31 .05	6 1.86 .29	6 1.86 .29	4 1.24 .19	21 6.52 1.01	6.82
CALM	1 .31 .05						1 .31 .05	CALM
TOTAL	5 1.55 24	31 9.63 1 49	62 19.25 2.97	153 47.52 7.33	59 18.32 2.83	12 3.73 .58	322 100.00 15.44	5.97

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL SEPTEMBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 .35 05	1 .35 .05	3 1.05 .14	7 2.46 .34	5 1.75 .24	3 1.05 .14	20 7.02 .96	6.85
NE	1 .35 .05	2 .70 .10	12 4.21 .58	16 5.61 .77	0 0.00 0.00	0 0.00 0.00	31 10.88 1.49	5.07
ENE	0 0.00 0.00	1 .35 .05	2 .70 .10	10 3.51 .48	8 2.81 .38	0 0.00 0.00	21 7.37 1.01	6.66
E	0 0.00 0.00	1 .35 .05	2 70 .10	12 4.21 .58	5 1.75 .24	0 0.00 0.00	20 7.02 .96	6.54
ESE	0 0.00 0.00	0 0.00 0.00	3 1.05 .14	14 4.91 .67	8 2.81 .38	0 0.00 0.00	25 8.77 1.20	6.71
SE	0 0.00 0.00	0 0.00 0.00	3 1.05 .14	26 9.12 1.25	10 3.51 .48	0 0.00 0.00	39 13.68 1.87	6.75
SSE	0 0.00 0.00	2 .70 .10	3 1.05 .14	22 7.72 1.05	7 2.46 .34	0 0.00 0.00	34 11.93 1.63	6.50
S	0 0.00 0.00	2 .70 .10	12 4.21 .58	20 7.02 .96	3 1.05 .14	0 0.00 0.00	37 12.98 1.77	5.43
SSW	0 0.00 0.00	0 0.00 0.00	6 2.11 .29	2 .70 .10	1 .35 .05	0 0.00 0.00	9 3.16 .43	4.72
SW	0 0.00 0.00	1 .35 .05	4 1.40 .19	3 1.05 .14	1 .35 .05	0 0.00 0.00	9 3.16 .43	5.27
WSW	1 .35 .05	2 .70 .10	4 1.40 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 2.46 .34	3.09
W	0 0.00 0.00	1 .35 .05	4 1.40 .19	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.75 .24	3.50
WNW	0 0.00 0.00	0 0.00 0.00	3 1.05 .14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.05 .14	3.77
NW	1 .35 .05	0 0.00 0.00	4 1.40 .19	3 1.05 .14	2 .70 .10	0 0.00 0.00	10 3.51 .48	5.01
NNW	0 0.00 0.00	0 0.00 0.00	1 .35 .05	1 35 .05	1 .35 .05	0 0.00 0.00	3 1.05 .14	6.00
N	0 0.00 0.00	1 .35 .05	0 0.00 0.00	3 1.05 .14	7 2.46 .34	0 0.00 0.00	11 3.86 .53	7.32
CALM	1 .35 .05						1 .35 .05	CALM
TOTAL	5 1.75 .24	14 4.91 .67	66 23.16 3.16	139 48.77 6.66	58 20.35 2.78	3 1.05 .14	285 100.00 13.66	5.99

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL SEPTEMBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 13.56.54.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	4 .19	4 .19	28 1.34	33 1.58	35 1.68	22 1.05	126 6.04	7.08
NE	1 .05	19 .91	39 1.87	34 1.63	8 .38	1 .05	102 4.89	4.85
ENE	0 0.00	12 .58	21 1.01	30 1.44	32 1.53	8 .38	103 4.94	6.57
E	0 0.00	11 .53	24 1.15	54 2.59	26 1.25	3 .14	118 5.66	6.04
ESE	0 0.00	15 .72	30 1.44	54 2.59	14 .67	0 0.00	113 5.42	5.47
SE	4 .19	18 .86	49 2.35	104 4.99	29 1.39	9 .43	213 10.21	5.77
SSE	4 .19	20 .96	59 2.83	105 5.03	48 2.30	24 1.15	260 12.46	6.30
S	2 .10	27 1.29	88 4.22	143 6.86	66 3.16	44 2.11	370 17.74	6.48
SSW	5 .24	24 1.15	50 2.40	69 3.31	21 1.01	8 .38	177 8.49	5.63
SW	0 0.00	20 .96	32 1.53	34 1.63	5 .24	0 0.00	91 4.36	4.81
WSW	1 .05	11 .53	16 .77	7 .34	2 .10	0 0.00	37 1.77	3.99
W	4 .19	13 .62	20 .96	3 .14	2 .10	0 0.00	42 2.01	3.44
WNW	1 .05	6 .29	11 .53	4 .19	1 .05	0 0.00	23 1.10	3.94
NW	2 .10	11 .53	15 .72	19 .91	8 .38	3 .14	58 2.78	5.37
NNW	2 .10	7 .34	11 .53	44 2.11	25 1.20	2 .10	91 4.36	6.32
N	2 .10	12 .58	8 .38	60 2.88	54 2.59	24 1.15	160 7.67	7.36
CALM	2 .10						2 .10	CALM
TOTAL	34 1.63	230 11.03	501 24.02	797 38.21	376 18.02	148 7.09	2086 100.00	6.01

NUMBER OF VALID OBSERVATIONS 2086 96.57 PCT.
NUMBER OF INVALID OBSERVATIONS 74 3.43 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	0 0.00 0.00	1 .76 .05	1 .76 .05	2 1.52 .10	0 0.00 0.00	4 3.03 .20	6.77
NE	0 0.00 0.00	2 1.52 .10	1 .76 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.27 .15	3.43
ENE	0 0.00 0.00	0 0.00 0.00	2 1.52 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.52 .10	3.60
E	0 0.00 0.00	1 .76 .05	2 1.52 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.27 .15	3.27
ESE	1 .76 .05	0 0.00 0.00	2 1.52 .10	2 1.52 .10	6 4.55 .30	1 .76 .05	12 9.09 .60	7.02
SE	0 0.00 0.00	0 0.00 0.00	3 2.27 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.27 .15	4.30
SSE	0 0.00 0.00	2 1.52 .10	3 2.27 .15	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.79 .25	3.64
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 6.82 .45	7 5.30 .35	11 8.33 .55	27 20.45 1.35	9.90
SSW	0 0.00 0.00	0 0.00 0.00	2 1.52 .10	4 3.03 .20	3 2.27 .15	4 3.03 .20	13 9.85 .65	9.53
SW	0 0.00 0.00	0 0.00 0.00	4 3.03 .20	2 1.52 .10	0 0.00 0.00	2 1.52 .10	8 6.06 .40	7.24
WSW	0 0.00 0.00	0 0.00 0.00	2 1.52 .10	4 3.03 .20	0 0.00 0.00	0 0.00 0.00	6 4.55 .30	5.25
W	0 0.00 0.00	0 0.00 0.00	1 .76 .05	1 .76 .05	0 0.00 0.00	0 0.00 0.00	2 1.52 .10	5.70
WNW	0 0.00 0.00	0 0.00 0.00	1 .76 .05	1 .76 .05	4 3.03 .20	3 2.27 .15	9 6.82 .45	9.04
NW	0 0.00 0.00	2 1.52 .10	0 0.00 0.00	0 0.00 0.00	5 3.79 .25	3 2.27 .15	10 7.58 .50	8.41
NNW	0 0.00 0.00	0 0.00 0.00	2 1.52 .10	1 .76 .05	2 1.52 .10	10 7.58 .50	15 11.36 .75	9.73
N	0 0.00 0.00	1 .76 .05	0 0.00 0.00	0 0.00 0.00	5 3.79 .25	4 3.03 .20	10 7.58 .50	9.89
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .76 .05	8 6.06 .40	26 19.70 1.30	25 18.94 1.25	34 25.76 1.70	38 28.79 1.90	132 100.00 6.58	8.12

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	2 1.98 .10	0 0.00 0.00	1 .99 .05	2 1.98 .10	0 0.00 0.00	5 4.95 .25	5.32
NE	0 0.00 0.00	1 .99 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .99 .05	2.80
ENE	0 0.00 0.00	0 0.00 0.00	1 .99 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .99 .05	3.50
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .99 .05	0 0.00 0.00	0 0.00 0.00	1 .99 .05	6.00
ESE	0 0.00 0.00	0 0.00 0.00	1 .99 .05	3 2.97 .15	1 .99 .05	1 .99 .05	6 5.94 .30	6.88
SE	0 0.00 0.00	1 .99 .05	1 .99 .05	2 1.98 .10	0 0.00 0.00	1 .99 .05	5 4.95 .25	5.90
SSE	0 0.00 0.00	1 .99 .05	1 .99 .05	1 .99 .05	1 .99 .05	0 0.00 0.00	4 3.96 .20	5.87
S	1 .99 .05	0 0.00 0.00	1 .99 .05	7 6.93 .35	5 4.95 .25	5 4.95 .25	19 18.81 .95	8.04
SSW	1 .99 .05	0 0.00 0.00	0 0.00 0.00	2 1.98 .10	3 2.97 .15	5 4.95 .25	11 10.89 .55	9.29
SW	0 0.00 0.00	1 .99 .05	5 4.95 .25	2 1.98 .10	3 2.97 .15	4 3.96 .20	15 14.85 .75	7.21
WSW	0 0.00 0.00	1 .99 .05	1 .99 .05	0 0.00 0.00	0 0.00 0.00	2 1.98 .10	4 3.96 .20	6.95
W	0 0.00 0.00	1 .99 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .99 .05	2.60
WNW	0 0.00 0.00	1 .99 .05	1 .99 .05	0 0.00 0.00	1 .99 .05	0 0.00 0.00	3 2.97 .15	4.77
NW	0 0.00 0.00	1 .99 .05	1 .99 .05	2 1.98 .10	1 .99 .05	1 .99 .05	6 5.94 .30	6.65
NNW	0 0.00 0.00	0 0.00 0.00	2 1.98 .10	2 1.98 .10	1 .99 .05	2 1.98 .10	7 6.93 .35	7.09
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.97 .15	7 6.93 .35	2 1.98 .10	12 11.88 .60	8.75
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.98 .10	10 9.90 .50	15 14.85 .75	26 25.74 1.30	25 24.75 1.25	23 22.77 1.15	101 100.00 5.04	7.28

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	0	1	0	0	2	4.70
	0.00	.95	0.00	.95	0.00	0.00	1.90	
	0.00	.05	0.00	.05	0.00	0.00	.10	
NE	0	1	0	0	0	0	1	2.10
	0.00	.95	0.00	0.00	0.00	0.00	.95	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
ENE	0	0	3	1	0	0	4	4.52
	0.00	0.00	2.86	.95	0.00	0.00	3.81	
	0.00	0.00	.15	.05	0.00	0.00	.20	
E	0	0	2	5	0	0	7	5.27
	0.00	0.00	1.90	4.76	0.00	0.00	6.67	
	0.00	0.00	.10	.25	0.00	0.00	.35	
ESE	0	0	4	1	1	0	6	5.03
	0.00	0.00	3.81	.95	.95	0.00	5.71	
	0.00	0.00	.20	.05	.05	0.00	.30	
SE	0	2	0	2	2	2	8	7.00
	0.00	1.90	0.00	1.90	1.90	1.90	7.62	
	0.00	.10	0.00	.10	.10	.10	.40	
SSE	0	0	0	3	2	0	5	7.86
	0.00	0.00	0.00	2.86	1.90	0.00	4.76	
	0.00	0.00	0.00	.15	.10	0.00	.25	
S	0	2	3	2	9	3	19	7.67
	0.00	1.90	2.86	1.90	8.57	2.86	18.10	
	0.00	.10	.15	.10	.45	.15	.95	
SSW	0	2	3	4	6	3	18	7.44
	0.00	1.90	2.86	3.81	5.71	2.86	17.14	
	0.00	.10	.15	.20	.30	.15	.90	
SW	0	0	1	1	1	1	4	7.50
	0.00	0.00	.95	.95	.95	.95	3.81	
	0.00	0.00	.05	.05	.05	.05	.20	
WSW	0	1	1	0	0	0	2	3.30
	0.00	.95	.95	0.00	0.00	0.00	1.90	
	0.00	.05	.05	0.00	0.00	0.00	.10	
W	0	1	1	1	0	0	3	4.27
	0.00	.95	.95	.95	0.00	0.00	2.86	
	0.00	.05	.05	.05	0.00	0.00	.15	
WNW	0	0	0	1	1	0	2	7.30
	0.00	0.00	0.00	.95	.95	0.00	1.90	
	0.00	0.00	0.00	.05	.05	0.00	.10	
NW	0	0	3	1	1	3	8	8.52
	0.00	0.00	2.86	.95	.95	2.86	7.62	
	0.00	0.00	.15	.05	.05	.15	.40	
NNW	0	1	3	1	1	1	7	5.47
	0.00	.95	2.86	.95	.95	.95	6.67	
	0.00	.05	.15	.05	.05	.05	.35	
N	0	0	1	3	3	2	9	7.67
	0.00	0.00	.95	2.86	2.86	1.90	8.57	
	0.00	0.00	.05	.15	.15	.10	.45	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	11	25	27	27	15	105	6.77
	0.00	10.48	23.81	25.71	25.71	14.29	100.00	
	0.00	.55	1.25	1.35	1.35	.75	5.24	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	4	7	7	6	1	25	5.99
	0.00	.77	1.35	1.35	1.16	.19	4.82	
	0.00	.20	.35	.35	.30	.05	1.25	
NE	0	1	9	6	0	0	16	4.64
	0.00	.19	1.73	1.16	0.00	0.00	3.08	
	0.00	.05	.45	.30	0.00	0.00	.80	
ENE	0	0	5	6	0	0	11	5.26
	0.00	0.00	.96	1.16	0.00	0.00	2.12	
	0.00	0.00	.25	.30	0.00	0.00	.55	
E	2	0	7	5	1	0	15	4.76
	.39	0.00	1.35	.96	.19	0.00	2.89	
	.10	0.00	.35	.25	.05	0.00	.75	
ESE	1	0	2	2	3	3	11	7.24
	.19	0.00	.39	.39	.58	.58	2.12	
	.05	0.00	.10	.10	.15	.15	.55	
SE	0	2	6	7	4	14	33	8.77
	0.00	.39	1.16	1.35	.77	2.70	6.36	
	0.00	.10	.30	.35	.20	.70	1.65	
SSE	0	1	7	10	7	10	35	7.84
	0.00	.19	1.35	1.93	1.35	1.93	6.74	
	0.00	.05	.35	.50	.35	.50	1.75	
S	1	3	18	35	49	41	147	8.78
	.19	.58	3.47	6.74	9.44	7.90	28.32	
	.05	.15	.90	1.75	2.44	2.04	7.33	
SSW	2	3	6	12	14	5	42	7.00
	.39	.58	1.16	2.31	2.70	.96	8.09	
	.10	.15	.30	.60	.70	.25	2.09	
SW	1	3	1	6	2	4	17	6.75
	.19	.58	.19	1.16	.39	.77	3.28	
	.05	.15	.05	.30	.10	.20	.85	
WSW	1	3	1	4	1	1	11	4.89
	.19	.58	.19	.77	.19	.19	2.12	
	.05	.15	.05	.20	.05	.05	.55	
W	0	2	7	2	7	7	25	7.49
	0.00	.39	1.35	39	1.35	1.35	4.82	
	0.00	.10	.35	10	.35	.35	1.25	
WNW	0	3	6	3	0	7	19	7.45
	0.00	.58	1.16	.58	0.00	1.35	3.66	
	0.00	.15	.30	.15	0.00	.35	95	
NW	0	1	4	3	3	5	16	8.49
	0.00	.19	.77	.58	.58	.96	3.08	
	0.00	.05	.20	.15	.15	.25	.80	
NNW	0	1	3	5	19	3	31	7.91
	0.00	.19	.58	.96	3.66	.58	5.97	
	0.00	.05	.15	.25	.95	.15	1.55	
N	2	1	2	12	19	28	64	9.24
	.39	.19	.39	2.31	3.66	5.39	12.33	
	.10	.05	.10	.60	.95	1.40	3.19	
CALM	1						1	CALM
	.19						.19	
	.05						.05	
TOTAL	11	28	91	125	135	129	519	7.80
	2.12	5.39	17.53	24.08	26.01	24.86	100.00	
	.55	1.40	4.54	6.23	6.73	6.43	25.89	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WOLF CREEK

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	2 .38 .10	2 .38 .10	5 .96 .25	5 .96 .25	14 2.68 .70	8.76
NE	0 0.00 0.00	2 .38 .10	5 .96 .25	2 .38 .10	0 0.00 0.00	0 0.00 0.00	9 1.72 .45	4.32
ENE	0 0.00 0.00	1 .19 .05	5 .96 .25	8 1.53 .40	6 1.15 .30	0 0.00 0.00	20 3.82 1.00	6.17
E	0 0.00 0.00	2 .38 .10	3 .57 .15	1 .19 05	11 2.10 .55	0 0.00 0.00	17 3.25 .85	7.18
ESE	0 0.00 0.00	0 0.00 0.00	2 .38 .10	3 .57 .15	4 .76 .20	5 .96 .25	14 2.68 .70	8.92
SE	0 0.00 0.00	1 .19 .05	2 .38 .10	11 2.10 55	10 1.91 .50	12 2.29 .60	36 6.88 1.80	8.64
SSE	1 .19 .05	1 .19 .05	4 .76 .20	11 2.10 55	32 6.12 1.60	23 4.40 1.15	72 13.77 3.59	9.18
S	1 .19 .05	1 .19 .05	8 1.53 .40	38 7.27 1.90	58 11.09 2.89	69 13.19 3.44	175 33.46 8.73	9.41
SSW	0 0.00 0.00	4 .76 .20	9 1.72 .45	15 2.87 .75	13 2.49 .65	2 .38 .10	43 8.22 2.14	6.30
SW	0 0.00 0.00	1 .19 .05	10 1.91 .50	7 1.34 .35	2 .38 .10	1 .19 .05	21 4.02 1.05	5.62
WSW	0 0.00 0.00	0 0.00 0.00	3 .57 .15	3 .57 .15	0 0.00 0.00	0 0.00 0.00	6 1.15 .30	5.02
W	0 0.00 0.00	1 .19 .05	5 .96 .25	3 .57 .15	1 .19 .05	1 .19 .05	11 2.10 .55	5.55
WNW	0 0.00 0.00	3 .57 .15	4 .76 .20	8 1.53 .40	9 1.72 .45	0 0.00 0.00	24 4.59 1.20	6.17
NW	1 .19 .05	0 0.00 0.00	6 1.15 .30	3 .57 .15	3 .57 .15	0 0.00 0.00	13 2.49 .65	5.65
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 2.10 .55	5 .96 .25	1 .19 .05	17 3.25 .85	7.37
N	1 .19 .05	0 0.00 0.00	0 0.00 0.00	8 1.53 .40	14 2.68 .70	8 1.53 .40	31 5.93 1.55	8.94
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 .76 .20	17 3.25 .85	68 13.00 3.39	134 25.62 6.68	173 33.08 8.63	127 24.28 6.33	523 100.00 26.08	8.13

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED. 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	2 .70 .10	9 3.15 .45	7 2.45 .35	0 0.00 0.00	18 6.29 .90	7.03
NE	0 0.00 0.00	0 0.00 0.00	3 1.05 .15	2 .70 .10	0 0.00 0.00	0 0.00 0.00	5 1.75 .25	4.84
ENE	1 .35 .05	2 .70 .10	3 1.05 .15	2 .70 .10	1 .35 .05	0 0.00 0.00	9 3.15 .45	4.22
E	0 0.00 0.00	1 .35 .05	2 .70 .10	1 .35 .05	6 2.10 .30	1 .35 .05	11 3.85 .55	7.06
ESE	1 .35 .05	0 0.00 0.00	7 2.45 .35	5 1.75 .25	4 1.40 .20	0 0.00 0.00	17 5.94 .85	5.50
SE	0 0.00 0.00	0 0.00 0.00	1 .35 .05	10 3.50 .50	5 1.75 .25	0 0.00 0.00	16 5.59 .80	7.28
SSE	0 0.00 0.00	1 .35 .05	1 .35 .05	21 7.34 1.05	17 5.94 .85	2 .70 .10	42 14.69 2.09	7.53
S	1 .35 .05	0 0.00 0.00	4 1.40 .20	17 5.94 .85	22 7.69 1.10	0 0.00 0.00	44 15.38 2.19	7.39
SSW	0 0.00 0.00	2 .70 .10	3 1.05 .15	9 3.15 .45	5 1.75 .25	0 0.00 0.00	19 6.64 .95	6.10
SW	0 0.00 0.00	0 0.00 0.00	8 2.80 .40	7 2.45 .35	4 1.40 .20	0 0.00 0.00	19 6.64 .95	5.67
WSW	0 0.00 0.00	0 0.00 0.00	11 3.85 .55	2 .70 .10	0 0.00 0.00	0 0.00 0.00	13 4.55 .65	4.42
W	0 0.00 0.00	1 .35 .05	3 1.05 .15	2 .70 .10	1 35 .05	0 0.00 0.00	7 2.45 .35	5.26
WNW	0 0.00 0.00	0 0.00 0.00	6 2.10 .30	3 1.05 .15	9 3.15 .45	0 0.00 0.00	18 6.29 .90	6.70
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 4.20 .60	11 3.85 .55	1 .35 .05	24 8.39 1.20	7.58
NNW	0 0.00 0.00	0 0.00 0.00	1 .35 .05	7 2.45 .35	5 1.75 .25	0 0.00 0.00	13 4.55 .65	6.88
N	0 0.00 0.00	0 0.00 0.00	3 1.05 .15	7 2.45 .35	1 .35 .05	0 0.00 0.00	11 3.85 .55	5.72
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 1.05 15	7 2.45 35	58 20.28 2.89	116 40.56 5.79	98 34.27 4.89	4 1.40 .20	286 100.00 14.26	6.61

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	0	1	8	3	1	13	6.92
	0.00	0.00	.29	2.36	.88	.29	3.83	
	0.00	0.00	.05	.40	.15	.05	.65	
NE	0	1	5	5	0	0	11	4.81
	0.00	.29	1.47	1.47	0.00	0.00	3.24	
	0.00	.05	.25	.25	0.00	0.00	.55	
ENE	0	0	3	7	2	0	12	6.24
	0.00	0.00	.88	2.06	.59	0.00	3.54	
	0.00	0.00	.15	.35	.10	0.00	.60	
E	0	0	3	7	6	0	16	6.63
	0.00	0.00	.88	2.06	1.77	0.00	4.72	
	0.00	0.00	.15	.35	.30	0.00	.80	
ESE	1	0	9	13	9	0	32	6.33
	.29	0.00	2.65	3.83	2.65	0.00	9.44	
	.05	0.00	.45	.65	.45	0.00	1.60	
SE	0	1	4	18	7	0	30	6.37
	0.00	.29	1.18	5.31	2.06	0.00	8.85	
	0.00	.05	.20	.90	.35	0.00	1.50	
SSE	0	2	7	18	9	0	36	6.24
	0.00	.59	2.06	5.31	2.65	0.00	10.62	
	0.00	.10	.35	.90	.45	0.00	1.80	
S	0	0	5	26	15	1	47	7.00
	0.00	0.00	1.47	7.67	4.42	.29	13.86	
	0.00	0.00	.25	1.30	.75	.05	2.34	
SSW	1	1	5	22	2	0	31	5.78
	.29	.29	1.47	6.49	.59	0.00	9.14	
	.05	.05	.25	1.10	.10	0.00	1.55	
SW	0	1	2	4	2	0	9	5.70
	0.00	.29	.59	1.18	.59	0.00	2.65	
	0.00	.05	.10	.20	.10	0.00	.45	
WSW	0	0	8	10	1	0	19	5.45
	0.00	0.00	2.36	2.95	.29	0.00	5.60	
	0.00	0.00	.40	.50	.05	0.00	.95	
W	0	3	2	5	0	0	10	4.33
	0.00	.88	.59	1.47	0.00	0.00	2.95	
	0.00	.15	.10	.25	0.00	0.00	.50	
WNW	0	0	3	9	5	0	17	6.59
	0.00	0.00	.88	2.65	1.47	0.00	5.01	
	0.00	0.00	.15	.45	.25	0.00	.85	
NW	0	0	5	9	10	1	25	6.84
	0.00	0.00	1.47	2.65	2.95	.29	7.37	
	0.00	0.00	.25	.45	.50	.05	1.25	
NNW	0	0	2	4	4	0	10	6.49
	0.00	0.00	.59	1.18	1.18	0.00	2.95	
	0.00	0.00	.10	.20	.20	0.00	.50	
N	0	2	4	6	9	0	21	6.34
	0.00	.59	1.18	1.77	2.65	0.00	6.19	
	0.00	.10	.20	.30	.45	0.00	1.05	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	11	68	171	84	3	339	6.28
	.59	3.24	20.06	50.44	24.78	.88	100.00	
	.10	.55	3.39	8.53	4.19	.15	16.91	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL OCTOBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 14.57.07.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	0	7	13	29	25	7	81	6.82
	0.00	.35	.65	1.45	1.25	.35	4.04	
NE	0	8	23	15	0	0	46	4.47
	0.00	.40	1.15	.75	0.00	0.00	2.29	
ENE	1	3	22	24	9	0	59	5.47
	.05	.15	1.10	1.20	.45	0.00	2.94	
E	2	4	19	20	24	1	70	6.14
	.10	.20	.95	1.00	1.20	.05	3.49	
ESE	4	0	27	29	28	10	98	6.70
	.20	0.00	1.35	1.45	1.40	.50	4.89	
SE	0	7	17	50	28	29	131	7.68
	0.00	.35	.85	2.49	1.40	1.45	6.53	
SSE	1	8	23	64	68	35	199	7.83
	.05	.40	1.15	3.19	3.39	1.75	9.93	
S	4	6	39	134	165	130	478	8.70
	.20	.30	1.95	6.68	8.23	6.48	23.84	
SSW	4	12	28	68	46	19	177	6.89
	.20	.60	1.40	3.39	2.29	.95	8.83	
SW	1	6	31	29	14	12	93	6.32
	.05	.30	1.55	1.45	.70	.60	4.64	
WSW	1	5	27	23	2	3	61	5.10
	.05	.25	1.35	1.15	.10	.15	3.04	
W	0	9	19	14	9	8	59	6.02
	0.00	.45	.95	.70	.45	.40	2.94	
WNW	0	7	21	25	29	10	92	6.88
	0.00	.35	1.05	1.25	1.45	.50	4.59	
NW	1	4	19	30	34	14	102	7.40
	.05	.20	.95	1.50	1.70	.70	5.09	
NNW	0	2	13	31	37	17	100	7.59
	0.00	.10	.65	1.55	1.85	.85	4.99	
N	3	4	10	39	58	44	158	8.46
	.15	.20	.50	1.95	2.89	2.19	7.88	
CALM	1						1	CALM
	.05						.05	
TOTAL	23	92	351	624	576	339	2005	7.40
	1.15	4.59	17.51	31.12	28.73	16.91	100.00	

NUMBER OF VALID OBSERVATIONS 2005 89.83 PCT
NUMBER OF INVALID OBSERVATIONS 227 10.17 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .84 .05	0 0.00 0.00	0 0.00 0.00	1 .84 .05	5.20
NE	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	1 .84 .05	0 0.00 0.00	0 0.00 0.00	5 4.20 .23	4.76
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	5.47
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .84 .05	0 0.00 0.00	0 0.00 0.00	1 .84 .05	6.20
ESE	1 .84 .05	2 1.68 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.52 .14	2.33
SE	0 0.00 0.00	1 .84 .05	0 0.00 0.00	1 .84 .05	0 0.00 0.00	0 0.00 0.00	2 1.68 .09	3.65
SSE	0 0.00 0.00	0 0.00 0.00	4 3.36 .19	7 5.88 .33	1 .84 .05	0 0.00 0.00	12 10.08 .56	5.95
S	0 0.00 0.00	0 0.00 0.00	1 .84 .05	7 5.88 .33	4 3.36 .19	3 2.52 .14	15 12.61 .70	8.63
SSW	0 0.00 0.00	0 0.00 0.00	1 .84 .05	1 .84 .05	0 0.00 0.00	11 9.24 .51	13 10.92 .61	11.88
SW	0 0.00 0.00	0 0.00 0.00	1 .84 .05	0 0.00 0.00	4 3.36 .19	5 4.20 .23	10 8.40 .47	10.30
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .84 .05	1 .84 .05	2 1.68 .09	11.15
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .84 .05	7 5.88 .33	1 .84 .05	9 7.56 .42	8.82
WNW	0 0.00 0.00	0 0.00 0.00	1 .84 .05	2 1.68 .09	2 1.68 .09	0 0.00 0.00	5 4.20 .23	7.00
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.68 .09	4 3.36 .19	9 7.56 .42	15 12.61 .70	10.46
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 4.20 .23	3 2.52 .14	2 1.68 .09	10 8.40 .47	8.63
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 9.24 .51	1 .84 .05	12 10.08 .56	9.08
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .84 .05	3 2.52 .14	12 10.08 .56	33 27.73 1.54	37 31.09 1.73	33 27.73 1.54	119 100.00 5.55	8.56

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	1 .88 .05	0 0.00 0.00	1 .88 .05	1 .88 .05	3 2.63 .14	7.67
NE	0 0.00 0.00	3 2.63 .14	1 .88 .05	1 .88 .05	1 .88 .05	0 0.00 0.00	6 5.26 .28	4.48
ENE	0 0.00 0.00	1 .88 .05	0 0.00 0.00	2 1.75 .09	1 .88 .05	0 0.00 0.00	4 3.51 .19	5.57
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	2 1.75 .09	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.75 .09	2.20
SE	0 0.00 0.00	1 .88 .05	1 .88 .05	1 .88 .05	0 0.00 0.00	0 0.00 0.00	3 2.63 .14	4.37
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.63 .14	1 .88 .05	0 0.00 0.00	4 3.51 .19	7.30
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 5.26 .28	6 5.26 .28	3 2.63 .14	15 13.16 .70	8.76
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.51 .19	3 2.63 .14	2 1.75 .09	9 7.89 .42	8.24
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.51 .19	1 .88 .05	3 2.63 .14	8 7.02 .37	8.92
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .88 .05	0 0.00 0.00	0 0.00 0.00	1 .88 .05	7.00
W	0 0.00 0.00	0 0.00 0.00	2 1.75 .09	7 6.14 .33	2 1.75 .09	0 0.00 0.00	11 9.65 .51	6.34
WNW	0 0.00 0.00	1 .88 .05	1 .88 .05	1 .88 .05	2 1.75 .09	0 0.00 0.00	5 4.39 .23	6.32
NW	0 0.00 0.00	1 .88 .05	1 .88 .05	2 1.75 .09	4 3.51 .19	11 9.65 .51	19 16.67 .89	10.67
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.51 .19	2 1.75 .09	7 6.14 .33	13 11.40 .61	10.00
N	0 0.00 0.00	0 0.00 0.00	3 2.63 .14	3 2.63 .14	3 2.63 .14	2 1.75 .09	11 9.65 .51	7.82
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	9 7.89 .42	10 8.77 .47	39 34.21 1.82	27 23.68 1.26	29 25.44 1.35	114 100.00 5.32	8.10

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.03.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	2 1.36 .09	3 2.04 .14	4 2.72 .19	6 4.08 .28	8 5.44 .37	23 15.65 1.07	8.20
NE	0 0.00 0.00	0 0.00 0.00	2 1.36 .09	2 1.36 .09	0 0.00 0.00	0 0.00 0.00	4 2.72 .19	4.62
ENE	0 0.00 0.00	1 .68 .05	0 0.00 0.00	1 .68 .05	1 .68 .05	0 0.00 0.00	3 2.04 .14	6.03
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	1 .68 .05	0 0.00 0.00	2 1.36 .09	2 1.36 .09	0 0.00 0.00	5 3.40 .23	6.40
SE	0 0.00 0.00	0 0.00 0.00	1 .68 .05	1 .68 .05	0 0.00 0.00	0 0.00 0.00	2 1.36 .09	4.95
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 5.44 .37	2 1.36 .09	0 0.00 0.00	10 6.80 .47	6.92
S	0 0.00 0.00	1 .68 .05	3 2.04 .14	5 3.40 .23	1 .68 .05	2 1.36 .09	12 8.16 .56	6.96
SSW	0 0.00 0.00	0 0.00 0.00	3 2.04 .14	5 3.40 .23	3 2.04 .14	4 2.72 .19	15 10.20 .70	7.65
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.36 .09	1 .68 .05	2 1.36 .09	5 3.40 .23	8.62
WSW	0 0.00 0.00	0 0.00 0.00	1 .68 .05	2 1.36 .09	2 1.36 .09	0 0.00 0.00	5 3.40 .23	6.82
W	0 0.00 0.00	0 0.00 0.00	3 2.04 .14	2 1.36 .09	1 .68 .05	0 0.00 0.00	6 4.08 .28	6.13
WNW	0 0.00 0.00	0 0.00 0.00	1 .68 .05	3 2.04 .14	1 .68 .05	0 0.00 0.00	5 3.40 .23	6.34
NW	0 0.00 0.00	1 .68 .05	0 0.00 0.00	4 2.72 .19	11 7.48 .51	6 4.08 .28	22 14.97 1.03	9.21
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 3.40 .23	4 2.72 .19	9 6.12 .42	18 12.24 .84	9.68
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.36 .09	8 5.44 .37	2 1.36 .09	12 8.16 .56	9.40
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	0 0.00 0.00	6 4.08 .28	17 11.56 .79	48 32.65 2.24	43 29.25 2.01	33 22.45 1.54	147 100.00 6.86	7.96

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.03.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1 .14 .05	2 .27 .09	13 1.77 .61	21 2.86 .98	19 2.59 .89	9 1.23 .42	65 8.87 3.03	7.01
NE	1 .14 .05	2 .27 .09	10 1.36 .47	17 2.32 .79	0 0.00 0.00	0 0.00 0.00	30 4.09 1.40	4.85
ENE	0 0.00 0.00	1 .14 .05	5 .68 .23	7 .95 .33	3 .41 .14	0 0.00 0.00	16 2.18 .75	5.71
E	1 .14 .05	0 0.00 0.00	3 .41 .14	8 1.09 .37	8 1.09 .37	3 .41 .14	23 3.14 1.07	7.30
ESE	0 0.00 0.00	0 0.00 0.00	1 .14 .05	2 .27 .09	3 .41 .14	2 .27 .09	8 1.09 .37	8.99
SE	0 0.00 0.00	1 .14 .05	5 .68 .23	4 .55 .19	1 .14 .05	3 .41 .14	14 1.91 .65	6.62
SSE	0 0.00 0.00	2 .27 .09	12 1.64 .56	24 3.27 1.12	13 1.77 .61	15 2.05 .70	66 9.00 3.08	7.42
S	2 .27 .09	6 .82 .28	34 4.64 1.59	41 5.59 1.91	15 2.05 .70	28 3.82 1.31	126 17.19 5.88	7.06
SSW	0 0.00 0.00	4 .55 .19	7 .95 .33	32 4.37 1.49	23 3.14 1.07	19 2.59 .89	85 11.60 3.97	7.71
SW	1 .14 .05	2 .27 .09	5 .68 .23	8 1.09 .37	13 1.77 .61	9 1.23 .42	38 5.18 1.77	7.80
WSW	0 0.00 0.00	0 0.00 0.00	3 .41 .14	4 .55 .19	9 1.23 .42	3 .41 .14	19 2.59 .89	7.51
W	0 0.00 0.00	0 0.00 0.00	5 .68 .23	10 1.36 .47	20 2.73 .93	4 .55 .19	39 5.32 1.82	7.89
WNW	0 0.00 0.00	1 .14 .05	2 .27 .09	10 1.36 .47	8 1.09 .37	1 .14 .05	22 3.00 1.03	7.17
NW	1 .14 .05	0 0.00 0.00	1 .14 .05	15 2.05 .70	16 2.18 .75	16 2.18 .75	49 6.68 2.29	9.01
NNW	2 .27 .09	3 .41 .14	7 .95 .33	15 2.05 .70	33 4.50 1.54	28 3.82 1.31	88 12.01 4.11	8.43
N	1 .14 .05	3 .41 .14	6 .82 .28	10 1.36 .47	18 2.46 .84	7 .95 .33	45 6.14 2.10	7.57
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	10 1.36 .47	27 3.68 1.26	119 16.23 5.55	228 31.11 10.64	202 27.56 9.43	147 20.05 6.86	733 100.00 34.20	7.49

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	1 .20 .05	1 .20 .05	2 .40 .09	2 .40 .09	0 0.00 0.00	3 .60 .14	9 1.81 .42	6.63
NE	0 0.00 0.00	1 .20 .05	9 1.81 .42	9 1.81 .42	0 0.00 0.00	0 0.00 0.00	19 3.83 .89	5.00
ENE	0 0.00 0.00	2 .40 .09	1 .20 .05	3 .60 .14	7 1.41 .33	8 1.61 .37	21 4.23 .98	8.59
E	0 0.00 0.00	0 0.00 0.00	1 .20 .05	5 1.01 .23	7 1.41 .33	0 0.00 0.00	13 2.62 .61	7.63
ESE	1 .20 .05	1 .20 .05	0 0.00 0.00	7 1.41 .33	3 .60 .14	3 .60 .14	15 3.02 .70	7.21
SE	0 0.00 0.00	1 .20 .05	4 .81 .19	12 2.42 .56	6 1.21 .28	3 .60 .14	26 5.24 1.21	7.01
SSE	0 0.00 0.00	0 0.00 0.00	4 .81 .19	10 2.02 .47	13 2.62 .61	22 4.44 1.03	49 9.88 2.29	9.22
S	1 .20 .05	0 0.00 0.00	5 1.01 .23	28 5.65 1.31	40 8.06 1.87	31 6.25 1.45	105 21.17 4.90	8.80
SSW	0 0.00 0.00	0 0.00 0.00	5 1.01 .23	29 5.85 1.35	15 3.02 .70	5 1.01 .23	54 10.89 2.52	7.36
SW	0 0.00 0.00	0 0.00 0.00	6 1.21 .28	5 1.01 .23	2 .40 .09	0 0.00 0.00	13 2.62 .61	6.19
WSW	0 0.00 0.00	0 0.00 0.00	1 .20 .05	8 1.61 .37	2 .40 .09	0 0.00 0.00	11 2.22 .51	6.60
W	0 0.00 0.00	1 .20 .05	2 .40 .09	7 1.41 .33	9 1.81 .42	3 .60 .14	22 4.44 1.03	7.54
WNW	0 0.00 0.00	0 0.00 0.00	3 .60 .14	27 5.44 1.26	21 4.23 .98	4 .81 .19	55 11.09 2.57	7.48
NW	1 .20 .05	0 0.00 0.00	1 .20 .05	15 3.02 .70	21 4.23 .98	4 .81 .19	42 8.47 1.96	7.83
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 2.22 .51	15 3.02 .70	4 .81 .19	30 6.05 1.40	8.26
N	1 .20 .05	1 .20 .05	1 .20 .05	5 1.01 .23	3 .60 .14	0 0.00 0.00	11 2.22 .51	6.27
CALM	1 .20 .05						1 .20 .05	CALM
TOTAL	6 1.21 .28	8 1.61 .37	45 9.07 2.10	183 36.90 8.54	164 33.06 7.65	90 18.15 4.20	496 100.00 23.15	7.81

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	3 .92 .14	5 1.54 .23	3 .92 .14	0 0.00 0.00	11 3.38 .51	6.50
NE	0 0.00 0.00	0 0.00 0.00	4 1.23 .19	6 1.85 .28	2 .62 .09	0 0.00 0.00	12 3.69 .56	5.64
ENE	1 .31 .05	0 0.00 0.00	2 .62 .09	2 .62 .09	6 1.85 .28	1 .31 .05	12 3.69 .56	7.02
E	0 0.00 0.00	1 .31 .05	2 .62 .09	5 1.54 .23	0 0.00 0.00	1 .31 .05	9 2.77 .42	5.90
ESE	0 0.00 0.00	0 0.00 0.00	1 .31 .05	8 2.46 .37	0 0.00 0.00	0 0.00 0.00	9 2.77 .42	5.98
SE	0 0.00 0.00	0 0.00 0.00	1 .31 .05	4 1.23 .19	3 .92 .14	0 0.00 0.00	8 2.46 .37	7.31
SSE	0 0.00 0.00	0 0.00 0.00	2 .62 .09	8 2.46 .37	15 4.62 .70	2 .62 .09	27 8.31 1.26	7.84
S	0 0.00 0.00	1 .31 .05	3 .92 .14	31 9.54 1.45	30 9.23 1.40	8 2.46 .37	73 22.46 3.41	7.63
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	12 3.69 .56	4 1.23 .19	7 2.15 .33	23 7.08 1.07	8.25
SW	0 0.00 0.00	2 .62 .09	2 .62 .09	6 1.85 .28	7 2.15 .33	0 0.00 0.00	17 5.23 .79	6.56
WSW	0 0.00 0.00	2 .62 .09	5 1.54 .23	5 1.54 .23	6 1.85 .28	0 0.00 0.00	18 5.54 .84	5.90
W	0 0.00 0.00	0 0.00 0.00	6 1.85 .28	17 5.23 .79	1 .31 .05	0 0.00 0.00	24 7.38 1.12	5.83
WNW	0 0.00 0.00	1 .31 .05	3 .92 .14	10 3.08 .47	16 4.92 .75	0 0.00 0.00	30 9.23 1.40	6.99
NW	0 0.00 0.00	0 0.00 0.00	2 .62 .09	11 3.38 .51	13 4.00 .61	0 0.00 0.00	26 8.00 1.21	7.27
NNW	0 0.00 0.00	0 0.00 0.00	3 .92 .14	6 1.85 .28	5 1.54 .23	0 0.00 0.00	14 4.31 .65	7.03
N	0 0.00 0.00	1 .31 .05	3 .92 .14	3 .92 .14	4 1.23 .19	1 .31 .05	12 3.69 .56	6.29
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	1 .31 .05	8 2.46 .37	42 12.92 1.96	139 42.77 6.49	115 35.38 5.37	20 6.15 .93	325 100.00 15.17	7.01

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD. ALL NOVEMBER COMBINED

STABILITY CLASS. PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 48 .05	3 1.44 .14	3 1.44 .14	6 2.87 .28	0 0.00 0.00	13 6.22 .61	6.35
NE	0 0.00 0.00	1 48 05	2 .96 .09	3 1.44 .14	1 .48 .05	0 0.00 0.00	7 3 35 .33	5.33
ENE	0 0.00 0.00	0 0.00 0.00	1 .48 .05	0 0.00 0.00	0 0.00 0.00	1 .48 .05	2 .96 .09	7.45
E	0 0.00 0.00	0 0.00 0.00	4 1.91 .19	1 .48 .05	3 1.44 .14	0 0.00 0.00	8 3 83 37	6.04
ESE	0 0.00 0.00	0 0.00 0.00	1 .48 .05	2 .96 .09	0 0.00 0.00	1 .48 .05	4 1.91 .19	6.72
SE	0 0.00 0.00	1 .48 .05	2 .96 .09	2 .96 .09	8 3.83 .37	0 0.00 0.00	13 6 22 61	7.02
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 2.39 .23	11 5.26 .51	1 .48 .05	17 8.13 .79	8.23
S	0 0.00 0.00	0 0.00 0.00	1 .48 .05	12 5.74 .56	24 11.48 1.12	1 .48 .05	38 18.18 1.77	8.02
SSW	1 .49 .05	1 .48 .05	2 .96 .09	9 4.31 .42	15 7.18 .70	1 .48 .05	29 13.88 1 35	7.36
SW	1 .48 .05	2 .96 .09	3 1.44 .14	8 3.83 .37	7 3.35 .33	1 .48 .05	22 10.53 1.03	6.55
WSW	0 0.00 0.00	1 .48 .05	7 3.35 .33	6 2.87 .28	5 2.39 .23	0 0.00 0.00	19 9.09 .89	5.71
W	1 .49 .05	2 .96 .09	2 .96 .09	5 2.39 .23	4 1.91 .19	0 0.00 0.00	14 6.70 .65	5.74
WNW	0 0.00 0.00	1 .48 .05	3 1.44 .14	1 .48 .05	0 0.00 0.00	0 0.00 0.00	5 2.39 .23	4.36
NW	0 0.00 0.00	0 0.00 0.00	3 1.44 .14	3 1.44 .14	0 0.00 0.00	0 0.00 0.00	6 2.87 .28	5.13
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.91 .19	2 .96 .09	0 0.00 0.00	6 2.87 .28	6.80
N	0 0.00 0.00	1 .48 .05	2 .96 .09	3 1.44 .14	0 0.00 0.00	0 0.00 0.00	6 2.87 .28	4.67
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	3 1.44 .14	11 5.26 .51	36 17.22 1.68	67 32.06 3.13	86 41.15 4.01	6 2.87 .28	209 100.00 9.75	6.76

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL NOVEMBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.00.46.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2 .09	6 .28	25 1.17	36 1.68	35 1.63	21 .98	125 5.83	7.09
NE	1 .05	7 .33	32 1.49	39 1.82	4 .19	0 0.00	83 3.87	5.00
ENE	1 .05	5 .23	9 .42	19 .89	18 .84	10 .47	62 2.89	6.98
E	1 .05	1 .05	10 .47	20 .93	18 .84	4 .19	54 2.52	6.94
ESE	2 .09	6 .28	3 .14	21 .98	8 .37	6 .28	46 2.15	6.61
SE	0 0.00	5 .23	14 .65	25 1.17	18 .84	6 .28	68 3.17	6.69
SSE	0 0.00	2 .09	22 1.03	65 3.03	56 2.61	40 1.87	185 8.63	7.91
S	3 .14	8 .37	47 2.19	130 6.07	120 5.60	76 3.55	384 17.92	7.87
SSW	1 .05	5 .23	18 .84	92 4.29	63 2.94	49 2.29	228 10.64	7.89
SW	2 .09	6 .28	17 .79	33 1.54	35 1.63	20 .93	113 5.27	7.52
WSW	0 0.00	3 .14	17 .79	26 1.21	25 1.17	4 .19	75 3.50	6.58
W	1 .05	3 .14	20 .93	49 2.29	44 2.05	8 .37	125 5.83	7.04
WNW	0 0.00	4 .19	14 .65	54 2.52	50 2.33	5 .23	127 5.93	7.08
NW	2 .09	2 .09	8 .37	52 2.43	69 3.22	46 2.15	179 8.35	8.67
NNW	2 .09	3 .14	10 .47	50 2.33	64 2.99	50 2.33	179 8.35	8.49
N	2 .09	6 .28	15 .70	26 1.21	47 2.19	13 .61	109 5.09	7.53
CALM	1 .05						1 .05	CALM
TOTAL	21 .98	72 3.36	281 13.11	737 34.39	674 31.45	358 16.71	2143 100.00	7.54

NUMBER OF VALID OBSERVATIONS 2143 99.21 PCT.
NUMBER OF INVALID OBSERVATIONS 17 .79 PCT.
TOTAL NUMBER OF OBSERVATIONS 2160 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.07.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO. 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	1 1.56 .05	0 0.00 0.00	1 1.56 .05	0 0.00 0.00	2 3.13 .10	6.55
NE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
ESE	0 0.00 0.00	1 1.56 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.56 .05	1.90
SE	0 0.00 0.00	1 1.56 .05	1 1.56 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 3.13 .10	2.70
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.56 .05	3 4.69 .16	0 0.00 0.00	4 6.25 .21	7.82
S	0 0.00 0.00	0 0.00 0.00	1 1.56 .05	4 6.25 .21	3 4.69 .16	0 0.00 0.00	8 12.50 .42	6.82
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
SW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
WSW	0 0.00 0.00	0 0.00 0.00	3 4.69 .16	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 4.69 .16	3.90
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 3.13 .10	0 0.00 0.00	0 0.00 0.00	2 3.13 .10	5.30
WNW	1 1.56 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 1.56 .05	.80
NW	1 1.56 .05	0 0.00 0.00	0 0.00 0.00	1 1.56 .05	1 1.56 .05	0 0.00 0.00	3 4.69 .16	5.23
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 10.94 .36	8 12.50 .42	9 14.06 .47	24 37.50 1.25	9.29
N	0 0.00 0.00	0 0.00 0.00	3 4.69 .16	5 7.81 .26	2 3.13 .10	4 6.25 .21	14 21.88 .73	7.85
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 3.13 .10	2 3.13 .10	9 14.06 .47	20 31.25 1.04	18 28.13 .94	13 20.31 .68	64 100.00 3.33	7.47

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.07.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO. 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES(METERS PER SECOND)							
NNE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.94 .16	3 2.94 .16	12.43
NE	0 0.00 0.00	1 .98 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2.10
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
E	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	2.15
ESE	0 0.00 0.00	0 0.00 0.00	1 .98 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	3.10
SE	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.96 .10	2.05
SSE	0 0.00 0.00	0 0.00 0.00	1 .98 .05	3 2.94 .16	0 0.00 0.00	0 0.00 0.00	4 3.92 .21	5.37
S	0 0.00 0.00	0 0.00 0.00	1 .98 .05	5 4.90 .26	1 .98 .05	0 0.00 0.00	7 6.86 .36	6.50
SSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 3.92 .21	5 4.90 .26	1 .98 .05	10 9.80 .52	8.24
SW	0 0.00 0.00	1 .98 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .98 .05	2 1.96 .10	7.40
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 5.88 .31	0 0.00 0.00	0 0.00 0.00	6 5.88 .31	6.45
W	1 .98 .05	0 0.00 0.00	3 2.94 .16	1 .98 .05	1 .98 .05	0 0.00 0.00	6 5.88 .31	4.80
WNW	0 0.00 0.00	2 1.96 .10	0 0.00 0.00	1 .98 .05	2 1.96 .10	1 .98 .05	6 5.88 .31	6.73
NW	0 0.00 0.00	3 2.94 .16	4 3.92 .21	6 5.88 .31	2 1.96 .10	5 4.90 .26	20 19.61 1.04	7.15
NNW	1 .98 .05	2 1.96 .10	1 .98 .05	1 .98 .05	7 6.86 .36	5 4.90 .26	17 16.67 .88	7.95
N	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 6.86 .36	6 5.88 .31	2 1.96 .10	15 14.71 .78	8.31
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	2 1.96 .10	13 12.75 .68	11 10.78 .57	34 33.33 1.77	24 23.53 1.25	18 17.65 .94	102 100.00 5.31	7.12

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

TABLE 2.3-32 (Continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

(MONTHLY - 60 METERS)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	1	0	0	1	6	8	11.81
	0.00	.58	0.00	0.00	.58	3.49	4.65	
	0.00	.05	0.00	0.00	.05	.31	.42	
NE	0	1	0	0	0	0	1	2.50
	0.00	.58	0.00	0.00	0.00	0.00	.58	
	0.00	.05	0.00	0.00	0.00	0.00	.05	
ENE	0	2	0	0	2	1	5	6.60
	0.00	1.16	0.00	0.00	1.16	.58	2.91	
	0.00	.10	0.00	0.00	.10	.05	.26	
E	0	0	0	0	3	0	3	8.00
	0.00	0.00	0.00	0.00	1.74	0.00	1.74	
	0.00	0.00	0.00	0.00	.16	0.00	.16	
ESE	0	1	1	1	0	0	3	3.67
	0.00	.58	.58	.58	0.00	0.00	1.74	
	0.00	.05	.05	.05	0.00	0.00	.16	
SE	1	0	0	4	0	0	5	5.12
	.58	0.00	0.00	2.33	0.00	0.00	2.91	
	.05	0.00	0.00	.21	0.00	0.00	.26	
SSE	0	0	1	10	2	0	13	6.79
	0.00	0.00	.58	5.81	1.16	0.00	7.56	
	0.00	0.00	.05	.52	.10	0.00	.68	
S	0	0	6	3	3	3	15	7.53
	0.00	0.00	3.49	1.74	1.74	1.74	8.72	
	0.00	0.00	.31	.16	.16	.16	.78	
SSW	0	1	0	5	5	1	12	7.19
	0.00	.58	0.00	2.91	2.91	.58	6.98	
	0.00	.05	0.00	.26	.26	.05	.62	
SW	2	1	4	1	2	0	10	4.45
	1.16	.58	2.33	.58	1.16	0.00	5.81	
	.10	.05	.21	.05	.10	0.00	.52	
WSW	0	1	2	4	1	1	9	5.96
	0.00	.58	1.16	2.33	.58	.58	5.23	
	0.00	.05	.10	.21	.05	.05	.47	
W	0	1	3	2	0	0	6	4.35
	0.00	.58	1.74	1.16	0.00	0.00	3.49	
	0.00	.05	.16	.10	0.00	0.00	.31	
WNW	0	0	0	0	5	1	6	8.72
	0.00	0.00	0.00	0.00	2.91	.58	3.49	
	0.00	0.00	0.00	0.00	.26	.05	.31	
NW	0	2	3	4	6	3	18	7.33
	0.00	1.16	1.74	2.33	3.49	1.74	10.47	
	0.00	.10	.16	.21	.31	.16	.94	
NNW	0	0	0	15	10	8	33	8.34
	0.00	0.00	0.00	8.72	5.81	4.65	19.19	
	0.00	0.00	0.00	.78	.52	.42	1.72	
N	0	1	1	4	9	10	25	9.16
	0.00	.58	.58	2.33	5.23	5.81	14.53	
	0.00	.05	.05	.21	.47	.52	1.30	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	3	12	21	53	49	34	172	7.50
	1.74	6.98	12.21	30.81	28.49	19.77	100.00	
	.16	.62	1.09	2.76	2.55	1.77	8.95	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1	8	12	8	11	15	55	7.31
	.14	1.08	1.63	1.08	1.49	2.03	7.45	
	.05	.42	.62	.42	.57	.78	2.86	
NE	1	8	14	11	5	0	39	4.90
	.14	1.08	1.90	1.49	.68	0.00	5.28	
	.05	.42	.73	.57	.26	0.00	2.03	
ENE	0	5	4	3	7	1	20	5.75
	0.00	.68	.54	.41	.95	.14	2.71	
	0.00	.26	.21	.16	.36	.05	1.04	
E	1	4	5	8	0	0	18	4.36
	.14	.54	.68	1.08	0.00	0.00	2.44	
	.05	.21	.26	.42	0.00	0.00	.94	
ESE	1	4	7	8	1	0	21	4.61
	.14	.54	.95	1.08	.14	0.00	2.85	
	.05	.21	.36	.42	.05	0.00	1.09	
SE	1	1	5	11	3	1	22	5.71
	.14	.14	.68	1.49	.41	.14	2.98	
	.05	.05	.26	.57	.16	.05	1.15	
SSE	1	3	3	26	5	1	39	6.34
	.14	.41	.41	3.52	.68	.14	5.28	
	.05	.16	.16	1.35	.26	.05	2.03	
S	0	1	6	19	14	12	52	8.09
	0.00	.14	.81	2.57	1.90	1.63	7.05	
	0.00	.05	.31	.99	.73	.62	2.71	
SSW	1	2	8	23	19	16	69	7.76
	.14	.27	1.08	3.12	2.57	2.17	9.35	
	.05	.10	.42	1.20	.99	.83	3.59	
SW	0	0	6	13	9	6	34	7.45
	0.00	0.00	.81	1.76	1.22	.81	4.61	
	0.00	0.00	.31	.68	.47	.31	1.77	
WSW	0	4	9	3	1	3	20	5.48
	0.00	.54	1.22	.41	.14	.41	2.71	
	0.00	.21	.47	.16	.05	.16	1.04	
W	0	1	3	2	0	4	10	7.94
	0.00	.14	.41	.27	0.00	.54	1.36	
	0.00	.05	.16	.10	0.00	.21	.52	
WNW	1	1	6	8	12	11	39	7.88
	.14	.14	.81	1.08	1.63	1.49	5.28	
	.05	.05	.31	.42	.62	.57	2.03	
NW	1	1	6	19	28	24	79	8.83
	.14	.14	.81	2.57	3.79	3.25	10.70	
	.05	.05	.31	.99	1.46	1.25	4.11	
NNW	0	5	9	43	31	26	114	7.94
	0.00	.68	1.22	5.83	4.20	3.52	15.45	
	0.00	.26	.47	2.24	1.61	1.35	5.93	
N	1	3	16	26	14	46	106	8.75
	.14	.41	2.17	3.52	1.90	6.23	14.36	
	.05	.16	.63	1.35	.73	2.39	5.52	
CALM	1						1	CALM
	.14						.14	
	.05						.05	
TOTAL	11	51	119	231	160	166	738	7.44
	1.49	6.91	16.12	31.30	21.68	22.49	100.00	
	.57	2.65	6.19	12.02	8.33	8.64	38.42	

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .24 .05	4 .94 .21	2 .47 .10	0 0.00 0.00	0 0.00 0.00	7 1.65 .36	4.21
NE	0 0.00 0.00	3 .71 .16	1 .24 .05	2 .47 .10	0 0.00 0.00	0 0.00 0.00	6 1.42 .31	3.55
ENE	1 .24 .05	1 .24 .05	0 0.00 0.00	1 .24 .05	0 0.00 0.00	0 0.00 0.00	3 .71 .16	3.17
E	0 0.00 0.00	0 0.00 0.00	1 .24 .05	3 .71 .16	3 .71 .16	0 0.00 0.00	7 1.65 .36	7.11
ESE	0 0.00 0.00	1 .24 .05	2 .47 .10	4 .94 .21	12 2.83 .62	3 .71 .16	22 5.19 1.15	7.99
SE	1 .24 .05	0 0.00 0.00	0 0.00 0.00	12 2.83 .62	14 3.30 .73	2 .47 .10	29 6.84 1.51	7.78
SSE	1 .24 .05	0 0.00 0.00	6 1.42 .31	8 1.89 .42	24 5.66 1.25	0 0.00 0.00	39 9.20 2.03	7.43
S	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 2.59 .57	38 8.96 1.98	42 9.91 2.19	91 21.46 4.74	9.82
SSW	0 0.00 0.00	0 0.00 0.00	2 .47 .10	12 2.83 62	34 8.02 1.77	13 3.07 .68	61 14.39 3.18	8.74
SW	0 0.00 0.00	1 .24 .05	2 .47 .10	13 3.07 .68	5 1.18 .26	2 .47 .10	23 5.42 1.20	6.84
WSW	0 0.00 0.00	1 .24 .05	1 .24 .05	4 .94 .21	2 .47 .10	2 .47 .10	10 2.36 .52	6.87
W	1 .24 .05	1 .24 .05	1 .24 .05	5 1.18 .26	3 .71 .16	0 0.00 0.00	11 2.59 .57	6.29
WNW	0 0.00 0.00	2 .47 .10	2 .47 .10	19 4.48 .99	2 .47 .10	1 .24 .05	26 6.13 1.35	6.41
NW	0 0.00 0.00	0 0.00 0.00	4 .94 .21	15 3.54 .78	7 1.65 .36	3 .71 .16	29 6.84 1.51	7.19
NNW	0 0.00 0.00	1 .24 .05	3 .71 .16	20 4.72 1.04	15 3.54 .78	4 .94 .21	43 10.14 2.24	7.30
N	0 0.00 0.00	1 .24 .05	1 .24 .05	8 1.89 .42	7 1.65 .36	0 0.00 0.00	17 4.01 .88	7.11
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 .94 .21	13 3.07 .68	30 7.08 1.56	139 32.78 7.24	166 39.15 8.64	72 16.98 3.75	424 100.00 22.07	7.86

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15.09.30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	WIND SPEED CATEGORIES(METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	1 .35 .05	5 1.75 .26	1 .35 .05	3 1.05 .16	0 0.00 0.00	10 3.51 .52	5.43
NE	0 0.00 0.00	1 .35 .05	4 1.40 .21	5 1.75 .26	1 .35 .05	0 0.00 0.00	11 3.86 .57	5.45
ENE	0 0.00 0.00	2 .70 .10	2 .70 .10	2 .70 .10	0 0.00 0.00	0 0.00 0.00	6 2.11 .31	3.85
E	2 .70 .10	1 .35 .05	1 .35 .05	6 2.11 .31	0 0.00 0.00	0 0.00 0.00	10 3.51 .52	4.22
ESE	0 0.00 0.00	0 0.00 0.00	1 .35 .05	4 1.40 .21	4 1.40 .21	0 0.00 0.00	9 3.16 .47	7.08
SE	0 0.00 0.00	0 0.00 0.00	2 .70 .10	5 1.75 .26	1 .35 .05	0 0.00 0.00	8 2.81 42	6.20
SSE	0 0.00 0.00	0 0.00 0.00	4 1.40 .21	10 3.51 .52	16 5.61 .83	0 0.00 0.00	30 10.53 1.56	7.27
S	0 0.00 0.00	1 .35 .05	3 1.05 .16	14 4.91 .73	27 9.47 1.41	5 1.75 .26	50 17.54 2.60	7.74
SSW	0 0.00 0.00	0 0.00 0.00	2 .70 .10	20 7.02 1.04	16 5.61 .83	16 5.61 .83	54 18.95 2.81	8.59
SW	0 0.00 0.00	1 .35 .05	2 .70 .10	15 5.26 .78	4 1.40 .21	0 0.00 0.00	22 7.72 1.15	6.24
WSW	0 0.00 0.00	0 0.00 0.00	1 .35 .05	3 1.05 .16	2 .70 .10	0 0.00 0.00	6 2.11 .31	6.73
W	0 0.00 0.00	1 .35 .05	0 0.00 0.00	5 1.75 .26	2 .70 .10	0 0.00 0.00	8 2.81 .42	6.22
WNW	0 0.00 0.00	2 .70 .10	2 .70 .10	7 2.46 .36	9 3.16 .47	0 0.00 0.00	20 7.02 1.04	6.84
NW	0 0.00 0.00	2 .70 .10	3 1.05 .16	6 2.11 .31	2 .70 .10	0 0.00 0.00	13 4.56 .68	5.86
NNW	0 0.00 0.00	1 .35 .05	1 .35 .05	1 .35 .05	7 2.46 .36	0 0.00 0.00	10 3.51 52	7.16
N	0 0.00 0.00	2 .70 .10	2 .70 .10	5 1.75 .26	7 2.46 .36	1 .35 .05	17 5.96 .88	6.81
CALM	1 .35 .05						1 .35 05	CALM
TOTAL	3 1.05 .16	15 5.26 .78	35 12.28 1.82	109 38.25 5.67	101 35.44 5.26	22 7.72 1.15	285 100.00 14.84	6.98

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15 09 30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	1 .74 .05	0 0.00 0.00	1 .74 .05	1 .74 .05	1 .74 .05	0 0.00 0.00	4 2.94 .21	4.87
NE	0 0.00 0.00	0 0.00 0.00	1 .74 .05	5 3.68 .26	1 .74 .05	1 .74 .05	8 5.88 .42	6.99
ENE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .74 .05	0 0.00 0.00	0 0.00 0.00	1 .74 .05	6.60
E	0 0.00 0.00	1 .74 .05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 .74 .05	2.40
ESE	0 0.00 0.00	0 0.00 0.00	1 .74 .05	2 1.47 .10	3 2.21 .16	0 0.00 0.00	6 4.41 .31	7.57
SE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 74 05	1 .74 .05	0 0.00 0.00	2 1.47 .10	7.70
SSE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 1.47 .10	7 5.15 .36	0 0.00 0.00	9 6.62 .47	8.36
S	0 0.00 0.00	1 .74 .05	0 0.00 0.00	14 10.29 .73	15 11.03 .78	0 0.00 0.00	30 22.06 1.56	7.53
SSW	1 .74 .05	0 0.00 0.00	1 .74 .05	10 7.35 .52	13 9.56 .68	1 .74 .05	26 19.12 1.35	7.40
SW	1 .74 .05	1 .74 .05	1 .74 .05	9 6.62 .47	0 0.00 0.00	0 0.00 0.00	12 8.82 .62	5.49
WSW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
W	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 2.21 .16	0 0.00 0.00	0 0.00 0.00	3 2.21 .16	5.97
WNW	0 0.00 0.00	0 0.00 0.00	1 .74 .05	7 5.15 .36	3 2.21 .16	0 0.00 0.00	11 8.09 .57	6.97
NW	0 0.00 0.00	0 0.00 0.00	1 .74 .05	3 2.21 .16	4 2.94 .21	0 0.00 0.00	8 5.88 .42	6.97
NNW	1 .74 .05	1 .74 .05	0 0.00 0.00	1 .74 .05	1 .74 .05	0 0.00 0.00	4 2.94 .21	4.55
N	0 0.00 0.00	2 1.47 .10	2 1.47 .10	1 .74 .05	5 3.68 .26	1 .74 .05	11 8.09 .57	6.67
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	4 2.94 .21	6 4.41 .31	9 6.62 .47	60 44.12 3.12	54 39.71 2.81	3 2.21 .16	136 100.00 7.08	6.96

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS
DATA PERIOD: ALL DECEMBER COMBINED

ALL CLASSES
DATA SOURCE: ON-SITE
WIND SENSOR HEIGHT: 60.00 METERS
TABLE GENERATED: 11/11/81. 15 09 30.

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO: 7699-064

WIND SECTOR	0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
	WIND SPEED CATEGORIES (METERS PER SECOND)							
NNE	2 .10	11 .57	23 1.20	12 .62	17 .88	24 1.25	89 4.63	7.31
NE	1 .05	14 .73	20 1.04	23 1.20	7 .36	1 .05	66 3.44	5.04
ENE	1 .05	10 .52	6 .31	7 .36	9 .47	2 .10	35 1.82	5.35
E	3 .16	8 .42	7 .36	17 .88	6 .31	0 0.00	41 2.13	4.91
ESE	1 .05	7 .36	13 .68	19 .99	20 1.04	3 .16	63 3.28	6.31
SE	3 .16	4 .21	8 .42	33 1.72	19 .99	3 .16	70 3.64	6.45
SSE	2 .10	3 .16	15 .78	60 3.12	57 2.97	1 .05	138 7.18	7.04
S	0 0.00	3 .16	17 .88	70 3.64	101 5.26	62 3.23	253 13.17	8.46
SSW	2 .10	3 .16	13 .68	74 3.85	92 4.79	48 2.50	232 12.08	8.16
SW	3 .16	5 .26	15 .78	51 2.65	20 1.04	9 .47	103 5.36	6.53
WSW	0 0.00	6 .31	16 .83	20 1.04	6 .31	6 .31	54 2.81	5.98
W	2 .10	4 .21	10 .52	20 1.04	6 .31	4 .21	46 2.39	6.13
WNW	2 .10	7 .36	11 .57	42 2.19	33 1.72	14 .73	109 5.67	7.17
NW	2 .10	8 .42	21 1.09	54 2.81	50 2.60	35 1.82	170 8.85	7.81
NNW	2 .10	10 .52	14 .73	88 4.58	79 4.11	52 2.71	245 12.75	7.93
N	1 .05	9 .47	25 1.30	56 2.92	50 2.60	64 3.33	205 10.67	8.30
CALM	2 .10						2 .10	CALM
TOTAL	27 1.51	112 5.83	234 12.18	646 33.63	572 29.78	328 17.07	1921 100.00	7.42

NUMBER OF VALID OBSERVATIONS 1921 86.07 PCT.
NUMBER OF INVALID OBSERVATIONS 311 13.93 PCT.
TOTAL NUMBER OF OBSERVATIONS 2232 100.00 PCT.

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH -DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.01.50.

WIND DIRECTION PERSISTENCE - PASQUILL #A#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	12	9	2	2	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	9	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	7	4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	14	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	19	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	24	5	5	3	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	47	21	15	17	7	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	43	19	18	8	5	7	4	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	25	14	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	7	3	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	12	3	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	8	4	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	15	5	5	3	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	17	10	9	8	3	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	20	9	4	4	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4.99	5.21	6.42	5.77	5.06	3.13	0.	6.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	4.62	3.20	3.33	8.20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	4.06	4.16	5.19	0.	0.	5.92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.10	6.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.88	4.73	5.46	9.06	3.99	7.18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.37	5.04	4.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	6.11	5.03	4.91	5.43	3.68	5.10	8.23	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.05	7.79	6.46	7.23	7.29	7.93	8.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.80	7.21	6.85	6.95	7.60	7.27	7.02	12.05	8.17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	7.07	7.49	5.69	0.	0.	8.95	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.89	7.88	0.	3.96	0.	9.62	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	4.87	4.10	4.21	5.63	0.	6.35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	6.22	6.16	6.98	0.	0.	0.	14.33	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	6 26	7.62	7.68	5.77	8.52	0.	0.	8.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	6.92	6.28	7.25	6.55	7.09	9.17	0.	6.96	9.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	5.89	5.53	7.06	5.80	7.63	6.90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

WIND DIRECTION PERSISTENCE

(10 METERS)

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.04.52.

WIND DIRECTION PERSISTENCE - PASQUILL #B#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	9	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	21	8	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	15	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	12	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	14	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	9	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	6.69	0.	5.33	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.40	3.74	0.	0.	0.	0.	0.	0.	0.	4.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.13	0.	6.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.54	11.09	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.40	0.	10.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	5.01	4.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	5.78	0.	0.	5.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.53	6.83	6.53	5.91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.61	5.13	8.00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	5.24	5.42	0.	8.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	6.45	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	4.92	0.	2.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	4.32	6.09	0.	8.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	6.08	7.23	9.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	6.88	6.83	6.80	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	6.13	5.14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.08.03.

WIND DIRECTION PERSISTENCE - PASQUILL #C#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	9	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	24	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	26	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	8	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	6	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	19	4	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	14	4	7	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	14	1	3	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.98	7.32	0.	10.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.58	2.52	6.20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	5.54	7.21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	5.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	5.18	3.96	6.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.88	4.74	3.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	5.31	4.94	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	5.53	4.70	5.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.78	7.80	5.79	8.86	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	6.06	6.00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	4.14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	5.32	2.50	0.	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	5.74	99.99	6.50	0.	8.35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	6.75	5.29	10.24	0.	6.24	0.	0.	7.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	5.91	6.50	6.08	0.	99.99	99.97	0.	0.	5.19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	6.82	3.31	6.89	9.18	7.19	0.	0.	0.	7.68	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.11.29.

WIND DIRECTION PERSISTENCE - PASQUILL #D#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	44	33	18	10	6	4	2	1	3	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0
NE	45	16	7	7	4	1	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
ENE	29	14	10	8	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	38	18	9	4	2	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
ESE	26	25	5	2	1	4	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SE	33	20	5	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	53	25	10	5	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	141	54	31	14	7	9	5	7	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	82	42	12	4	3	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	34	9	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	16	7	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	21	11	8	3	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
WNW	32	6	4	5	2	0	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
NW	48	27	11	11	5	3	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
NNW	60	28	20	13	7	6	6	1	1	0	0	2	1	0	1	0	0	0	0	0	0	0	0	0
N	68	32	16	13	12	3	2	2	3	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4.11	4.96	4.89	5.00	6.58	7.91	4.83	8.08	6.03	6.97	0.	5.29	0.	0.	6.79	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.53	4.27	4.15	4.24	6.96	7.04	4.63	5.40	0.	0.	0.	0.	0.	0.	0.	7.05	0.	0.	0.	0.	0.	0.	0.	0.
ENE	4.02	3.37	4.14	6.28	5.03	4.04	0.	0.	5.84	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.09	4.80	4.64	5.41	3.35	5.40	0.	0.	0.	0.	0.	3.96	5.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.91	5.18	5.45	3.61	4.54	4.68	0.	0.	0.	4.93	0.	10.31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.53	5.04	4.49	4.46	0.	6.00	9.28	9.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	4.81	5.74	5.66	6.47	4.49	0.	8.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.30	6.03	7.14	6.18	5.94	7.31	7.77	8.43	5.89	6.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.69	7.21	6.94	5.86	8.75	7.03	0.	0.	0.	7.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	5.05	4.83	4.88	6.91	4.40	8.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	5.04	5.38	2.68	0.	8.07	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	4.20	5.50	5.48	6.31	7.48	2.99	0.	0.	0.	0.	0.	6.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	4.69	5.34	5.82	8.77	7.78	0.	6.51	6.27	0.	0.	0.	0.	8.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	5.90	5.75	7.14	7.70	6.81	7.70	0.	9.75	0.	0.	7.98	0.	0.	0.	0.	0.	6.65	0.	0.	0.	0.	0.	0.	0.
NNW	5.40	5.97	7.22	5.51	6.63	6.61	7.73	99.99	9.46	0.	0.	6.01	10.14	0.	6.72	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.59	5.30	6.12	6.13	5.98	5.59	6.65	9.37	7.37	5.01	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.38	0.	99.99	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.14.31.

WIND DIRECTION PERSISTENCE - PASQUILL #E#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	13	13	6	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	27	9	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	29	8	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	30	12	7	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	29	13	7	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	64	14	5	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	87	39	15	9	6	5	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	118	57	34	28	17	12	12	2	2	0	3	4	1	1	1	0	0	0	0	0	0	0	0	0
SSW	48	22	13	6	4	2	2	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
SW	33	5	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	15	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	26	14	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	25	10	5	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	28	8	6	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	28	14	2	1	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.02	5.10	3.55	4.42	0.	0.	10.23	0.	0.	0.	6.07	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.94	3.32	3.85	0.	0.	0.	2.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.17	3.33	3.62	4.44	4.60	5.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.52	4.38	4.35	6.62	6.62	5.03	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.46	3.77	5.10	5.32	5.08	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.79	5.19	3.03	6.01	4.11	7.69	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.87	4.52	4.40	5.54	5.18	5.67	5.18	6.67	5.08	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.67	5.14	5.34	5.82	5.19	5.82	6.57	3.92	6.66	0.	6.04	8.16	10.20	9.39	9.94	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	4.63	6.01	5.17	5.86	5.76	8.07	6.50	0.	7.00	0.	8.10	0.	4.81	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.94	3.67	7.52	5.02	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.07	4.74	2.89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.23	4.71	3.15	4.08	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.63	3.84	4.08	0.	5.82	0.	5.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	3.66	4.19	3.79	6.15	4.53	4.00	4.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.88	4.29	3.95	5.20	6.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.17	4.59	4.11	3.38	3.88	0.	6.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.17.49.

WIND DIRECTION PERSISTENCE - PASQUILL #F#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	15	1	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	11	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	18	3	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	24	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	24	10	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	43	19	7	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	71	34	17	6	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	63	20	7	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	31	6	6	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	15	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	13	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	13	5	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	31	7	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	26	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	14	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WOLF CREEK

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.82	3.17	3.26	3.16	3.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.50	2.79	0.	3.24	3.17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.82	2.80	2.91	0.	3.46	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.28	3.19	3.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	2.94	3.78	2.57	4.59	1.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.94	2.98	2.71	2.10	2.60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.10	3.09	2.76	3.62	3.05	3.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.57	3.50	3.79	3.69	2.74	3.55	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.20	2.94	3.91	3.87	3.32	6.67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.58	2.86	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.49	2.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.02	3.33	0.	2.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.57	3.11	4.26	3.50	3.27	0.	0.	0.	3.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.74	2.96	2.32	0.	2.85	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.89	2.77	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.21	3.40	3.26	3.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81 TIME - 10.24.23.

WIND DIRECTION PERSISTENCE - PASQUILL ALL
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	111	62	42	29	18	4	9	4	9	3	4	2	0	1	0	2	1	0	0	0	0	0	0	0
NE	119	44	30	29	8	7	3	2	3	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0
ENE	101	49	25	17	8	7	4	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
E	126	57	29	21	8	6	3	2	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0
ESE	127	63	31	16	12	6	2	5	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
SE	180	91	52	23	14	6	10	2	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
SSE	254	123	75	59	21	23	13	6	5	7	1	1	1	0	0	0	1	2	0	0	0	0	0	0
S	298	164	106	67	62	33	39	20	13	12	7	4	9	5	5	1	4	1	0	0	3	1	1	5
SSW	222	104	61	28	26	18	15	11	7	6	6	5	0	2	1	0	1	0	2	0	0	0	0	1
SW	119	60	21	10	8	2	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
WSW	79	30	11	6	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	92	38	21	10	9	4	1	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
WNW	111	48	12	9	6	3	5	3	2	1	2	2	0	0	0	0	0	1	0	0	0	0	0	0
NW	141	58	32	23	17	12	7	5	0	2	4	0	2	0	1	0	2	0	0	1	1	0	2	0
NNW	124	63	33	29	18	24	13	10	10	4	6	1	2	0	0	0	1	0	1	0	0	0	0	2
N	139	82	36	24	22	12	7	8	3	5	2	4	1	3	0	0	0	0	0	0	1	1	0	2

WOLF CREEK

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.88	4.46	3.97	4.80	5.49	2.90	4.98	5.34	5.61	5.52	5.44	6.84	0.	9.24	0.	8.79	2.80	0.	0.	0.	0.	0.	0.	0.
NE	3.33	3.36	3.71	3.62	4.75	3.42	5.21	5.05	4.49	4.77	3.14	0.	0.	3.76	0.	7.05	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.35	3.40	3.66	4.22	4.87	4.79	4.82	4.47	5.84	0.	4.30	4.60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.85	4.14	4.32	4.32	4.29	4.69	3.80	5.30	3.29	0.	0.	3.88	5.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.45	4.02	4.29	4.34	4.58	4.12	7.56	6.01	0.	4.93	0.	8.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.44	3.61	3.59	3.50	4.22	6.05	3.92	4.52	6.52	0.	0.	0.	0.	0.	0.	0.	8.83	0.	0.	0.	0.	0.	0.	0.
SSE	3.79	3.87	3.83	4.12	4.72	4.80	5.40	5.55	4.13	5.41	2.78	8.10	6.11	0.	0.	0.	3.06	4.83	0.	0.	0.	0.	0.	0.
S	4.23	4.77	4.85	5.47	5.43	6.47	5.75	6.69	6.23	5.83	6.45	6.56	7.12	6.74	8.15	8.87	7.89	9.06	0.	0.	7.68	5.91	5.91	7.91
SSW	4.58	5.54	5.99	6.39	6.25	6.53	5.88	7.85	7.50	7.36	6.82	7.01	0.	7.37	5.00	0.	7.62	0.	7.43	0.	0.	0.	0.	5.28
SW	4.14	5.20	5.20	5.42	8.26	8.27	8.19	4.37	0.	0.	0.	0.	4.46	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.79	4.11	4.08	4.46	8.07	6.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.62	4.13	4.15	4.75	4.76	4.68	5.27	3.43	5.14	0.	0.	6.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.72	3.77	4.42	6.22	5.87	5.09	6.35	5.91	10.34	4.94	4.87	4.42	0.	0.	0.	0.	0.	8.11	0.	0.	0.	0.	0.	0.
NW	3.90	4.37	5.00	6.15	5.18	5.93	8.08	6.29	0.	4.39	6.07	0.	9.10	0.	8.40	0.	8.57	0.	0.	7.77	7.31	0.	7.35	0.
NNW	4.13	4.61	5.66	5.41	6.06	5.88	7.13	6.44	5.91	6.49	7.86	8.55	8.42	0.	0.	0.	6.21	0.	5.49	0.	0.	0.	0.	8.45
N	4.41	4.53	4.37	5.48	4.95	6.21	6.78	6.44	4.87	7.62	7.54	5.34	7.04	6.04	0.	0.	0.	0.	0.	0.	7.38	8.18	0.	5.83

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 177

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 10.20.42.

WIND DIRECTION PERSISTENCE - PASQUILL #G#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	17	3	4	5	2	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	15	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	10	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	19	8	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	21	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	40	12	6	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	44	17	11	6	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	29	7	10	2	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	16	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	13	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	18	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	22	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	16	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	13	6	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.95	2.42	2.77	3.06	3.16	3.53	0.	2.14	0.	2.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.42	3.11	2.92	2.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.18	2.78	3.36	3.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.01	2.86	3.20	3.32	0.	0.	3.21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	2.58	2.78	2.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.46	2.54	3.20	2.88	3.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	2.74	3.07	2.60	3.06	0.	99.99	0.	0.	0.	2.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	2.94	2.65	2.95	2.23	1.10	2.82	2.45	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	2.55	4.34	.93	0.	0.	2.66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	1.97	1.97	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.10	1.81	2.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	1.99	2.62	2.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.13	1.85	2.03	2.78	0.	2.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.29	2.67	2.58	3.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	2.58	2.55	2.66	3.67	2.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 14.18.53.

WIND DIRECTION PERSISTENCE - PASQUILL #S#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	38	24	17	10	2	1	2	1	3	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
NE	47	21	8	11	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	53	20	12	7	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	70	34	15	8	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	72	33	18	8	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	129	58	28	14	8	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	171	88	52	44	17	14	4	2	4	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0
S	186	91	55	41	27	14	21	5	5	3	4	5	1	1	1	0	0	0	0	0	0	0	0	0
SSW	90	34	20	9	9	5	4	1	3	0	3	1	1	0	0	0	0	0	0	0	0	0	0	0
SW	55	17	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	38	8	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	39	14	7	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	57	25	5	6	2	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
NW	70	24	11	8	6	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	55	27	13	12	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	55	30	11	6	6	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.86	4.34	3.08	3.34	3.40	2.97	3.50	2.68	4.78	0.	4.17	2.78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.56	2.89	3.52	3.08	2.55	2.21	2.15	0.	0.	0.	3.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.74	3.04	3.58	3.08	4.10	4.80	3.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.54	3.66	3.89	4.45	3.76	4.76	3.32	4.09	3.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.19	3.40	3.64	4.95	3.85	4.26	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.12	3.31	2.97	3.39	3.33	4.31	2.82	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.32	3.55	3.32	3.77	3.91	4.51	4.81	4.79	3.60	4.40	2.63	0.	0.	0.	4.75	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.97	4.36	4.45	4.87	4.78	5.41	5.37	3.57	4.99	4.55	5.45	7.56	10.20	9.39	9.94	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.59	4.60	4.71	5.27	3.78	5.13	5.12	3.40	5.96	0.	6.86	6.42	4.81	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.21	3.51	4.78	5.02	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.56	2.70	3.26	2.58	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.70	3.02	2.82	2.61	3.58	5.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.87	3.39	3.61	2.69	4.54	0.	5.41	0.	0.	3.87	0.	3.92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.92	3.25	2.82	4.00	3.94	3.28	3.78	2.52	4.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.24	3.29	3.64	4.28	3.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.45	3.75	3.12	3.93	3.59	3.34	0.	3.04	0.	5.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 26304
TOTAL NO. OF INVALID OBSERVATIONS = 1351

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 09.44.59.

WIND DIRECTION PERSISTENCE - PASQUILL #A#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	10	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	19	10	9	6	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	8	6	9	0	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	12	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	5	2	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	3	1	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	3	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5.04	3.19	0.	6.30	0.	3.13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	5.19	2.59	3.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	5.24	4.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.98	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	5.84	0.	7.07	9.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	6.20	0.	5.70	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	7.00	4.93	5.58	6.25	3.68	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.62	8.08	7.01	8.00	7.32	11.86	12.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	7.05	7.08	7.97	0.	8.35	0.	5.46	15.04	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	7.51	8.20	10.66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.50	0.	0.	0.	0.	9.62	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	6.02	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	5.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	6.15	8.37	8.40	4.22	9.01	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	7.69	7.54	6.61	6.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	5.68	5.64	5.73	7.80	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 10.16.45.

WIND DIRECTION PERSISTENCE - PASQUILL #B#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	11	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	6	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.52	0.	0.	0.	0.	0.	0.	0.	0.	4.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.54	11.09	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.81	4.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	5.78	0.	0.	5.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.45	7.31	10.59	5.91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.94	5.13	10.65	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	5.42	5.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	6.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.37	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.40	6.09	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	5.21	6.34	11.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	7.04	6.82	6.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	6.55	5.57	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 11.30.38.

WIND DIRECTION PERSISTENCE - PASQUILL #C#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	3	2	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4.33	5.58	0.	10.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	7.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	6.75	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.29	0.	6.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.94	4.74	3.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	5.46	4.94	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	5.25	4.32	5.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.43	7.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	5.77	6.00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	4.01	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	5.25	2.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	6.18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	5.25	6.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	5.80	4.89	6.70	0.	0.	0.	0.	0.	5.19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	6.14	0.	0.	0.	10.57	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 11.33.22.

WIND DIRECTION PERSISTENCE - PASQUILL #D#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	12	13	7	1	3	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	16	2	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	7	4	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	14	4	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	5	5	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	9	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	19	7	4	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	60	19	8	4	2	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	24	12	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	17	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	7	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	5	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	15	2	1	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	20	14	5	4	3	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
NNW	26	8	4	9	4	3	2	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
N	25	8	4	7	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5.04	4.63	4.48	4.17	6.45	7.89	3.82	8.08	0.	8.42	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.89	3.50	4.03	4.34	0.	7.04	4.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	5.06	2.93	4.92	6.90	5.33	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.92	3.39	2.87	5.27	2.35	5.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.49	4.66	3.61	4.29	0.	4.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.77	5.23	3.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	5.61	7.72	5.08	4.38	3.35	0.	10.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.72	7.30	7.92	6.04	6.08	7.78	7.33	7.52	5.89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.69	6.94	4.83	6.66	9.46	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	5.44	3.49	0.	7.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	4.72	3.80	0.	0.	7.36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	5.20	4.46	0.	4.36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	4.84	6.45	99.99	10.03	7.78	0.	0.	5.82	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	5.86	6.01	9.24	9.19	7.22	0.	0.	9.75	0.	0.	0.	0.	0.	0.	0.	0.	6.65	0.	0.	0.	0.	0.	0.	0.
NNW	5.38	4.80	6.79	6.13	7.52	4.64	8.17	99.99	0.	0.	0.	5.25	10.14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.42	4.84	5.87	5.61	5.14	99.99	8.96	99.99	5.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

WIND DIRECTION PERSISTENCE

(10 METERS)

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 11.36.25.

WIND DIRECTION PERSISTENCE - PASQUILL #E#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	8	4	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	10	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	10	3	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	29	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	39	13	6	7	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	56	17	11	15	8	4	4	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
SSW	11	7	4	4	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	11	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	9	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	9	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	14	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	7	5	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.97	4.68	3.06	5.09	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.55	3.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.15	4.05	4.23	0.	4.60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.54	4.80	4.53	6.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.91	3.41	4.63	0.	3.77	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.66	5.46	2.50	6.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	4.11	4.57	4.69	5.08	4.91	9.64	4.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.86	5.66	5.91	5.94	5.56	5.03	6.18	4.33	0.	0.	5.46	5.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	4.29	6.04	4.75	6.70	5.28	8.21	0.	0.	8.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.89	0.	7.52	5.02	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.15	3.72	2.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.60	4.15	3.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	4.17	4.28	4.21	6.47	5.04	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.70	3.56	3.00	6.45	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.19	4.09	4.11	0.	2.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 10.20.19.

WIND DIRECTION PERSISTENCE - PASQUILL #F#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	9	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	6	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	6	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	18	10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	27	9	7	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	23	9	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	14	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	9	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.94	0.	0.	3.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.40	0.	0.	3.99	3.17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.21	0.	3.30	0.	3.46	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	2.58	1.52	3.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.06	4.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.90	3.31	2.25	2.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.07	3.03	2.79	5.27	2.99	2.78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.61	3.59	4.19	3.75	2.74	3.71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.07	2.86	2.63	0.	0.	6.67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.65	2.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	1.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	1.56	2.99	4.26	3.50	3.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	3.04	1.78	0.	0.	2.51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.68	2.77	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.50	3.46	3.23	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 11.38.52.

WIND DIRECTION PERSISTENCE - PASQUILL #G#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3	1	1	3	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	13	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	20	7	4	4	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	11	4	7	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	7	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.35	1.94	2.18	3.25	3.16	0.	0.	2.14	0.	2.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	1.99	3.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.20	4.02	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	2.77	3.14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.01	2.73	3.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.75	2.19	2.77	2.78	3.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	2.87	3.20	2.55	3.12	0.	99.99	0.	0.	0.	2.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.48	2.25	3.00	2.23	0.	2.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	2.76	4.84	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	1.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	1.72	1.97	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.01	2.04	2.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.54	2.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	1.76	1.70	2.03	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	1.92	2.81	2.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	2.01	2.10	2.77	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 128

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 10.23.44.

WIND DIRECTION PERSISTENCE - PASQUILL ALL
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	36	20	8	8	6	2	4	2	1	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0
NE	39	11	4	7	2	1	1	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
ENE	31	14	8	6	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
E	33	14	6	2	3	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	35	16	9	7	3	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	66	25	19	8	7	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	93	40	29	22	7	10	6	1	1	5	1	0	0	0	0	0	1	1	0	0	0	0	0	0
S	110	56	37	25	22	13	16	8	5	5	3	2	3	4	3	0	2	1	0	0	0	1	0	1
SSW	66	38	23	5	9	8	6	3	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
SW	38	22	8	5	5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
WSW	30	12	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	31	12	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	33	17	4	5	3	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	54	24	10	6	5	6	4	2	0	0	2	0	1	0	0	0	1	0	0	0	1	0	1	0
NNW	39	23	12	8	8	6	2	4	5	2	2	0	1	0	0	0	0	0	1	0	0	0	0	1
N	48	27	12	7	7	6	2	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.95	3.90	2.73	5.09	6.58	3.22	4.06	5.38	1.89	5.52	2.28	0.	0.	0.	0.	9.15	2.80	0.	0.	0.	0.	0.	0.	0.
NE	3.04	3.61	2.62	3.62	2.90	7.04	4.32	0.	3.76	4.27	3.14	0.	0.	3.76	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.72	3.74	4.28	4.62	6.00	5.15	3.63	0.	0.	0.	4.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.09	4.50	3.68	5.94	2.60	3.75	3.80	6.52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.69	3.96	3.74	4.87	4.87	4.65	0.	5.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.68	3.97	3.19	3.56	5.00	0.	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	4.06	4.11	3.89	4.03	4.44	5.40	5.53	5.09	5.35	5.43	2.78	0.	0.	0.	0.	0.	3.06	4.64	0.	0.	0.	0.	0.	0.
S	4.47	5.11	5.30	5.66	5.37	5.93	6.26	7.24	7.02	6.31	6.99	7.92	5.56	6.42	7.29	0.	5.87	9.06	0.	0.	0.	5.91	0.	6.57
SSW	4.85	5.17	5.73	7.07	7.18	7.32	5.24	10.40	7.75	0.	0.	7.66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	4.35	5.60	6.42	5.63	8.70	7.60	0.	0.	0.	0.	0.	0.	4.46	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.96	3.36	2.22	0.	7.36	9.62	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.67	3.57	3.28	4.97	2.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.99	3.90	3.76	6.83	6.28	5.09	0.	5.82	0.	0.	3.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	3.58	4.56	4.37	5.98	6.44	5.43	7.72	10.26	0.	0.	5.08	0.	10.65	0.	0.	0.	10.38	0.	0.	0.	7.31	0.	6.74	0.
NNW	4.33	4.20	5.74	6.28	5.68	5.71	5.06	5.92	5.58	6.68	6.64	0.	2.01	0.	0.	0.	0.	0.	5.49	0.	0.	0.	0.	9.02
N	4.12	4.90	4.56	4.94	5.32	7.13	7.39	2.94	5.06	0.	0.	0.	0.	3.45	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 116

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 730601 TO 740531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 13.53.28.

WIND DIRECTION PERSISTENCE - PASQUILL #S#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	11	8	3	3	1	0	1	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
NE	17	7	1	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	17	6	4	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	16	12	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	19	10	7	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	51	14	13	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	71	30	22	19	5	6	2	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
S	79	31	21	18	12	5	7	2	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0
SSW	28	13	7	4	1	1	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SW	17	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	13	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	18	10	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	27	11	6	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	20	11	5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	21	6	6	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.64	3.75	2.77	3.78	3.55	0.	3.48	2.68	2.59	0.	2.28	2.78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.23	3.13	1.74	3.36	0.	0.	0.	0.	0.	0.	3.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.66	3.56	4.53	3.63	4.60	0.	3.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.30	4.15	3.52	4.54	3.57	0.	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.50	3.17	3.44	4.85	3.77	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.25	3.40	2.96	3.67	3.44	2.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.59	3.53	3.34	4.02	4.00	5.25	4.72	2.92	2.64	0.	2.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.22	4.76	4.34	5.15	4.95	4.85	5.39	3.72	3.80	4.54	4.58	5.37	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.13	3.92	4.23	6.43	2.54	8.21	4.82	0.	8.88	0.	0.	6.42	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.06	3.67	6.00	5.02	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.18	2.00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.14	2.94	2.24	2.66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.91	3.40	3.35	3.50	3.27	0.	0.	0.	0.	3.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	3.23	3.05	3.31	2.24	5.04	2.57	5.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.99	3.11	3.31	5.12	2.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.10	4.05	3.25	3.34	0.	0.	0.	3.04	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760
TOTAL NO. OF INVALID OBSERVATIONS = 4565

WOLF CREEK

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.03.29.

WIND DIRECTION PERSISTENCE - PASQUILL #A#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	6	6	1	1	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	8	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	5	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	11	3	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	10	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	14	4	3	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	24	11	5	9	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	28	10	6	6	1	6	3	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	13	7	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	6	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	6	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	5	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	9	3	2	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	8	7	6	2	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	11	3	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4.26	5.40	5.99	5.23	5.06	0.	0.	6.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	4.55	3.51	3.45	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.59	4.32	5.19	0.	0.	5.92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.14	6.00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.47	4.73	3.86	0.	3.99	7.18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.61	5.09	2.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	5.48	5.06	4.47	5.02	0.	5.10	8.23	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	5.50	7.53	5.87	7.30	6.89	6.94	6.43	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.60	7.56	5.49	7.02	6.31	7.44	7.53	10.55	8.17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	6.65	7.43	4.45	0.	0.	8.95	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	4.12	10.71	0.	3.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	4.21	4.98	4.21	6.86	0.	6.35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	6.58	6.16	0.	0.	0.	0.	14.33	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	5.91	7.12	6.59	6.54	7.53	0.	0.	8.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	6.70	6.14	7.54	7.25	6.72	9.17	0.	6.96	9.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	5.46	5.15	0.	4.98	6.82	5.92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.03.29.

WIND DIRECTION PERSISTENCE - PASQUILL #8#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	8.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.03	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	1.79	0.	6.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	10.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	7.64	7.17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	6.46	0.	7.67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	4.71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	6.55	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	8.19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	99.99	0.	0.	8.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	6.25	8.13	7.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	6.33	9.34	7.17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	6.84	6.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

TABLE 2.3-33 (Continued)

WIND DIRECTION PERSISTENCE

(10 METERS)

WOLF CREEK

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.03.32.

WIND DIRECTION PERSISTENCE - PASQUILL *C*
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	9	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	7	2	4	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	5	0	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.69	8.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.86	2.52	6.20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	4.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	6.55	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.69	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	6.62	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.69	0.	4.08	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.07	7.91	5.79	8.86	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	6.35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	6.81	99.99	6.50	0.	8.35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	7.42	5.66	10.24	0.	6.24	0.	0.	7.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	7.49	7.30	4.84	0.	99.99	99.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	8.68	0.	5.41	9.18	5.51	0.	0.	0.	7.68	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.03.31.

WIND DIRECTION PERSISTENCE - PASQUILL *D*
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS...

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	12	12	8	5	1	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	10	6	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	8	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	10	5	5	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
ESE	13	10	3	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SE	12	7	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	10	12	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	42	18	8	5	3	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	20	12	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	7	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	7	2	4	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
WNW	10	2	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	14	9	5	5	1	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
NNW	20	13	5	3	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	16	15	4	3	6	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.46	5.21	5.63	5.29	6.55	7.15	0.	0.	5.86	5.51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.50	4.71	4.29	4.97	5.62	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	4.92	4.92	3.86	5.70	4.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.25	6.08	4.98	7.42	0.	0.	0.	0.	0.	0.	0.	3.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	5.90	5.13	6.15	0.	4.54	0.	0.	0.	0.	0.	0.	10.31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.09	5.49	6.31	5.81	0.	4.87	9.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	4.94	4.87	5.75	0.	0.	0.	5.21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.37	4.85	6.67	6.41	6.69	6.94	8.43	6.92	0.	8.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	6.29	6.72	6.82	0.	8.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	4.25	3.83	6.46	0.	4.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	4.47	6.54	2.13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.92	2.89	7.05	0.	7.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	5.06	3.84	4.30	9.06	0.	0.	6.72	0.	0.	0.	0.	0.	8.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	6.64	5.25	5.29	6.30	5.60	8.03	0.	0.	0.	0.	7.98	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	5.33	6.84	8.81	3.34	7.33	7.92	7.95	0.	0.	0.	0.	0.	0.	0.	6.72	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.69	5.62	7.43	5.25	6.66	5.96	0.	9.37	6.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

WOLF CREEK

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.04.00.

WIND DIRECTION PERSISTENCE - PASQUILL *E*
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	9	1	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	7	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	5	4	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	16	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	29	12	7	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	32	23	11	5	2	2	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	20	7	4	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	7	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	12	6	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	8	4	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	12	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WOLF CREEK

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.14	3.76	4.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.83	2.97	4.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.13	2.47	2.70	3.24	0.	5.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.96	3.60	5.72	0.	6.62	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.41	3.75	5.46	5.72	6.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.09	5.73	3.45	3.75	4.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.75	4.89	4.33	7.60	5.27	4.97	6.10	6.67	4.89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.54	4.61	5.69	6.70	4.72	6.58	8.93	0.	6.83	0.	5.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	4.13	5.35	4.57	0.	7.14	7.94	6.98	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.86	3.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.84	4.34	2.89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.58	5.36	2.67	4.08	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.53	3.65	0.	0.	0.	0.	5.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	3.10	4.29	3.36	5.26	4.03	4.00	4.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.89	2.56	4.15	4.18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.38	4.49	0.	0.	0.	0.	6.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

TABLE 2.3-33 (Continued)

WIND DIRECTION PERSISTENCE

(10 METERS)

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.03.28.

WIND DIRECTION PERSISTENCE - PASQUILL *F*
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	12	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	7	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	13	5	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	26	16	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	23	8	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	11	2	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	6	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	10	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.78	3.17	4.67	0.	3.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.92	2.94	0.	2.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.74	0.	3.36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.89	3.63	4.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.10	3.95	0.	4.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.46	2.83	3.14	0.	2.87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.25	3.35	2.86	4.43	0.	3.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.84	3.36	3.63	3.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.34	3.13	3.68	3.46	3.70	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.41	3.05	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.89	0.	0.	2.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.83	3.75	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.61	4.53	0.	0.	0.	0.	0.	0.	3.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.26	4.50	3.29	3.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

WIND DIRECTION PERSISTENCE

(10 METERS)

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.03.57.

WIND DIRECTION PERSISTENCE - PASQUILL #G#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	9	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	5	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	7	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	13	6	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	15	3	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	11	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	7	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	9	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.99	2.83	3.41	3.14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.79	2.23	2.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.61	2.49	3.36	3.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.11	2.97	3.20	4.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	2.91	2.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.58	3.15	3.41	2.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	2.84	2.90	2.66	2.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	2.70	3.42	2.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	2.92	0.	0.	0.	0.	2.66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.20	2.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	1.99	2.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.30	2.56	0.	2.78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.16	2.56	0.	3.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.50	2.60	0.	3.67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.04.13.

WIND DIRECTION PERSISTENCE - PASQUILL ALL
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	36	22	20	11	6	1	3	0	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
NE	38	15	10	8	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	31	12	8	5	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	40	15	11	7	2	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
ESE	41	24	13	6	6	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
SE	54	32	20	7	4	3	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
SSE	76	43	29	20	9	6	5	4	1	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0
S	95	64	35	17	20	13	10	7	4	1	2	1	5	1	1	1	0	0	0	0	0	0	0	1
SSW	84	39	16	11	11	8	6	2	3	2	3	1	0	2	0	0	1	0	0	0	0	0	0	0
SW	45	18	9	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	19	8	7	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	35	11	8	3	3	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	38	18	4	2	2	0	4	1	1	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0
NW	39	18	15	13	8	3	1	1	0	2	1	0	1	0	1	0	1	0	0	0	0	0	1	0
NNW	40	24	5	12	5	10	3	3	4	0	4	0	1	0	0	0	0	0	0	0	0	0	0	1
N	40	27	10	11	7	3	1	3	1	4	1	3	1	1	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.41	4.53	4.24	5.63	5.13	2.97	4.52	0.	6.35	5.51	5.84	8.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.49	3.02	3.87	4.38	5.62	3.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.24	3.48	4.13	5.14	3.74	5.07	3.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.13	4.15	5.15	4.37	4.57	4.63	0.	4.09	0.	0.	0.	3.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.60	4.57	5.21	4.30	5.27	0.	7.56	0.	0.	0.	0.	8.30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.47	3.75	3.83	3.53	3.22	4.34	4.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.00	0.	0.	0.	0.	0.	0.	0.
SSE	3.63	3.91	4.13	3.96	4.35	4.94	5.74	5.94	4.82	5.35	0.	8.10	0.	0.	0.	0.	0.	5.03	0.	0.	0.	0.	0.	0.
S	4.11	4.60	4.99	5.52	5.86	6.83	6.35	6.07	5.24	8.38	5.63	5.42	8.25	8.00	9.37	8.87	0.	0.	0.	0.	0.	0.	0.	6.86
SSW	4.41	5.41	5.66	6.53	6.21	6.05	6.54	8.78	8.04	7.91	8.25	8.84	0.	7.37	0.	0.	7.62	0.	0.	0.	0.	0.	0.	0.
SW	4.14	5.07	4.57	6.71	7.32	8.95	0.	4.37	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.97	6.78	3.82	4.47	0.	3.83	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.77	4.07	5.19	4.58	6.27	5.75	5.27	0.	3.80	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	4.45	3.85	4.14	9.06	5.58	0.	6.36	6.44	13.99	0.	0.	4.42	0.	0.	0.	0.	0.	8.11	0.	0.	0.	0.	0.	0.
NW	4.12	4.70	5.57	7.03	4.92	4.68	8.05	99.99	0.	4.39	4.45	0.	7.55	0.	8.40	0.	6.75	0.	0.	0.	0.	0.	7.96	0.
NNW	4.21	5.00	5.14	5.23	5.20	6.45	7.37	6.45	6.84	0.	9.08	0.	8.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.14
N	4.72	4.32	4.23	5.71	4.79	6.09	4.71	8.05	4.68	8.07	6.50	5.59	7.04	7.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 7699-062-07
DATA PERIOD (YR - MONTH - DAY) - 740601 TO 750531
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 07/28/80. TIME - 20.04.23.

WIND DIRECTION PERSISTENCE - PASQUILL #S#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	20	8	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	12	6	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	17	5	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	25	5	5	2	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	21	12	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	32	21	9	3	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	54	33	18	16	7	3	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
S	59	39	20	8	5	4	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	36	12	6	3	5	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	9	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	14	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	16	8	1	2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
NW	19	7	3	3	4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	15	7	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	16	14	3	3	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.97	3.79	3.78	2.76	3.24	2.97	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.79	2.37	3.31	2.82	0.	2.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.87	3.29	3.03	3.00	3.60	4.65	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.95	3.62	4.43	3.00	3.70	4.63	0.	4.09	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.20	3.53	5.22	5.43	6.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.42	3.69	3.14	2.53	3.22	3.88	3.06	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.19	3.64	3.55	3.70	3.85	4.84	6.10	6.67	0.	4.40	0.	0.	0.	0.	4.75	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.95	4.05	4.58	5.16	4.89	5.69	6.38	0.	6.83	0.	5.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.37	4.52	4.32	4.44	4.84	4.36	0.	0.	0.	0.	6.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.20	3.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.74	4.48	2.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.02	2.73	2.91	2.56	3.84	5.16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.36	3.68	1.90	2.90	0.	0.	5.41	0.	0.	0.	0.	3.92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.56	3.50	2.16	4.66	3.85	4.00	0.	0.	4.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.37	2.80	3.73	3.31	2.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.02	3.78	3.20	3.70	3.32	0.	0.	0.	0.	5.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8760

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.00.14.

WIND DIRECTION PERSISTENCE - PASQUILL #A#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	4	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	7	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	6	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	6	1	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	6.91	8.17	6.85	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	0.	0.	0.	8.20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	0.	6.57	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.44	4 77	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.65	0.	4.53	4.61	7.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.15	6.34	6.24	6.74	6.62	6.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	0.	3.55	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	0.	2.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.06	2.32	0.	4.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	0.	0.	6.98	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	9.90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	6.79	6.12	0.	6.07	7.82	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	6.97	6.14	8.39	5.45	8.44	7.89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.04.04.

WIND DIRECTION PERSISTENCE - PASQUILL #B#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	7	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	9	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	6	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WOLF CREEK

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4.83	0.	5.33	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.89	3.74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.26	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	7.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.19	3.99	4.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.33	0.	6.84	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	5.26	5.30	0.	8.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	4.29	0.	2.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	5.25	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	9.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	0.	4.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.15	2.89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.06.51.

WIND DIRECTION PERSISTENCE - PASQUILL #C#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	10	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	13	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.91	8.39	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	0.	7.21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	5.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.69	3.96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	6.20	4.82	6.52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	6.21	7.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	4.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	7.14	0.	0.	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	4.24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	8.17	3.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.58	0.	6.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	5.72	3.31	7.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

WOLF CREEK

TABLE 2.3-33 (Continued)

WIND DIRECTION PERSISTENCE

(10 METERS)

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.10.16.

WIND DIRECTION PERSISTENCE - PASQUILL #D#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	20	8	3	4	2	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
NE	19	8	4	3	2	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
ENE	14	8	3	3	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	14	9	3	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
ESE	8	10	1	1	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	12	8	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	24	6	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	39	17	15	5	2	0	2	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	38	18	7	3	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	10	4	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	9	6	4	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
WNW	7	2	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	14	4	1	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	14	7	11	1	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
N	27	9	8	3	3	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.94	5.19	4.06	4.93	6.95	9.46	5.84	0.	6.37	0.	0.	5.29	0.	0.	6.79	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.26	4.13	4.11	3.68	7.63	0.	4.94	5.40	0.	0.	0.	0.	0.	0.	0.	7.05	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.99	3.21	3.74	6.05	5.24	4.04	0.	0.	5.84	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.22	4.72	4.65	4.47	4.35	0.	0.	0.	0.	0.	0.	0.	5.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.57	5.49	5.16	2.92	0.	5.16	0.	0.	0.	4.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	4.80	4.52	0.	3.10	0.	7.14	0.	9.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	4.16	5.20	6.64	6.99	5.64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	5.58	5.86	7.02	6.07	4.66	0.	7.89	8.91	0.	4.41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.34	7.70	7.59	5.60	0.	7.03	0.	0.	0.	7.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	4.99	6.43	3.30	4.75	0.	8.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	5.95	6.63	3.78	0.	8.78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	4.49	6.88	3.91	7.28	0.	2.99	0.	0.	0.	0.	0.	6.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.85	5.72	8.85	5.69	0.	0.	6.30	6.71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	5.27	5.85	7.98	8.24	6.79	7.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	5.51	5.81	6.72	6.48	4.48	0.	7.07	0.	9.46	0.	0.	6.76	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	4.67	5.17	5.58	8.22	5.92	5.22	4.35	0.	10.17	5.01	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.38	0.	99.99	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

WOLF CREEK

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.13.06.

WIND DIRECTION PERSISTENCE - PASQUILL #E#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3	6	3	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	12	2	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	12	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	13	5	5	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	14	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	19	6	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	19	14	2	1	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	30	17	12	8	7	6	7	1	1	0	1	3	1	1	1	0	0	0	0	0	0	0	0	0
SSW	17	8	5	2	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
SW	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	5	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	8	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	6	5	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	9	5	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.92	6.05	3.57	3.75	0.	0.	10.23	0.	0.	0.	6.07	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.26	2.91	3.80	0.	0.	0.	2.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.20	2.67	0.	5.64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	4.28	4.27	4.04	6.66	0.	5.03	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	4.15	3.95	0.	4.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.74	4.65	2.87	7.08	0.	7.68	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.56	4.15	3.82	6.72	5.36	4.37	0.	0.	5.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.45	5.32	4.51	5.05	4.90	6.10	6.46	3.51	6.49	0.	7.37	9.02	10.20	9.39	9.94	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	5.43	6.57	6.00	4.19	3.47	0.	6.01	0.	5.11	0.	8.10	0.	4.81	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	4.09	3.46	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.58	5.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.70	4.88	4.88	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	3.93	3.81	4.44	0.	5.82	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	3.71	3.81	0.	7.44	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	4.29	4.92	4.52	5.14	6.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.89	5.19	0.	3.38	4.69	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.15.46.

WIND DIRECTION PERSISTENCE - PASQUILL #F#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	8	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	6	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	5	4	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	12	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	18	9	6	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	17	3	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	6	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	6	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	12	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.82	0.	2.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	0.	2.64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.53	2.80	2.48	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	2.75	3.31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	2.44	3.46	2.57	0.	1.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.43	2.41	2.06	1.66	2.34	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	2.95	2.69	2.67	3.01	3.11	2.68	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.15	3.62	3.65	0.	0.	3.38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	3.23	2.82	6.10	5.50	3.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.74	2.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.75	2.56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.46	3.33	0.	2.20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.89	2.54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.65	3.15	2.32	0.	3.20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.04	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	2.93	3.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.18.55.

WIND DIRECTION PERSISTENCE - PASQUILL #G#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	5	1	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	8	2	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	10	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	9	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	9	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	7	1	1	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	9	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	3	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	3.24	2.50	2.75	2.42	0.	3.53	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.50	3.55	3.27	2.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.06	1.82	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	2.97	2.45	0.	2.54	0.	0.	3.21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	2.08	3.20	2.72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.07	1.68	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	2.30	3.00	2.59	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	2.45	2.34	3.25	0.	1.10	2.98	2.45	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	1.98	3.34	.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	2.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.22	1.49	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	1.87	2.99	2.12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.25	1.28	0.	0.	0.	2.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	2.66	2.59	1.99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	2.00	2.71	2.55	0.	2.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/13/81. TIME - 15.21.01.

WIND DIRECTION PERSISTENCE - PASQUILL ALL
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	39	20	14	10	6	1	2	2	3	0	2	1	0	1	0	1	0	0	0	0	0	0	0	0
NE	42	19	17	14	4	2	2	2	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
ENE	39	23	9	6	2	3	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
E	53	28	12	12	3	2	0	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0
ESE	51	23	9	3	3	3	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	60	34	13	8	3	3	2	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
SSE	85	40	17	17	5	7	2	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
S	93	44	34	25	20	7	13	5	4	6	2	1	1	0	1	0	2	0	0	0	3	0	1	3
SSW	72	27	22	12	6	2	3	6	1	4	3	2	0	0	1	0	0	0	2	0	0	0	0	1
SW	36	20	4	3	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	30	10	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	26	15	9	5	5	2	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
WNW	40	13	4	2	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	48	16	7	4	4	3	2	2	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
NNW	45	16	16	9	5	8	8	3	1	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0
N	51	28	14	6	8	3	4	3	0	1	1	1	0	1	0	0	0	0	0	0	1	1	0	2

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	4.24	4.93	4.24	3.78	4.64	2.22	7.51	5.29	5.61	0.	6.82	5.29	0.	9.24	0.	6.79	0.	0.	0.	0.	0.	0.	0.	0.
NE	3.47	3.40	3.75	3.20	5.45	2.65	5.65	5.05	4.86	5.27	0.	0.	0.	0.	0.	7.05	0.	0.	0.	0.	0.	0.	0.	0.
ENE	3.16	3.16	2.70	3.05	6.00	4.39	6.06	4.47	5.84	0.	0.	4.60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.49	3.97	3.88	4.03	5.80	5.68	0.	0.	3.29	0.	0.	3.83	5.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.17	3.48	3.52	3.19	2.92	3.59	0.	6.12	0.	4.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	3.16	3.22	3.80	3.42	3.71	7.78	3.27	4.52	6.52	0.	0.	0.	0.	0.	0.	0.	8.66	0.	0.	0.	0.	0.	0.	0.
SSE	3.63	3.57	3.19	4.41	5.79	3.91	4.14	4.46	3.49	0.	0.	0.	6.11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	4.06	4.59	4.26	5.24	5.07	6.74	4.67	6.68	6.23	5.00	6.35	4.97	6.16	0.	9.52	0.	9.91	0.	0.	0.	7.68	0.	5.91	8.88
SSW	4.53	6.24	6.50	5.99	4.95	5.28	5.86	6.27	5.11	7.09	5.38	5.45	0.	0.	5.00	0.	0.	0.	7.43	0.	0.	0.	0.	5.28
SW	3.91	4.68	4.08	4.22	7.93	0.	8.19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	3.50	2.88	5.31	4.44	8.78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	3.35	4.63	3.62	4.75	4.29	4.00	0.	3.43	6.48	0.	0.	6.28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.81	3.48	5.35	1.85	5.21	0.	6.30	5.47	6.69	4.94	5.86	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	4.07	3.78	4.58	3.62	4.06	7.65	8.81	2.32	0.	0.	9.66	0.	0.	0.	0.	0.	0.	0.	0.	7.77	0.	0.	0.	0.
NNW	3.92	4.61	5.78	4.88	7.41	5.37	7.55	6.95	3.84	6.29	0.	8.55	0.	0.	0.	0.	6.21	0.	0.	0.	0.	0.	0.	0.
N	4.44	4.35	4.34	5.68	4.75	4.48	7.00	6.00	0.	6.27	8.59	4.59	0.	6.94	0.	0.	0.	0.	0.	0.	7.38	8.18	0.	5.83

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 39

KANSAS GAS AND ELECTRIC
WOLF CREEK GENERATING STATION
JOB NO. - 07699-064-07
DATA PERIOD (YR - MONTH - DAY) - 790305 TO 800304
THRESHOLD OF ANEMOMETER (MPH) - .74
DATE OF THIS RUN - 11/17/81. TIME - 14.03.16.

WIND DIRECTION PERSISTENCE - PASQUILL #S#
1 SECTOR PERSISTENCE

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	7	8	10	6	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	18	9	6	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	19	9	4	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	29	17	8	4	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	32	11	6	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	46	23	6	6	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	46	25	12	9	5	5	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	48	22	14	15	10	5	12	3	3	1	1	3	1	1	1	0	0	0	0	0	0	0	0	0
SSW	26	9	7	2	3	0	1	1	2	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
SW	20	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	18	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W	12	7	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	23	7	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	24	6	2	4	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	20	9	4	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	18	10	2	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AVERAGE WIND SPEED (M/SEC)

CONSECUTIVE HOURS

SECTOR	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
NNE	2.91	5.47	2.89	3.21	0.	0.	3.51	0.	9.15	0.	6.07	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NE	2.71	2.98	3.58	2.96	2.55	0.	2.15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENE	2.69	2.54	3.16	2.65	0.	5.10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
E	3.32	3.33	3.64	5.14	4.02	5.03	0.	0.	3.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ESE	3.01	3.46	2.56	3.34	1.40	4.26	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SE	2.77	2.91	2.76	3.58	0.	7.68	2.58	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSE	3.06	3.44	2.94	3.39	3.91	3.56	3.69	0.	3.92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S	3.60	4.34	4.42	4.37	4.52	5.75	5.19	3.42	4.77	4.58	7.37	9.02	10.20	9.39	9.94	0.	0.	0.	0.	0.	0.	0.	0.	0.
SSW	4.36	5.68	5.52	4.19	2.42	0.	6.01	3.40	4.51	0.	7.02	0.	4.81	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SW	3.34	3.69	2.34	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WSW	2.70	2.78	5.17	2.58	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W	2.92	3.19	3.26	2.61	3.32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
WNW	2.49	3.04	4.74	2.28	5.82	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NW	2.87	3.29	2.55	3.97	3.20	0.	1.96	2.52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NNW	3.37	3.88	3.89	4.66	6.27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
N	3.36	3.52	2.62	4.56	3.72	3.34	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NO. OF OBSERVATIONS = 8784
TOTAL NO. OF INVALID OBSERVATIONS = 1197

TABLE 2.3-34

AVERAGE MONTHLY AND ANNUAL DAYLIGHT CLOUD COVER, AND SUNSHINE FOR TOPEKA, KANSAS

Month	Clear Days[a]	Partly Cloudy Days[a]	Cloudy Days[a]	Sky Cover[a] (Tenth of) (Celestial Dome)	Possible Sunshine[b] (%)
January	9	6	16	6.2	55
February	8	6	14	6.3	54
March	7	8	16	6.7	54
April	7	8	15	6.4	56
May	7	10	14	6.3	59
June	8	10	12	5.9	65
July	10	11	10	5.2	69
August	12	11	8	4.9	70
September	12	7	11	5.0	64
October	13	7	11	4.8	65
November	10	6	14	5.8	54
December	9	6	16	6.2	51
Annual	112	96	157	5.8	60

a Data Period 1947-1978.
b Data Period 1950-1978.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Topeka, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-35

AVERAGE MONTHLY AND ANNUAL DAYLIGHT CLOUD COVER, AND SUNSHINE FOR WICHITA, KANSAS*

Month	Clear Days	Partly Cloudy Days	Cloudy Days	Sky Cover (Tenth of) (Celestial Dome)	Possible Sunshine (%)
January	10	6	15	6.0	59
February	8	7	13	6.0	60
March	9	7	15	6.2	61
April	8	8	14	6.1	62
May	9	9	13	6.0	64
June	10	10	10	5.3	70
July	13	10	8	4.7	75
August	13	11	7	4.5	74
September	13	6	11	5.0	66
October	14	7	10	4.7	67
November	11	6	13	5.6	59
December	10	7	14	5.9	58
Annual	128	94	143	5.5	65

* Data Period 1954-1978.

Source:

Environmental Data Service, 1978, Local climatological data, annual summary with comparative data, Wichita, Kansas: Environmental Science Services Administration, U.S. Department of Commerce, Silver Spring, Maryland.

TABLE 2.3-36

PERSISTENCE OF STABILITY FREQUENCY
DISTRIBUTION (IN PERCENT) AT CHANUTE F.S.S., KANSAS*

SPRING

Upper Class Intervals of Hours of Persistence	Stability Class					
	A	B	C	D	E	F
3	77.78	64.56	54.34	3.27	39.47	38.91
6	22.22	20.25	30.14	4.01	36.80	32.00
9	.00	15.19	13.70	4.39	15.98	26.18
12	.00	.00	1.83	4.09	7.75	2.91
15	.00	.00	.00	3.81	.00	.00
18	.00	.00	.00	3.73	.00	.00
21	.00	.00	.00	5.75	.00	.00
24	.00	.00	.00	1.92	.00	.00
27	.00	.00	.00	3.79	.00	.00
30	.00	.00	.00	3.21	.00	.00
33	.00	.00	.00	2.86	.00	.00
36	.00	.00	.00	2.40	.00	.00
39	.00	.00	.00	3.91	.00	.00
42	.00	.00	.00	3.08	.00	.00
45	.00	.00	.00	4.81	.00	.00
48	.00	.00	.00	2.56	.00	.00

* Data Period 1955-1964.

SPRING

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
51	.00	.00	.00	1.02	.00	.00
54	.00	.00	.00	2.88	.00	.00
57	.00	.00	.00	4.19	.00	.00
60	.00	.00	.00	1.20	.00	.00
63	.00	.00	.00	2.94	.00	.00
66	.00	.00	.00	2.20	.00	.00
69	.00	.00	.00	3.23	.00	.00
72	.00	.00	.00	.00	.00	.00
75	.00	.00	.00	1.00	.00	.00
78	.00	.00	.00	1.04	.00	.00
81	.00	.00	.00	2.70	.00	.00
84	.00	.00	.00	1.12	.00	.00
87	.00	.00	.00	.58	.00	.00
90	.00	.00	.00	1.20	.00	.00
93	.00	.00	.00	2.48	.00	.00
96	.00	.00	.00	.00	.00	.00
99	.00	.00	.00	1.98	.00	.00
102	.00	.00	.00	.68	.00	.00
>102	.00	.00	.00	11.94	.00	.00

SUMMER

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
3	61.90	60.38	48.00	12.36	35.13	34.16
6	23.81	25.38	31.20	12.23	31.73	33.71
9	14.29	12.69	16.80	10.51	29.75	27.64
12	.00	1.54	4.00	9.94	3.40	4.49
15	.00	.00	.00	5.42	.00	.00
18	.00	.00	.00	6.31	.00	.00
21	.00	.00	.00	15.61	.00	.00
24	.00	.00	.00	3.06	.00	.00
27	.00	.00	.00	3.15	.00	.00
30	.00	.00	.00	4.14	.00	.00
33	.00	.00	.00	.70	.00	.00
36	.00	.00	.00	3.44	.00	.00
39	.00	.00	.00	2.48	.00	.00
42	.00	.00	.00	.45	.00	.00
45	.00	.00	.00	2.39	.00	.00
48	.00	.00	.00	1.02	.00	.00

TABLE 2.3-36 (continued)

SUMMER

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
51	.00	.00	.00	.54	.00	.00
54	.00	.00	.00	.00	.00	.00
57	.00	.00	.00	.61	.00	.00
60	.00	.00	.00	.64	.00	.00
63	.00	.00	.00	.00	.00	.00
66	.00	.00	.00	.00	.00	.00
69	.00	.00	.00	.73	.00	.00
72	.00	.00	.00	.76	.00	.00
75	.00	.00	.00	.80	.00	.00
78	.00	.00	.00	.83	.00	.00
81	.00	.00	.00	.86	.00	.00
84	.00	.00	.00	.00	.00	.00
87	.00	.00	.00	.00	.00	.00
90	.00	.00	.00	.00	.00	.00
93	.00	.00	.00	.00	.00	.00
96	.00	.00	.00	1.02	.00	.00

FALL

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
3	100.00	53.33	54.81	4.14	30.24	21.63
6	.00	40.00	33.65	6.34	25.99	26.62
9	.00	6.67	11.54	5.05	20.29	18.85
12	.00	.00	.00	5.17	20.16	23.66
15	.00	.00	.00	4.75	3.32	9.24
18	.00	.00	.00	4.68	.00	.00
21	.00	.00	.00	3.41	.00	.00
24	.00	.00	.00	2.34	.00	.00
27	.00	.00	.00	1.97	.00	.00
30	.00	.00	.00	3.17	.00	.00
33	.00	.00	.00	1.88	.00	.00
36	.00	.00	.00	4.39	.00	.00
39	.00	.00	.00	2.54	.00	.00
42	.00	.00	.00	3.75	.00	.00
45	.00	.00	.00	3.29	.00	.00
48	.00	.00	.00	2.34	.00	.00

FALL

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
51	.00	.00	.00	1.24	.00	.00
54	.00	.00	.00	1.76	.00	.00
57	.00	.00	.00	2.78	.00	.00
60	.00	.00	.00	5.36	.00	.00
63	.00	.00	.00	1.54	.00	.00
66	.00	.00	.00	1.61	.00	.00
69	.00	.00	.00	2.24	.00	.00
72	.00	.00	.00	1.17	.00	.00
75	.00	.00	.00	1.22	.00	.00
78	.00	.00	.00	.63	.00	.00
81	.00	.00	.00	.66	.00	.00
84	.00	.00	.00	.00	.00	.00
87	.00	.00	.00	.71	.00	.00
90	.00	.00	.00	.73	.00	.00
93	.00	.00	.00	2.27	.00	.00
96	.00	.00	.00	.00	.00	.00
99	.00	.00	.00	1.61	.00	.00
102	.00	.00	.00	.83	.00	.00
>102	.00	.00	.00	14.43	.00	.00

TABLE 2.3-36 (continued)

WINTER

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
3	100.00	64.29	61.07	2.50	37.76	36.52
6	.00	35.71	30.87	4.03	33.14	26.95
9	.00	.00	8.05	4.10	12.72	17.02
12	.00	.00	.00	3.24	15.41	14.18
15	.00	.00	.00	3.70	.96	5.32
18	.00	.00	.00	2.78	.00	.00
21	.00	.00	.00	3.56	.00	.00
24	.00	.00	.00	3.15	.00	.00
27	.00	.00	.00	2.92	.00	.00
30	.00	.00	.00	2.78	.00	.00
33	.00	.00	.00	3.56	.00	.00
36	.00	.00	.00	2.78	.00	.00
39	.00	.00	.00	5.11	.00	.00
42	.00	.00	.00	3.24	.00	.00
45	.00	.00	.00	.69	.00	.00
48	.00	.00	.00	1.85	.00	.00

TABLE 2.3-36 (continued)

WINTER

Upper Class Intervals of Hours of Persistence	Stability Class A	B	C	D	E	F
51	.00	.00	.00	3.54	.00	.00
54	.00	.00	.00	2.50	.00	.00
57	.00	.00	.00	3.96	.00	.00
60	.00	.00	.00	1.85	.00	.00
63	.00	.00	.00	4.37	.00	.00
66	.00	.00	.00	1.02	.00	.00
69	.00	.00	.00	1.06	.00	.00
72	.00	.00	.00	2.78	.00	.00
75	.00	.00	.00	.00	.00	.00
78	.00	.00	.00	2.41	.00	.00
81	.00	.00	.00	1.87	.00	.00
84	.00	.00	.00	1.94	.00	.00
87	.00	.00	.00	.67	.00	.00
90	.00	.00	.00	1.39	.00	.00
93	.00	.00	.00	3.59	.00	.00
96	.00	.00	.00	.74	.00	.00
99	.00	.00	.00	1.53	.00	.00
102	.00	.00	.00	.00	.00	.00
>102	.00	.00	.00	14.82	.00	.00

STABILITY PERSISTENCE SUMMARY

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064-07
DATA PERIOD FROM 6/ 1/73 TO 3/ 4/80
DATE AND TIME OF RUN 10/30/81. 09.31.21.

NUMBER OF HOURS

NUMBER OF CONSECUTIVE HOURS	PASQUILL STABILITY CLASS						
	-A-	-B-	-C-	-D-	-E-	-F-	-G-
2	2106	433	573	5917	4089	2073	1727
3	1640	193	266	4696	3053	1338	1341
4	1250	88	140	3869	2330	892	1057
5	926	38	78	3263	1798	595	825
6	659	24	44	2811	1382	388	637
7	445	15	27	2425	1051	247	483
8	282	10	20	2086	782	152	353
9	162	9	14	1801	575	88	244
10	84	8	10	1564	411	48	159
11	34	7	7	1373	298	25	102
12	15	6	6	1216	201	13	59
13	11	5	5	1082	128	7	29
14	9	4	4	962	84	4	12
15	7	3	3	852	54	1	5
16	5	2	2	759	37	0	2
17	3	1	1	676	25	0	0
18	2	0	0	608	17	0	0
19	1	0	0	551	13	0	0
20	0	0	0	503	11	0	0
21	0	0	0	458	10	0	0
22	0	0	0	422	9	0	0
23	0	0	0	390	8	0	0
24	0	0	0	359	7	0	0
>24	0	0	0	334	6	0	0

1244 INVALID HOUR(S).

STABILITY PERSISTENCE SUMMARY

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064-07
DATA PERIOD FROM 6/ 1/73 TO 5/31/74
DATE AND TIME OF RUN 10/30/81. 09.27.50.

NUMBER OF HOURS

NUMBER OF CONSECUTIVE HOURS	PASQUILL STABILITY CLASS -A-	-B-	-C-	-D-	-E-	-F-	-G-
2	608	213	211	1905	1427	668	637
3	443	100	93	1472	1032	407	495
4	314	50	48	1204	763	256	386
5	210	26	24	1017	565	166	295
6	132	19	10	865	422	103	224
7	75	13	5	735	316	59	165
8	39	10	3	621	229	32	118
9	14	9	2	524	160	17	80
10	2	8	1	444	104	9	47
11	0	7	0	380	68	4	26
12	0	6	0	329	40	1	12
13	0	5	0	287	21	0	6
14	0	4	0	248	12	0	2
15	0	3	0	211	6	0	1
16	0	2	0	179	3	0	0
17	0	1	0	152	2	0	0
18	0	0	0	129	1	0	0
19	0	0	0	112	0	0	0
20	0	0	0	98	0	0	0
21	0	0	0	85	0	0	0
22	0	0	0	76	0	0	0
23	0	0	0	68	0	0	0
24	0	0	0	60	0	0	0
>24	0	0	0	52	0	0	0

66 INVALID HOUR(S).

STABILITY PERSISTENCE SUMMARY

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064-07
DATA PERIOD FROM 6/ 1/74 TO 5/31/75
DATE AND TIME OF RUN 10/30/81. 09.26.44.

NUMBER OF HOURS

NUMBER OF CONSECUTIVE HOURS	PASQUILL STABILITY CLASS						
	-A-	-B-	-C-	-D-	-E-	-F-	-G-
2	1294	116	224	1843	1208	741	519
3	1061	47	124	1492	889	496	396
4	850	15	75	1249	671	343	308
5	667	4	49	1061	510	233	237
6	503	2	33	934	383	156	180
7	360	1	22	825	274	105	133
8	240	0	17	733	194	70	93
9	148	0	12	657	138	46	60
10	82	0	9	594	94	25	38
11	34	0	7	541	64	13	25
12	15	0	6	495	38	8	15
13	11	0	5	451	19	5	8
14	9	0	4	410	10	3	4
15	7	0	3	372	4	1	2
16	5	0	2	339	2	0	1
17	3	0	1	308	1	0	0
18	2	0	0	283	0	0	0
19	1	0	0	263	0	0	0
20	0	0	0	247	0	0	0
21	0	0	0	233	0	0	0
22	0	0	0	222	0	0	0
23	0	0	0	212	0	0	0
24	0	0	0	202	0	0	0
>24	0	0	0	194	0	0	0

4 INVALID HOUR(S).

STABILITY PERSISTENCE SUMMARY

WOLF CREEK GENERATING STATION
BURLINGTON, KANSAS
KANSAS GAS AND ELECTRIC
DAMES AND MOORE JOB NO 7699-064-07
DATA PERIOD FROM 3/ 5/79 TO 3/ 4/80
DATE AND TIME OF RUN 10/30/81. 09.29.03.

NUMBER OF HOURS

NUMBER OF CONSECUTIVE HOURS	PASQUILL STABILITY CLASS						
	-A-	-B-	-C-	-D-	-E-	-F-	-G-
2	204	104	138	2169	1454	664	571
3	136	46	49	1732	1132	435	450
4	86	23	17	1416	896	293	363
5	49	8	5	1185	723	196	293
6	24	3	1	1012	577	129	233
7	10	1	0	865	461	83	185
8	3	0	0	732	359	50	142
9	0	0	0	620	277	25	104
10	0	0	0	526	213	14	74
11	0	0	0	452	166	8	51
12	0	0	0	392	123	4	32
13	0	0	0	344	88	2	15
14	0	0	0	304	62	1	6
15	0	0	0	269	44	0	2
16	0	0	0	241	32	0	1
17	0	0	0	216	22	0	0
18	0	0	0	196	16	0	0
19	0	0	0	176	13	0	0
20	0	0	0	158	11	0	0
21	0	0	0	140	10	0	0
22	0	0	0	124	9	0	0
23	0	0	0	110	8	0	0
24	0	0	0	97	7	0	0
>24	0	0	0	88	6	0	0

1174 INVALID HOUR(S).

TABLE 2.3-37a

OCCURRENCES OF A, F, AND G STABILITIES
PERSISTING GREATER THAN 12 HOURS

STABILITY	TIME PERIOD	NUMBER OF CONSECUTIVE HOURS
A	79030705 - 79030804	24
A	79030806 - 79030821	16
A	79030823 - 79030921	23
A	79031003 - 79031021	19
A	79031104 - 79031119	16
A	79031204 - 79031218	15
G	79091720 - 79091808	13
G	79092520 - 79092608	13
G	79100620 - 79100708	13
G	79102720 - 79102809	14
G	79111518 - 79111609	16
G	79111619 - 79111708	14
F	79120119 - 79120208	14
G	79120320 - 79120409	14
G	80011321 - 80011409	13
G	80021122 - 80021210	13

WOLF CREEK

TABLE 2.3-38

HOURS OF FOGGING AND ICING DUE TO THE COOLING LAKE
AT SELECTED RECEPTORS FOR DATA PERIOD:
6/01-73 - 5/31/74

Receptors	Fog	Visibility <100M (1/16 Mile)	Visibility <200M (1/8 Mile)	Ice
1	13	5	10	1
2	18	8	11	1
11	13	7	10	2
12	22	15	18	2
21	15	10	11	4
22	31	21	22	4
28	33	20	26	8
29	40	26	33	7
35	34	15	28	8
36	68	37	57	11
44	49	31	42	4
45	76	54	66	5
48	367	259	332	31
53	50	30	48	4
54	87	56	80	8
62	55	33	48	6
63	86	50	71	5
71	45	26	41	5
72	82	46	64	1
82	62	37	52	3

Naturally occurring fog (ambient) was predicted for 19 hours.

Naturally occurring ice (ambient) was predicted for zero hours.

TABLE 2.3-39

HOURS OF FOGGING AND ICING DUE TO THE COOLING LAKE
AT SELECTED RECEPTORS FOR DATA PERIOD:
6/01/74 - 5/31/75

Receptors	Fog	Visibility <100M (1/16 Mile)	Visibility <200M (1/8 Mile)	Ice
1	25	4	13	3
2	32	5	19	6
11	39	12	29	4
12	39	9	23	6
21	44	15	37	4
22	60	23	44	7
28	43	18	31	7
29	65	30	52	8
35	60	26	44	4
36	82	40	63	7
44	63	32	49	8
45	104	64	87	9
48	491	314	411	61
53	43	19	33	1
54	106	54	82	2
62	68	36	56	0
63	113	74	95	1
71	68	42	59	2
72	101	67	85	1
82	67	37	57	0

Naturally occurring fog (ambient) was predicted for 22 hours.
Naturally occurring ice (ambient) was predicted for 16 hours.

TABLE 2.3-40

HOURS OF FOGGING AND ICING DUE TO THE COOLING LAKE AT SELECTED RECEPTORS FOR DATA PERIOD:

3/05/79 - 3/04/80

Receptors	Fog	Visibility <100M (1/16 Mile)	Visibility <200M (1/8 Mile)	Ice
1	20	3	10	13
2	31	10	18	20
11	24	3	11	16
12	39	8	26	27
21	25	7	13	14
22	35	7	25	22
28	30	15	18	11
29	46	20	31	19
35	39	17	25	9
36	59	28	45	15
44	46	13	31	6
45	88	44	73	17
48	453	327	407	82
53	35	16	25	10
54	58	35	49	13
62	28	18	22	8
63	52	35	46	8
71	22	15	21	7
72	43	28	36	7
82	37	23	32	6

Naturally occurring fog (ambient) was predicted for 17 hours.
Naturally occurring ice (ambient) was predicted for 19 hours.

TABLE 2.3-41

HOURS OF FOG PER MONTH
DUE TO COOLING LAKE AT SELECTED RECEPTORS FOR DATA PERIOD:
6/01/74 - 5/31/75

Receptors	1974 June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1975 Jan.	Feb.	Mar.	Apr	May
21	1	0	16	1	3	13	1	0	10	15	2	0
22	0	0	19	0	11	17	2	0	10	16	3	0
53	2	5	2	10	6	13	1	0	10	14	0	0

WOLF CREEK

TABLE 2.3 - 42

FREQUENCY (HOURS) OF TEMPERATURE CHANGE >2^{o}C

Receptor	Years* 1	2	3
11	69	42	42
12	90	65	79
21	66	69	73
22	112	93	99
48	829	918	854
53	102	154	142

* Year 1 = 6/1/73 - 5/31/74
Year 2 = 6/1/74 - 5/31/75
Year 3 = 3/5/79 - 3/4/80

TABLE 2.3-43

FREQUENCY (HOURS) OF CHANGE IN VAPOR DENSITY DISTRIBUTION (g/m^3)
DUE TO COOLING LAKE AT SELECTED RECEPTORS FOR DATA PERIOD:

6/01/73 - 5/31/74

Receptors	Water Vapor Density (g/m^3) 0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50
11	-	19	-	40	7	-	-	-	-	-
12	-	18	4	39	13	-	-	-	-	-
21	-	17	1	43	7	-	-	-	-	-
22	-	24	-	61	10	-	-	-	-	-
48	-	-	-	361	182	26	13	3	-	1
53	-	-	3	42	21	1	-	-	-	-

TABLE 2.3-44

FREQUENCY (HOURS) OF CHANGE IN VAPOR DENSITY DISTRIBUTION (g/m^3)

DUE TO COOLING LAKE AT SELECTED RECEPTORS FOR DATA PERIOD:

6/01/74 - 5/31/75

Receptors	Water Vapor Density (g/m^3) 0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50
11	-	-	64	16	3	-	-	-	-	-
12	-	-	74	14	4	-	-	-	-	-
21	-	-	73	22	2	-	-	-	-	-
22	-	-	93	31	3	-	-	-	-	-
48	-	-	140	383	67	9	6	2	-	-
53	-	-	71	61	12	-	-	-	-	-

TABLE 2.3-45

FREQUENCY (HOURS) OF CHANGE IN VAPOR DENSITY DISTRIBUTION (g/m^3)

DUE TO COOLING LAKE AT SELECTED RECEPTORS FOR DATA PERIOD:

3/05/79 - 3/04/80

	Water Vapor Density (g/m^3)									
Receptors	0 5	6 10	11 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50
11	-	6	33	24	-	-	-	-	-	-
12	-	1	47	29	1	-	-	-	-	-
21	-	11	32	42	1	-	-	-	-	-
22	-	-	54	48	1	12	1	-	-	-
48	-	149	11	425	59	-	-	-	-	-
53	-	-	20	100	8	-	-	-	-	-

TABLE 2.3-46

PHASE 1 METEOROLOGICAL INSTRUMENTATION ON TOWER
(JUNE 1, 1973 to MAY 31, 1975)

Meteorological Parameters	Heights (feet)	Sensor	Threshold	Range	Manufacturer
Horizontal Wind Speed	32,116,196	Precision Cup Anemometer Model 011-1, Accuracy ± 1% or ± 0.15 mph, whichever is greater	0.6 mph	100 mph	Climet
Horizontal Wind Direction	32,116,196	Precision Wind Model 012-10, Accuracy ±3°	0.75 mph	0 to 540°	Climet
Standard Deviation of Horizontal Wind Direction	32,116,196	Precision Wind Model 012-10, Accuracy ±3°		0 to 40°	Climet
Temperature at Reference	32	Aspirated Thermistors Model 015-3, Accuracy ±0.15°C		-30 to 50°C	Climet
Dewpoint Temperature	32	Aspirated Dew Cell Model 015-12, Accuracy ±2°F (± 1.1°C)		-50 to 50°C	Climet
Temperature Difference	32-116 32-196 32-277	Aspirated Thermistors Special Circuit Model 015-3, Accuracy ±0.15°C		-5 to 10°C	Climet
Radiation	6	Thermopile, Accuracy ± 1%		2 Langley/min	Eppley

TABLE 2.3-47

PHASE 2 METEOROLOGICAL INSTRUMENTATION ON TOWER
(MARCH 5, 1979 TO MARCH 4, 1980)

Meteorological Parameters	Heights (feet)	Sensor	Threshold	Range	Manufacturer
Horizontal Wind Speed	32,116,196	Precision Cup Anemometer Model 011-1, Accuracy ± 1% or ± 0.15 mph, whichever is greater	0.6 mph	100 mph	Climet
Horizontal Wind Direction	32,116,196	Precision Wind Model 012-10, Accuracy ±3°	0.75 mph	0 to 540°	Climet
Standard Deviation of Horizontal Wind Direction	32,116,196	Precision Wind Model 012-10, Accuracy ±3°		0 to 40°	Climet
Temperature at Reference[a]	32	Platinum Resistance Sensor Model R15-31-A-500-B-2-4-X1 ± 0.15°C (system error ± 0.14°C)		-50 to 50°C[b]	HY-CAL
Dewpoint Temperature[c]	32	Cooled Mirror Dew Cell Model C1-64, Accuracy 0.5°		-50 to 50°C	Climet
Temperature Difference[a]	32-116 32-196 32-277	Platinum Resistance Sensor Special Circuit Model CT-825-A-A-A, ± 0.15°C		-5 to 10°C	HY-CAL
Precipitation	6	Tipping Bucket Accuracy ±1%	0.01 inch		Weather Measure

a HY-CAL temperature sensors are aspirated and shielded by Weather Measure Model IS6FD Motor-aspirated Temperature Shields at 32, 116, and 196 feet. Radiation errors: 0.1°C. Operating temperature range -62.2 to +71.1°C.

b Prior to March 14, 1979 the range was -30° to +40C.

c Dewpoint sensor has its own dedicated Climet aspirated shield; operating range -50° to +50°C, shield error 0.1°C.

TABLE 2.3-48

OPERATIONAL METEOROLOGICAL INSTRUMENTATION ON TOWER
(AFTER MARCH 4, 1980)

Meteorological Parameters	Heights (feet)	Sensor	Threshold	Range
Horizontal Wind Speed	32,196	Anemometer Accuracy ± 1% or ± 0.15 mph, whichever is greater	0.6 mph	100 mph
Horizontal Wind Direction	32,196	Wind direction Accuracy ±3°	0.75 mph	0 to 540°
Standard Deviation of Horizontal Wind Direction	196	Standard Deviation Accuracy ± 3°		0 to 40°
Temperature at Reference*	32	Temperature Sensor (RTD) Accuracy ± 0.3°C		-50 to 50°C
Temperature Difference*	32,196	Temperature Sensor (RTD) Accuracy ± 0.3°C		-4 to + 6°C
Temperature Difference*	32,196	Temperature Difference Transmitter Accuracy ± 0.1°C		-4 to + 6°C
Temperature at Reference	32	Reference Temperature Transmitter Accuracy ± 0.1°C		-50 to +50°C

* Temperature sensors are aspirated and shielded.
More aspirated temperature shields at 32 and 196 feet.
Radiation error: 0.1°C
Operating temperature range: -62.2°C to 71.1°C.

TABLE 2.3-49

LOCATION OF METEOROLOGICAL SENSORS
AT THE PERMANENT METEOROLOGICAL SITE

Distance of wind sensors from tower	84 inches at both elevations
Distance from tower to instrument shed	52 feet
Direction of instrument shed from tower	East
Dimensions of the instrument shed	12 feet x 16 feet x 10 feet 4 inches
Distance of rain gauge from instrument shed	90 feet
Direction of rain gauge from instrument shed	South

TABLE 2.3-50

WIND SPEED TRANSMITTER
TRUE VS. INDICATED AIR SPEED

True Air Speed (mph)	Indicated Air Speed (mph)
0.51	0
5	4.50
10	9.52
15	14.55
20	19.59
22.5	22.09
25	24.60
30	29.63
35	34.66
40	39.68
45	44.71
50	49.73
60	59.79
70	69.84
80	79.89
90	89.94

Source:

Climet Instrument Company, 1970, Instruction manual Model 011-1 and speed transmitter: Climet Instrument Company, Redlands, California.

TABLE 2.3-51

DATA RECOVERY
PHASE 1 (JUNE 1973 - JUNE 1975)

Parameters	Height (feet)	Percent Recovery
Temperature	32	99.6
Temperature Difference	116-32	88.5
Tempterature Difference	196-32	94.3
Temperature Difference	277-32	96.5
Dewpoint	32	97.3
Wind Speed	32	97.1
Wind Direction	32	99.2
Wind Deviation	32	94.7
Wind Speed	116	95.6
Wind Direction	116	97.3
Wind Deviation	116	92.9
Wind Speed	196	94.0
Wind Direction	196	98.1
Wind Deviation	196	93.6

TABLE 2.3-52

DATA RECOVERY
PHASE 2 (MARCH 5, 1979 - MARCH 4, 1980)

Parameters	Height (feet)	Percent Recovery
Temperature	32	96.3
Temperature Difference	116-32	92.9
Tempterature Difference	196-32	86.4
Temperature Difference	277-32	79.4
Dewpoint	32	88.4
Wind Speed	32	98.8
Wind Direction	32	99.7
Wind Deviation	32	99.5
Wind Speed	116	97.9
Wind Direction	116	97.7
Wind Deviation	116	98.9
Wind Speed	196	96.9
Wind Direction	196	99.5
Wind Deviation	196	97.6
Precipitation	6	99.9

TABLE 2.3-53

ELEVATIONS OF INSTRUMENTATION USED FOR
REGIONAL METEOROLOGICAL MEASUREMENTS

Measuring Agency	Location	Parameter	Elevation Above Ground (feet)	Time Period
Chanute Flight Service Station	Chanute, Kansas	wind speed, wind direction	20	1/01/55 thru 12/31/64
National Weather Service	Topeka, Kansas	temperature, humidity .	65	1/01/41 thru 2/17/44
			43	2/18/44 thru 1/30/47
			4	1/31/47 thru 8/03/56
			5	8/04/56 thru 12/31/78
National Weather Service	Topeka, Kansas	precipitation	61	1/01/41 thru 9/27/44
			4	8/04/56 thru 12/31/78
National Weather Service	Wichita, Kansas	temperature, humidity	6	1/01/41 thru 9/27/44
			51	9/28/44 thru 11/30/53
			5	12/01/53 thru 12/31/78
National Weather Service	Wichita, Kansas	precipitation	4	1/01/41 thru 9/27/44
			43	9/28/44 thru 11/30/53
			5	12/01/53 thru 12/31/78

Source: Local Climatological Data, 1978, Topeka and Wichita, Kansas, U.S. Dept. of Commerce, National Climatic Center, Asheville, North Carolina.

TABLE 2.3-54

PLANT AND METEOROLOGICAL PARAMETERS
KANSAS GAS & ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

Parameter	Measurement
Height of Containment Building	63.41 m
Plant Vent Height	66.45 m
Area of Reactor Building	2650 m^2
Building Shape Factor	0.5
Stack Diameter	2.11 m
Stack Gas Exit Velocity	10 m/sec
Plant Grade Elevation	1099.5 ft (335.2 m) MSL
Anemometer Starting Speed Threshold	0.33 m/sec
Height of Mixing Layer	870 m above grade
Meteorological Data Period (On Site)	6/1/73 through 5/31/75 and 3/5/79 through 3/4/80

TABLE 2.3-55

ACCIDENT ATMOSPHERIC RELATIVE CONCENTRATIONS (χ/Q)[a]
FOR 3-YEAR DATA PERIOD

Affected Sector	Exclusion Zone Circular (1200 m)	Low Population Zone Circular (4023 m)					Remarks
	Time						
	2-Hr	2-Hr	8-Hr	16-Hr	72-Hr	624-Hr	
NNE	1.0E-04	2.9E-05	1.3E-05	8.3E-06	3.4E-06	9.3E-07	Highest 0.5%
NE	7.6E-05	1.9E-05	7.9E-06	5.1E-06	1.9E-06	4.9E-07	Highest 0.5%
ENE	7.8E-05	2.1E-05	8.4E-06	5.3E-06	2.0E-06	4.7E-07	Highest 0.5%
E	8.0E-05	2.2E-05	9.0E-06	5.8E-06	2.2E-06	5.5E-07	Highest 0.5%
ESE	1.1E-04	3.3E-05	1.3E-05	8.4E-06	3.1E-06	7.4E-07	Highest 0.5%
SE	1.3E-04	4.3E-05	1.7E-05	1.0E-05	3.7E-06	8.5E-07	Highest 0.5%
SSE	8.8E-05	2.7E-05	1.1E-05	7.3E-06	2.8E-06	7.3E-07	Highest 0.5%
S	1.1E-04	3.2E-05	1.3E-05	8.2E-06	3.0E-06	7.4E-07	Highest 0.5%
SSW	1.4E-04	4.3E-05	1.7E-05	1.1E-05	3.8E-06	8.9E-07	Highest 0.5%
SW	1.2E-04	3.8E-05	1.5E-05	9.1E-06	3.2E-06	7.4E-07	Highest 0.5%
WSW	8.0E-05	2.3E-05	9.9E-06	6.5E-06	2.6E-06	7.0E-07	Highest 0.5%
W	1.3E-04	4.2E-05	1.6E-05	1.0E-05	3.7E-06	8.4E-07	Highest 0.5%
WNW	1.3E-04	4.2E-05	1.7E-05	1.0E-05	3.8E-06	8.9E-07	Highest 0.5%
NW	1.5E-04*	4.4E-05*	1.8E-05	1.2E-05	4.7E-06	1.2E-06	Highest 0.5%
NNW	1.5E-04*	4.4E-05*	2.0E-05*	1.3E-05*	5.4E-06*	1.5E-06*	Highest 0.5%
N	1.5E-04*	4.4E-05*	1.9E-05	1.3E-05*	5.4E-06*	1.5E-06*	Highest 0.5%
5%	1.4E-04	4.4E-05	1.4E-05	9.8E-06	4.3E-06	1.3E-06	Highest 5%
50%	2.5E-05	4.4E-06	2.4E-06	2.0E-06	1.3E-06	6.9E-07	Highest 50%

[a]Units sec/m^3.

*Maximum sector values.

TABLE 2.3-56

ACCIDENT ATMOSPHERIC RELATIVE CONCENTRATIONS (χ/Q)[a] FOR 6/1/73 TO 5/31/74 DATA PERIOD

Affected Sector	Exclusion Zone Circular (1200 m)	Low Population Zone Circular (4023 m)					Remarks
	Time						
	2-Hr	2-Hr	8-Hr	16-Hr	72-Hr	624-Hr	
NNE	1.2E-04	3.9E-05	1.6E-05	1.0E-05	3.9E-06	9.8E-07	Highest 0.5%
NE	7.6E-05	1.8E-05	7.6E-06	4.9E-06	1.9E-06	5.0E-07	Highest 0.5%
ENE	7.8E-05	2.0E-05	8.2E-06	5.3E-06	2.0E-06	5.0E-07	Highest 0.5%
E	1.0E-04	3.1E-05	1.2E-05	7.4E-06	2.6E-06	6.0E-07	Highest 0.5%
ESE	1.1E-04	3.3E-05	1.3E-05	8.4E-06	3.1E-06	7.4E-07	Highest 0.5%
SE	1.3E-04	4.0E-05	1.6E-05	1.0E-05	3.7E-06	8.7E-07	Highest 0.5%
SSE	8.8E-05	2.7E-05	1.1E-05	7.4E-06	2.9E-06	7.7E-07	Highest 0.5%
S	8.3E-05	2.2E-05	9.5E-06	6.3E-06	2.5E-06	6.9E-07	Highest 0.5%
SSW	1.5E-04*	4.4E-05*	1.8E-05	1.1E-05	4.3E-06	1.1E-06	Highest 0.5%
SW	8.4E-05	2.4E-05	1.0E-05	6.6E-06	2.6E-06	6.7E-07	Highest 0.5%
WSW	7.8E-05	2.1E-05	8.9E-06	5.8E-06	2.3E-06	6.1E-07	Highest 0.5%
W	1.3E-04	4.1E-05	1.6E-05	9.8E-06	3.5E-06	8.0E-07	Highest 0.5%
WNW	8.8E-05	2.7E-05	1.1E-05	7.2E-06	2.8E-06	7.0E-07	Highest 0.5%
NW	1.4E-04	4.4E-05*	1.8E-05	1.2E-05	4.5E-06	1.1E-06	Highest 0.5%
NNW	1.5E-04*	4.4E-05*	2.0E-05*	1.3E-05*	5.6E-06*	1.6E-06*	Highest 0.5%
N	1.5E-04*	4.4E-05*	2.0E-05*	1.3E-05*	5.5E-06	1.6E-06*	Highest 0.5%
5%	1.4E-04	4.4E-05	1.5E-05	1.0E-05	4.5E-06	1.4E-06	Highest 5%
50%	2.5E-05	4.5E-06	2.5E-06	2.1E-06	1.4E-06	7.4E-07	Highest 50%

[a]Units sec/m^3

*Maximum sector values

TABLE 2.3-57

ACCIDENT ATMOSPHERIC RELATIVE CONCENTRATIONS (X/Q)[a]
FOR 6/1/74 TO 5/31/75 DATA PERIOD

Affected Sector	Exclusion Zone Circular (1200 m)	Low Population Zone Circular (4023 m)					Remarks
		Time					
	2-Hr	2-Hr	8-Hr	16-Hr	72-Hr	624-Hr	
NNE	9.3E-05	2.7E-05	1.2E-05	7.8E-06	3.2E-06	8.7E-07	Highest 0.5%
NE	7.7E-05	1.9E-05	7.7E-06	4.9E-06	1.9E-06	4.6E-07	Highest 0.5%
ENE	7.7E-05	1.8E-05	7.0E-06	4.4E-06	1.6E-06	3.7E-07	Highest 0.5%
E	7.8E-05	1.9E-05	7.7E-06	4.9E-06	1.8E-06	4.5E-07	Highest 0.5%
ESE	7.8E-05	1.9E-05	8.1E-06	5.3E-06	2.1E-06	5.6E-07	Highest 0.5%
SE	1.0E-04	3.1E-05	1.2E-05	7.7E-06	2.8E-06	6.5E-07	Highest 0.5%
SSE	1.0E-04	3.1E-05	1.3E-05	8.0E-06	3.0E-06	7.3E-07	Highest 0.5%
S	1.1E-04	3.3E-05	1.3E-05	8.2E-06	3.0E-06	7.0E-07	Highest 0.5%
SSW	1.1E-04	3.4E-05	1.4E-05	8.5E-06	3.1E-06	7.5E-07	Highest 0.5%
SW	8.0E-05	2.2E-05	9.0E-06	5.8E-06	2.2E-06	5.5E-07	Highest 0.5%
WSW	1.1E-04	3.5E-05	1.4E-05	8.6E-06	3.1E-06	7.2E-07	Highest 0.5%
W	1.3E-04	3.9E-05	1.5E-05	9.5E-06	3.4E-06	7.8E-07	Highest 0.5%
WNW	8.8E-05	2.7E-05	1.1E-05	7.0E-06	2.7E-06	6.6E-07	Highest 0.5%
NW	1.5E-04*	4.4E-05*	1.8E-05	1.2E-05	4.5E-06	1.1E-06	Highest 0.5%
NNW	1.5E-04*	4.4E-05*	1.9E-05*	1.3E-05*	5.2E-06*	1.4E-06*	Highest 0.5%
N	1.4E-04	4.3E-05	1.8E-05	1.2E-05	4.8E-06	1.3E-06	Highest 0.5%
5%	1.4E-04	4.3E-05	1.4E-05	9.4E-06	4.1E-06	1.3E-06	Highest 5%
50%	2.1E-05	3.7E-06	2.1E-06	1.7E-06	1.1E-06	6.2E-07	Highest 50%

[a]Units sec/m^3

*Maximum sector values

TABLE 2.3-58

ACCIDENT ATMOSPHERIC RELATIVE CONCENTRATIONS (χ/Q)[a]
FOR 3/5/79 TO 3/4/80 DATA PERIOD

Affected Sector	Exclusion Zone Circular (1200 m)	Low Population Zone Circular (4023 m)					Remarks
	Time						
	2-Hr	2-Hr	8-Hr	16-Hr	72-Hr	624-Hr	
NNE	7.8E-05	2.3E-05	1.0E-05	7.1E-06	3.0E-06	8.9E-07	Highest 0.5%
NE	7.6E-05	1.9E-05	7.9E-06	5.1E-06	2.0E-06	5.0E-07	Highest 0.5%
ENE	7.8E-05	2.2E-05	9.0E-06	5.8E-06	2.2E-06	5.4E-07	Highest 0.5%
E	1.2E-04	3.3E-05	1.3E-05	8.5E-06	3.2E-06	7.8E-07	Highest 0.5%
ESE	1.4E-04	4.5E-05	1.8E-05	1.1E-05	3.9E-06	9.0E-07	Highest 0.5%
SE	1.4E-04	4.5E-05	1.8E-05	1.1E-05	3.9E-06	9.0E-07	Highest 0.5%
SSE	8.8E-05	2.7E-05	1.1E-05	7.3E-06	2.8E-06	7.3E-07	Highest 0.5%
S	1.3E-04	4.3E-05	1.7E-05	1.0E-05	3.7E-06	8.5E-07	Highest 0.5%
SSW	1.3E-04	4.2E-05	1.6E-05	1.0E-05	3.7E-06	8.4E-07	Highest 0.5%
SW	1.4E-04	4.3E-05	1.7E-05	1.1E-05	3.8E-06	8.9E-07	Highest 0.5%
WSW	8.4E-05	2.3E-05	1.0E-05	6.9E-06	2.9E-06	8.3E-07	Highest 0.5%
W	1.4E-04	4.3E-05	1.7E-05	1.1E-05	4.0E-06	9.7E-07	Highest 0.5%
WNW	1.4E-04	4.4E-05	1.8E-05	1.2E-05	4.4E-06	1.1E-06	Highest 0.5%
NW	1.5E-04*	5.0E-05*	2.1E-05*	1.4E-05*	5.4E-06	1.4E-06	Highest 0.5%
NNW	1.5E-04*	4.5E-05	2.0E-05	1.3E-05	5.4E-06	1.5E-06	Highest 0.5%
N	1.5E-04*	4.4E-05	2.0E-05	1.3E-05	5.6E-06*	1.6E-06*	Highest 0.5%
5%	1.5E-04	4.5E-05	1.5E-05	1.0E-05	4.6E-06	1.5E-06	Highest 5%
50%	2.8E-05	5.0E-06	2.7E-06	2.2E-06	1.4E-07	7.7E-07	Highest 50%

[a]Units sec/m^3

*Maximum sector values

TABLE 2.3-59

TERRAIN/RECIRCULATION FACTORS - STANDARD DISTANCES
GROUND RELEASE
BASED ON 6/1/73 THROUGH 5/31/74 ON-SITE DATA

Distance (km)	Sector															
	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.4	1.06	1.03	1.07	1.51	1.02	0.96	1.17	1.05	1.10	1.08	1.31	1.11	1.08	1.00	1.02	1.05
0.8	1.05	1.05	1.08	1.43	1.12	0.97	1.09	1.13	1.09	1.06	1.28	1.25	1.13	1.07	1.07	1.03
1.2	1.00	1.02	1.03	1.28	1.10	0.96	1.04	1.08	1.07	1.05	1.23	1.32	1.05	1.06	1.03	0.98
1.6	1.04	1.09	1.10	1.21	1.10	1.00	1.07	1.05	1.09	1.05	1.21	1.27	1.08	1.08	1.06	1.02
2.4	1.09	1.14	1.16	1.11	1.08	1.02	1.08	0.99	1.09	1.05	1.17	1.20	1.03	1.05	1.01	0.96
3.2	1.05	1.14	1.07	1.10	1.13	0.99	1.16	1.03	1.14	1.01	1.21	1.13	1.15	1.07	1.06	0.96
4.0	1.02	1.05	1.00	1.09	1.15	0.97	1.18	1.04	1.16	1.01	1.27	1.05	1.18	1.01	1.04	0.95
4.8	1.04	1.02	0.92	0.96	1.10	0.92	1.14	1.06	1.12	1.01	1.26	1.11	1.16	1.06	1.06	0.96
5.6	1.09	1.00	0.86	0.87	1.09	0.83	1.13	1.13	1.19	1.04	1.26	1.13	1.17	1.08	1.07	0.96
6.4	1.05	1.00	0.81	0.88	1.11	0.83	1.12	1.13	1.11	1.03	1.28	1.17	1.17	1.07	1.05	0.95
7.2	1.05	0.99	0.76	0.89	1.11	0.84	1.11	1.14	1.05	1.02	1.30	1.18	1.18	1.01	1.09	0.95
8.0	1.05	1.01	0.71	0.89	1.13	0.85	1.11	1.15	1.02	1.03	1.32	1.20	1.18	1.00	1.10	0.93
12.0	0.93	1.00	0.68	0.79	1.13	0.83	1.04	1.16	1.11	0.90	1.31	1.18	1.17	0.98	1.04	0.99
16.0	0.86	0.96	0.64	0.74	1.11	0.82	1.00	1.19	1.19	0.83	1.28	1.12	1.14	0.95	0.99	1.04
24.0	0.81	0.93	0.61	0.68	0.95	0.77	0.92	0.94	1.07	0.78	1.18	0.98	1.09	0.94	1.04	1.02
32.0	0.80	0.89	0.59	0.65	0.83	0.72	0.91	0.83	1.04	0.80	1.11	0.95	1.04	0.88	1.03	1.01
40.0	0.80	0.69	0.46	0.67	0.84	0.63	0.81	0.82	0.99	0.70	1.00	0.86	0.96	0.83	0.88	1.01
48.0	0.80	0.57	0.38	0.68	0.85	0.57	0.72	0.82	0.95	0.63	0.90	0.78	0.90	0.76	0.73	0.96
56.0	0.79	0.48	0.32	0.69	0.85	0.52	0.67	0.81	0.93	0.58	0.82	0.71	0.85	0.71	0.62	0.92
64.0	0.71	0.42	0.29	0.53	0.71	0.44	0.61	0.74	0.84	0.53	0.73	0.68	0.83	0.67	0.59	0.84
72.0	0.63	0.37	0.27	0.42	0.61	0.37	0.55	0.70	0.77	0.50	0.63	0.65	0.81	0.63	0.55	0.78
80.0	0.58	0.32	0.26	0.35	0.53	0.33	0.52	0.64	0.70	0.49	0.57	0.62	0.78	0.58	0.52	0.71

TABLE 2.3-59d

LIMITING ATMOSPHERIC DISPERSION FACTOR, χ/Q (sec/m^3)

	χ/Q
Site Boundary	
0-2 hr.	1.5E-4
Low Population Zone	
0-8 hr.	1.9E-5
8-24 hr.	1.3E-5
24-96 hr.	5.3E-6
96-720 hr.	1.5E-6

WOLF CREEK

TABLE 2.3-60

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-60a

TERRAIN/RECIRCULATION CORRECTION FACTORS AT TEN STANDARD DISTANCES
(GROUND RELEASE) BASED ON JUNE 1, 1973 to MAY 31, 1974 ONSITE DATA

DISTANCE (KILOMETERS)	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.4	1.14	0.96	0.96	1.10	0.98	0.95	1.08	0.95	1.02	0.99	1.29	1.08	1.04	0.99	1.00	1.02
1.2	1.00	1.05	0.94	1.02	1.09	0.91	1.06	0.97	1.04	0.96	1.24	1.28	1.02	1.05	1.02	0.97
2.4	1.08	1.07	1.04	0.99	1.05	0.98	1.07	0.91	1.05	0.97	1.17	1.13	1.03	1.05	1.01	0.95
4.0	1.07	1.01	0.97	1.03	1.16	0.93	1.19	1.01	1.09	0.89	1.28	1.03	1.17	1.01	1.03	0.95
5.6	1.12	0.82	0.88	0.84	1.07	0.80	1.11	1.01	1.22	0.96	1.25	1.11	1.14	0.98	1.05	1.00
8.0	1.08	0.94	0.71	0.81	1.10	0.80	1.09	1.06	1.05	0.98	1.31	1.17	1.17	0.98	1.09	0.92
16.0	0.80	1.00	0.60	0.69	1.05	0.75	0.99	1.14	1.12	0.77	1.31	1.09	1.11	0.94	0.98	1.00
32.0	0.76	0.88	0.58	0.59	0.74	0.70	0.86	0.80	1.00	0.75	1.09	0.93	1.03	0.87	1.02	0.93
56.0	0.73	0.44	0.29	0.63	0.83	0.49	0.65	0.75	0.91	0.55	0.82	0.69	0.84	0.68	0.61	0.87
80.0	0.57	0.28	0.24	0.35	0.55	0.31	0.50	0.61	0.75	0.43.	0.56	0.60	0.75	0.55	0.51	0.70

TABLE 2.3-61

TERRAIN/RECIRCULATION FACTORS - SPECIAL DISTANCES
BASED ON 6/1/73 THROUGH 5/31/74 ON-SITE DATA

Receptor[a]	Sector															
	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
							Ground Release									
Exclusion Zone	1.00	1.02	1.03	1.28	1.10	0.96	1.04	1.08	1.07	1.05	1.23	1.32	1.05	1.06	1.03	0.98
Low Population Zone	1.08	1.06	1.00	1.07	1.14	0.96	1.17	1.03	1.15	1.00	1.26	1.04	1.17	1.06	1.06	0.95
Nearest Resident	1.07	1.12	1.11	1.06	1.10	1.00	1.13	1.12	1.15	0.99	1.25	1.10	1.16	1.05	1.04	0.96
Nearest Vegetable Garden	1.05	1.05	1.09	1.06	1.10	1.00	1.14	1.12	1.05	1.01	1.25	1.10	1.16	1.05	1.06	0.96
Nearest Meat Animal	1.01	1.01	1.04	1.13	1.08	1.00	1.14	1.12	1.16	1.06	1.16	1.16	1.16	1.03	1.05	0.94
Nearest Dairy Cow	1.05	1.03	b	1.06	1.08	1.00	1.13	b	b	b	1.31	1.18	b	b	1.05	b
Nearest Plant Boundary	1.05	1.14	1.12	1.13	1.08	1.00	1.13	1.12	1.14	1.03	1.16	1.13	1.15	1.06	1.01	0.97
							Mixed-Mode Release									
Exclusion Zone	1.19	1.40	1.05	1.08	1.17	1.19	1.08	1.06	1.17	1.09	1.36	1.20	1.04	0.87	0.78	0.97
Low Population Zone	1.10	1.15	0.95	1.40	1.21	1.08	1.13	1.08	1.26	1.08	1.19	1.10	0.99	0.87	0.84	0.98
Nearest Resident	1.13	1.35	1.03	1.20	1.27	1.19	1.12	1.07	1.26	1.07	1.19	1.11	0.99	0.86	0.87	0.99
Nearest Vegetable Garden	1.10	1.25	0.96	1.20	1.27	1.19	1.14	1.07	1.13	1.12	1.19	1.11	0.99	0.84	0.84	0.99
Nearest Meat Animal	1.18	1.39	1.04	1.10	1.28	1.16	1.14	1.08	1.19	1.07	1.16	1.14	1.00	0.86	0.84	1.01
Nearest Dairy Cow	1.15	1.11	b	1.20	1.28	1.16	1.13	b	b	b	1.29	b	b	0.94	0.84	b
Nearest Plant Boundary	1.15	1.36	1.08	1.10	1.23	1.21	1.12	1.08	1.18	1.08	1.16	1.14	0.99	0.88	0.82	1.00

[a]No dairy goats within 5 miles.

[b]No dairy cows within 5 miles.

TABLE 2.3-62

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 05/01/73 TO 05/31/74

ANNUAL AVERAGE (GROUND)
STANDARD PTS - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 08:01:25

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.4 KM																
	6.3E-06	3.4E-06	3.5E-06	5.1E-06	4.1E-06	5.2E-06	5.3E-06	4.8E-06	6.6E-06	4.8E-06	4.3E-06	4.6E-06	4.3E-06	6.9E-06	1.2E-05	1.3E-05
	5.9E-06	3.2E-06	3.3E-06	4.8E-06	3.8E-06	4.9E-06	5.0E-06	4.6E-06	6.3E-06	4.5E-06	4.1E-06	4.3E-06	4.1E-06	6.5E-06	1.1E-05	1.2E-05
	5.0E-08	2.2E-08	1.3E-08	1.9E-08	2.0E-08	3.2E-08	4.1E-08	3.2E-08	3.2E-08	2.3E-08	2.4E-08	2.1E-08	2.3E-08	3.1E-08	6.2E-08	1.1E-07
	6.3E-06	3.4E-06	3.5E-06	5.1E-06	4.1E-06	5.2E-06	5.3E-06	4.8E-06	6.6E-06	4.7E-06	4.3E-06	4.6E-06	4.3E-06	6.9E-06	1.2E-05	1.3E-05
	6.3E-06	3.4E-06	3.5E-06	5.1E-06	4.1E-06	5.2E-06	5.3E-06	4.8E-06	6.6E-06	4.7E-06	4.3E-06	4.6E-06	4.3E-06	6.9E-06	1.2E-05	1.3E-05
	5.9E-06	3.2E-06	3.3E-06	4.8E-06	3.8E-06	4.9E-06	5.0E-06	4.6E-06	6.3E-06	4.5E-06	4.1E-06	4.3E-06	4.1E-06	6.5E-06	1.1E-05	1.2E-05
	5.9E-06	3.2E-06	3.3E-06	4.8E-06	3.8E-06	4.9E-06	5.0E-06	4.6E-06	6.3E-06	4.5E-06	4.1E-06	4.3E-06	4.1E-06	6.5E-06	1.1E-05	1.2E-05
	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.
0.8 KM																
	1.9E-06	1.1E-06	1.1E-06	1.5E-06	1.4E-06	1.7E-06	1.6E-06	1.7E-06	2.1E-06	1.5E-06	1.3E-06	1.6E-06	1.4E-06	2.3E-06	3.9E-06	4.0E-06
	1.8E-06	9.8E-07	1.0E-06	1.4E-06	1.3E-06	1.5E-06	1.5E-06	1.5E-06	1.9E-06	1.4E-06	1.2E-06	1.5E-06	1.3E-06	2.1E-06	3.6E-06	3.7E-06
	1.7E-08	7.6E-09	4.6E-09	6.2E-09	7.4E-09	1.1E-08	1.3E-08	1.1E-08	1.1E-08	7.6E-09	7.8E-09	7.8E-09	8.0E-09	1.1E-08	2.2E-08	3.6E-08
	1.9E-06	1.1E-06	1.1E-06	1.5E-06	1.4E-06	1.7E-06	1.6E-06	1.7E-06	2.1E-06	1.5E-06	1.3E-06	1.6E-06	1.4E-06	2.3E-06	3.9E-06	4.0E-06
	1.9E-06	1.1E-06	1.1E-06	1.5E-06	1.4E-06	1.7E-06	1.6E-06	1.7E-06	2.1E-06	1.5E-06	1.3E-06	1.6E-06	1.4E-06	2.3E-06	3.9E-06	4.0E-06
	1.8E-06	9.8E-07	1.0E-06	1.4E-06	1.3E-06	1.5E-06	1.5E-06	1.5E-06	1.9E-06	1.4E-06	1.2E-06	1.5E-06	1.3E-06	2.1E-06	3.6E-06	3.7E-06
	1.8E-06	9.8E-07	1.0E-06	1.4E-06	1.3E-06	1.5E-06	1.5E-06	1.5E-06	1.9E-06	1.4E-06	1.2E-06	1.5E-06	1.3E-06	2.1E-06	3.6E-06	3.7E-06
	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.
1.2 KM																
	9.7E-07	5.5E-07	5.5E-07	7.0E-07	7.2E-07	8.8E-07	8.1E-07	8.6E-07	1.1E-06	7.8E-07	6.9E-07	9.2E-07	7.0E-07	1.2E-06	2.0E-06	2.1E-06
	8.7E-07	4.9E-07	4.9E-07	6.2E-07	6.4E-07	7.8E-07	7.3E-07	7.7E-07	9.6E-07	7.0E-07	6.1E-07	8.2E-07	6.3E-07	1.1E-06	1.8E-06	1.8E-06
	8.3E-09	3.9E-09	2.3E-09	2.9E-09	3.8E-09	5.7E-09	6.4E-09	5.7E-09	5.5E-09	3.9E-09	3.9E-09	4.3E-09	3.9E-09	5.8E-09	1.1E-08	1.8E-08
	9.7E-07	5.5E-07	5.5E-07	7.0E-07	7.2E-07	8.7E-07	8.1E-07	8.6E-07	1.1E-06	7.8E-07	6.9E-07	9.2E-07	7.0E-07	1.2E-06	2.0E-06	2.1E-06
	9.7E-07	5.5E-07	5.5E-07	7.0E-07	7.2E-07	8.8E-07	8.1E-07	8.6E-07	1.1E-06	7.8E-07	6.9E-07	9.2E-07	7.0E-07	1.2E-06	2.0E-06	2.1E-06
	8.7E-07	4.9E-07	4.9E-07	6.2E-07	6.4E-07	7.8E-07	7.2E-07	7.6E-07	9.6E-07	6.9E-07	6.1E-07	8.2E-07	6.2E-07	1.1E-06	1.8E-06	1.8E-06
	8.7E-07	4.9E-07	4.9E-07	6.2E-07	6.4E-07	7.8E-07	7.3E-07	7.7E-07	9.6E-07	7.0E-07	6.1E-07	8.2E-07	6.3E-07	1.1E-06	1.8E-06	1.8E-06
	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.
1.6 KM																
	6.5E-07	3.8E-07	3.8E-07	4.2E-07	4.6E-07	5.8E-07	5.4E-07	5.4E-07	7.0E-07	5.0E-07	4.4E-07	5.7E-07	4.7E-07	7.9E-07	1.3E-06	1.4E-06
	5.7E-07	3.3E-07	3.3E-07	3.7E-07	4.1E-07	5.1E-07	4.7E-07	4.7E-07	6.1E-07	4.4E-07	3.8E-07	5.0E-07	4.1E-07	6.9E-07	1.2E-06	1.2E-06
	5.4E-09	2.6E-09	1.5E-09	1.7E-09	2.4E-09	3.7E-09	4.1E-09	3.5E-09	3.5E-09	2.4E-09	2.4E-09	2.6E-09	2.5E-09	3.7E-09	7.0E-09	1.2E-08
	6.5E-07	3.8E-07	3.8E-07	4.2E-07	4.6E-07	5.8E-07	5.4E-07	5.4E-07	7.0E-07	5.0E-07	4.4E-07	5.7E-07	4.7E-07	7.8E-07	1.3E-06	1.4E-06
	6.5E-07	3.8E-07	3.8E-07	4.2E-07	4.6E-07	5.8E-07	5.4E-07	5.4E-07	7.0E-07	5.0E-07	4.4E-07	5.7E-07	4.7E-07	7.8E-07	1.3E-06	1.4E-06
	5.7E-07	3.3E-07	3.3E-07	3.7E-07	4.0E-07	5.1E-07	4.7E-07	4.7E-07	6.1E-07	4.4E-07	3.8E-07	5.0E-07	4.1E-07	6.8E-07	1.2E-06	1.2E-06
	5.7E-07	3.3E-07	3.3E-07	3.7E-07	4.0E-07	5.1E-07	4.7E-07	4.7E-07	6.1E-07	4.4E-07	3.8E-07	5.0E-07	4.1E-07	6.9E-07	1.2E-06	1.2E-06
	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.4 KM																
	3.8E-07	2.2E-07	2.2E-07	2.1E-07	2.5E-07	3.3E-07	3.0E-07	2.8E-07	3.8E-07	2.8E-07	2.4E-07	3.0E-07	2.5E-07	4.3E-07	7.0E-07	7.2E-07
	3.2E-07	1.9E-07	1.9E-07	1.8E-07	2.1E-07	2.8E-07	2.5E-07	2.3E-07	3.2E-07	2.3E-07	2.0E-07	2.5E-07	2.1E-07	3.6E-07	5.9E-07	6.1E-07
	2.9E-09	1.4E-09	8.2E-10	8.0E-10	1.2E-09	1.9E-09	2.1E-09	1.7E-09	1.8E-09	1.2E-09	1.2E-09	1.2E-09	1.2E-09	1.8E-09	3.4E-09	5.5E-09
	3.8E-07	2.2E-07	2.2E-07	2.1E-07	2.5E-07	3.3E-07	3.0E-07	2.8E-07	3.8E-07	2.8E-07	2.4E-07	3.0E-07	2.5E-07	4.2E-07	7.0E-07	7.2E-07
	3.8E-07	2.2E-07	2.2E-07	2.1E-07	2.5E-07	3.3E-07	3.0E-07	2.8E-07	3.8E-07	2.8E-07	2.4E-07	3.0E-07	2.5E-07	4.2E-07	7.0E-07	7.2E-07
	3.2E-07	1.8E-07	1.8E-07	1.8E-07	2.1E-07	2.8E-07	2.5E-07	2.3E-07	3.2E-07	2.3E-07	2.0E-07	2.5E-07	2.1E-07	3.6E-07	5.9E-07	6.1E-07
	3.2E-07	1.8E-07	1.8E-07	1.8E-07	2.1E-07	2.8E-07	2.5E-07	2.3E-07	3.2E-07	2.3E-07	2.0E-07	2.5E-07	2.1E-07	3.6E-07	5.9E-07	6.1E-07
	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400	2400.	2400.	2400.	2400
3.2 KM																
	2.4E-07	1.4E-07	1.3E-07	1.4E-07	1.7E-07	2.1E-07	2.1E-07	1.9E-07	2.6E-07	1.7E-07	1.6E-07	1.9E-07	1.8E-07	2.9E-07	4.9E-07	4.7E-07
	2.0E-07	1.2E-07	1.1E-07	1.1E-07	1.4E-07	1.7E-07	1.7E-07	1.6E-07	2.1E-07	1.4E-07	1.3E-07	1.5E-07	1.5E-07	2.4E-07	4.0E-07	3.9E-07
	1.7E-09	8.5E-10	4.7E-10	4.9E-10	7.7E-10	1.1E-09	1.4E-09	1.1E-09	1.2E-09	7.4E-10	7.6E-10	7.3E-10	8.4E-10	1.1E-09	2.2E-09	3.4E-09
	2.4E-07	1.4E-07	1.3E-07	1.3E-07	1.7E-07	2.1E-07	2.1E-07	1.9E-07	2.5E-07	1.7E-07	1.6E-07	1.8E-07	1.8E-07	2.8E-07	4.8E-07	4.7E-07
	2.4E-07	1.4E-07	1.3E-07	1.3E-07	1.7E-07	2.1E-07	2.1E-07	1.9E-07	2.6E-07	1.7E-07	1.6E-07	1.9E-07	1.8E-07	2.9E-07	4.9E-07	4.7E-07
	2.0E-07	1.2E-07	1.1E-07	1.1E-07	1.4E-07	1.7E-07	1.7E-07	1.5E-07	2.1E-07	1.4E-07	1.3E-07	1.5E-07	1.5E-07	2.3E-07	4.0E-07	3.9E-07
	2.0E-07	1.2E-07	1.1E-07	1.1E-07	1.4E-07	1.7E-07	1.7E-07	1.6E-07	2.1E-07	1.4E-07	1.3E-07	1.5E-07	1.5E-07	2.4E-07	4.0E-07	3.9E-07
	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200
4.0 KM																
	1.7E-07	9.7E-08	9.2E-08	1.0E-07	1.3E-07	1.5E-07	1.6E-07	1.4E-07	1.9E-07	1.3E-07	1.2E-07	1.3E-07	1.4E-07	2.0E-07	3.5E-07	3.5E-07
	1.4E-07	7.8E-08	7.4E-08	8.0E-08	1.0E-07	1.2E-07	1.3E-07	1.1E-07	1.6E-07	1.0E-07	1.0E-07	1.0E-07	1.1E-07	1.6E-07	2.8E-07	2.8E-07
	1.1E-09	5.4E-10	3.0E-10	3.3E-10	5.4E-10	7.7E-10	9.8E-10	7.5E-10	8.1E-10	5.1E-10	5.4E-10	4.6E-10	5.9E-10	7.4E-10	1.5E-09	2.3E-09
	1.7E-07	9.6E-08	9.0E-08	9.8E-08	1.3E-07	1.5E-07	1.5E-07	1.4E-07	1.9E-07	1.3E-07	1.2E-07	1.3E-07	1.4E-07	2.0E-07	3.5E-07	3.4E-07
	1.7E-07	9.7E-08	9.1E-08	9.9E-08	1.3E-07	1.5E-07	1.6E-07	1.4E-07	1.9E-07	1.3E-07	1.2E-07	1.3E-07	1.4E-07	2.0E-07	3.5E-07	3.5E-07
	1.4E-07	7.7E-08	7.3E-08	7.9E-08	1.0E-07	1.2E-07	1.2E-07	1.1E-07	1.5E-07	1.0E-07	1.0E-07	1.0E-07	1.1E-07	1.6E-07	2.8E-07	2.8E-07
	1.4E-07	7.6E-08	7.3E-08	8.0E-08	1.0E-07	1.2E-07	1.3E-07	1.1E-07	1.5E-07	1.0E-07	1.0E-07	1.0E-07	1.1E-07	1.6E-07	2.8E-07	2.8E-07
	4000	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000	4000
4.8 KM																
	1.4E-07	7.4E-08	6.6E-08	6.9E-08	9.7E-08	1.1E-07	1.2E-07	1.1E-07	1.5E-07	1.0E-07	9.6E-08	1.0E-07	1.0E-07	1.6E-07	2.8E-07	2.7E-07
	1.1E-07	5.8E-08	5.2E-08	5.4E-08	7.6E-08	8.8E-08	9.2E-08	8.7E-08	1.1E-07	7.8E-08	7.6E-08	8.3E-08	8.3E-08	1.3E-07	2.2E-07	2.1E-07
	8.6E-10	3.8E-10	2.0E-10	2.2E-10	3.8E-10	5.4E-10	7.0E-10	5.6E-10	5.7E-10	3.7E-10	4.0E-10	3.6E-10	4.3E-10	5.7E-10	1.1E-09	1.7E-09
	1.4E-07	7.3E-08	6.5E-08	6.8E-08	9.6E-08	1.1E-07	1.2E-07	1.1E-07	1.4E-07	9.8E-08	9.5E-08	1.0E-07	1.0E-07	1.6E-07	2.8E-07	2.7E-07
	1.4E-07	7.3E-08	6.6E-08	6.9E-08	9.7E-08	1.1E-07	1.2E-07	1.1E-07	1.5E-07	9.9E-08	9.6E-08	1.0E-07	1.0E-07	1.6E-07	2.8E-07	2.7E-07
	1.1E-07	5.7E-08	5.1E-08	5.4E-08	7.6E-08	8.7E-08	9.1E-08	8.6E-08	1.1E-07	7.7E-08	7.5E-08	8.2E-08	8.2E-08	1.3E-07	2.2E-07	2.1E-07
	1.1E-07	5.8E-08	5.2E-08	5.4E-08	7.6E-08	8.7E-08	9.2E-08	8.6E-08	1.1E-07	7.8E-08	7.6E-08	8.2E-08	8.2E-08	1.3E-07	2.2E-07	2.1E-07
	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800	4800	4800

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 06/01/73 TO 05/31/74

ANNUAL AVERAGE (GROUND)
STANDARD PTS - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 08:01:25

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
5.6 KM															
1.2E-07	5.8E-08	5.0E-08	5.1E-08	7.8E-08	8.1E-08	9.3E-08	9.4E-08	1.3E-07	8.3E-08	7.8E-08	8.6E-08	8.6E-08	1.4E-07	2.3E-07	2.2E-07
9.0E-08	4.5E-08	3.9E-08	3.9E-08	6.0E-08	6.3E-08	7.2E-08	7.3E-08	9.7E-08	6.4E-08	6.0E-08	6.7E-08	6.6E-08	1.1E-07	1.8E-07	1.7E-07
6.9E-10	2.9E-10	1.4E-10	1.5E-10	2.9E-10	3.7E-10	5.3E-10	4.6E-10	4.6E-10	2.9E-10	3.0E-10	2.8E-10	3.3E-10	4.5E-10	8.7E-10	1.3E-09
1.1E-07	5.7E-08	4.9E-08	5.0E-08	7.7E-08	8.0E-08	9.2E-08	9.3E-08	1.2E-07	8.1E-08	7.7E-08	8.5E-08	8.5E-08	1.4E-07	2.3E-07	2.2E-07
1.2E-07	5.8E-08	5.0E-08	5.1E-08	7.8E-08	8.1E-08	9.3E-08	9.4E-08	1.3E-07	8.2E-08	7.7E-08	8.6E-08	8.5E-08	1.4E-07	2.3E-07	2.2E-07
8.9E-08	4.4E-08	3.8E-08	3.9E-08	6.0E-08	6.2E-08	7.1E-08	7.2E-08	9.6E-08	6.3E-08	5.9E-08	6.6E-08	6.6E-08	1.0E-07	1.8E-07	1.7E-07
9.0E-08	4.5E-08	3.9E-08	3.9E-08	6.0E-08	6.3E-08	7.2E-08	7.3E-08	9.7E-08	6.4E-08	6.0E-08	6.7E-08	6.6E-08	1.1E-07	1.8E-07	1.7E-07
5600	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600	5600.	5600.	5600.	5600.	5600.	5600.
6.4 KM															
9.3E-08	4.8E-08	4.0E-08	4.3E-08	6.6E-08	6.8E-08	7.6E-08	7.8E-08	9.8E-08	6.8E-08	6.6E-08	7.4E-08	7.1E-08	1.1E-07	1.9E-07	1.8E-07
7.1E-08	3.7E-08	3.0E-08	3.3E-08	5.1E-08	5.2E-08	5.8E-08	5.9E-08	7.5E-08	5.2E-08	5.0E-08	5.7E-08	5.4E-08	8.6E-08	1.5E-07	1.4E-07
5.3E-10	2.3E-10	1.1E-10	1.2E-10	2.3E-10	3.0E-10	4.2E-10	3.6E-10	3.4E-10	2.3E-10	2.4E-10	2.3E-10	2.6E-10	3.5E-10	6.7E-10	1.0E-09
9.2E-08	4.7E-08	3.9E-08	4.2E-08	6.5E-08	6.7E-08	7.5E-08	7.7E-08	9.6E-08	6.7E-08	6.5E-08	7.3E-08	7.0E-08	1.1E-07	1.9E-07	1.8E-07
9.3E-08	4.8E-08	3.9E-08	4.3E-08	6.6E-08	6.8E-08	7.6E-08	7.8E-08	9.7E-08	6.8E-08	6.5E-08	7.4E-08	7.1E-08	1.1E-07	1.9E-07	1.8E-07
7.0E-08	3.6E-08	2.9E-08	3.2E-08	5.0E-08	5.1E-08	5.7E-08	5.9E-08	7.3E-08	5.1E-08	4.9E-08	5.6E-08	5.4E-08	8.5E-08	1.4E-07	1.4E-07
7.1E-08	3.7E-08	3.0E-08	3.3E-08	5.0E-08	5.2E-08	5.8E-08	5.9E-08	7.4E-08	5.2E-08	5.0E-08	5.6E-08	5.4E-08	8.6E-08	1.4E-07	1.4E-07
6400.	6400.	6400	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.
7.2 KM															
7.9E-08	4.1E-08	3.2E-08	3.7E-08	5.7E-08	5.8E-08	6.4E-08	6.7E-08	7.9E-08	5.7E-08	5.7E-08	6.4E-08	6.1E-08	9.1E-08	1.7E-07	1.5E-07
5.9E-08	3.1E-08	2.4E-08	2.8E-08	4.2E-08	4.4E-08	4.8E-08	5.0E-08	5.9E-08	4.3E-08	4.2E-08	4.8E-08	4.6E-08	6.8E-08	1.3E-07	1.1E-07
4.3E-10	1.9E-10	8.2E-11	9.9E-11	1.9E-10	2.4E-10	3.4E-10	3.0E-10	2.7E-10	1.9E-10	2.0E-10	1.9E-10	2.2E-10	2.7E-10	5.7E-10	8.5E-10
7.8E-08	4.0E-08	3.1E-08	3.6E-08	5.6E-08	5.7E-08	6.3E-08	6.6E-08	7.8E-08	5.6E-08	5.6E-08	6.3E-08	6.0E-08	9.0E-08	1.7E-07	1.5E-07
7.9E-08	4.1E-08	3.1E-08	3.7E-08	5.6E-08	5.8E-08	6.4E-08	6.7E-08	7.9E-08	5.7E-08	5.6E-08	6.4E-08	6.1E-08	9.1E-08	1.7E-07	1.5E-07
5.8E-08	3.0E-08	2.3E-08	2.7E-08	4.2E-08	4.3E-08	4.7E-08	4.9E-08	5.8E-08	4.2E-08	4.2E-08	4.7E-08	4.5E-08	6.8E-08	1.3E-07	1.1E-07
5.9E-08	3.1E-08	2.4E-08	2.8E-08	4.2E-08	4.3E-08	4.8E-08	5.0E-08	5.9E-08	4.3E-08	4.2E-08	4.8E-08	4.6E-08	6.8E-08	1.3E-07	1.1E-07
7200.	7200.	7200	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.
8.0 KM															
6.9E-08	3.6E-08	2.6E-08	3.2E-08	5.0E-08	5.1E-08	5.5E-08	5.8E-08	6.7E-08	5.0E-08	5.0E-08	5.6E-08	5.3E-08	7.8E-08	1.5E-07	1.3E-07
5.1E-08	2.7E-08	1.9E-08	2.4E-08	3.7E-08	3.8E-08	4.1E-08	4.3E-08	4.9E-08	3.7E-08	3.7E-08	4.2E-08	3.9E-08	5.8E-08	1.1E-07	9.6E-08
3.6E-10	1.6E-10	6.4E-11	8.3E-11	1.6E-10	2.1E-10	2.8E-10	2.5E-10	2.1E-10	1.6E-10	1.7E-10	1.6E-10	1.8E-10	2.2E-10	4.6E-10	6.9E-10
6.7E-08	3.5E-08	2.5E-08	3.2E-08	4.9E-08	5.0E-08	5.4E-08	5.7E-08	6.5E-08	4.9E-08	4.9E-08	5.5E-08	5.2E-08	7.7E-08	1.5E-07	1.3E-07
6.8E-08	3.6E-08	2.5E-08	3.2E-08	5.0E-08	5.1E-08	5.5E-08	5.8E-08	6.6E-08	5.0E-08	4.9E-08	5.6E-08	5.3E-08	7.8E-08	1.5E-07	1.3E-07
5.0E-08	2.6E-08	1.8E-08	2.3E-08	3.6E-08	3.7E-08	4.0E-08	4.2E-08	4.8E-08	3.6E-08	3.6E-08	4.1E-08	3.9E-08	5.7E-08	1.1E-07	9.5E-08
5.0E-08	2.6E-08	1.9E-08	2.4E-08	3.7E-08	3.8E-08	4.1E-08	4.3E-08	4.9E-08	3.7E-08	3.7E-08	4.1E-08	3.9E-08	5.8E-08	1.1E-07	9.6E-08
8000.	8000.	8000	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
12.0 KM															
3.5E-08	2.1E-08	1.4E-08	1.7E-08	2.9E-08	2.9E-08	3.0E-08	3.3E-08	4.2E-08	2.5E-08	2.8E-08	3.2E-08	3.0E-08	4.5E-08	8.2E-08	8.0E-08
2.4E-08	1.4E-08	1.0E-08	1.2E-08	2.0E-08	2.0E-08	2.1E-08	2.3E-08	2.9E-08	1.7E-08	2.0E-08	2.2E-08	2.1E-08	3.1E-08	5.7E-08	5.6E-08
1.6E-10	7.6E-11	3.0E-11	3.6E-11	7.9E-11	9.8E-11	1.3E-10	1.2E-10	1.1E-10	6.7E-11	8.3E-11	7.7E-11	8.7E-11	1.1E-10	2.2E-10	3.6E-10
3.4E-08	2.0E-08	1.4E-08	1.6E-08	2.8E-08	2.8E-08	2.9E-08	3.3E-08	4.1E-08	2.4E-08	2.8E-08	3.1E-08	3.0E-08	4.4E-08	8.0E-08	7.8E-08
3.5E-08	2.0E-08	1.4E-08	1.7E-08	2.9E-08	2.8E-08	2.9E-08	3.3E-08	4.2E-08	2.5E-08	2.8E-08	3.2E-08	3.0E-08	4.4E-08	8.1E-08	8.0E-08
2.4E-08	1.4E-08	9.6E-09	1.1E-08	2.0E-08	1.9E-08	2.0E-08	2.3E-08	2.9E-08	1.7E-08	1.9E-08	2.2E-08	2.1E-08	3.0E-08	5.6E-08	5.5E-08
2.4E-08	1.4E-08	9.9E-09	1.2E-08	2.0E-08	2.0E-08	2.0E-08	2.3E-08	2.9E-08	1.7E-08	2.0E-08	2.2E-08	2.1E-08	3.1E-08	5.7E-08	5.5E-08
12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000	12000.
16.0 KM															
2.2E-08	1.3E-08	9.2E-09	1.1E-08	1.9E-08	2.0E-08	1.9E-08	2.3E-08	3.1E-08	1.6E-08	1.9E-08	2.1E-08	2.0E-08	3.0E-08	5.3E-08	5.7E-08
1.5E-08	8.9E-09	6.1E-09	7.2E-09	1.3E-08	1.3E-08	1.3E-08	1.5E-08	2.0E-08	1.0E-08	1.2E-08	1.4E-08	1.3E-08	2.0E-08	3.5E-08	3.8E-08
8.6E-11	4.4E-11	1.7E-11	2.0E-11	4.6E-11	5.8E-11	7.4E-11	7.6E-11	7.3E-11	3.7E-11	4.9E-11	4.4E-11	5.1E-11	6.2E-11	1.3E-10	2.3E-10
2.1E-08	1.3E-08	8.7E-09	1.0E-08	1.9E-08	1.9E-08	1.8E-08	2.2E-08	3.0E-08	1.5E-08	1.8E-08	2.0E-08	2.0E-08	2.9E-08	5.2E-08	5.5E-08
2.2E-08	1.3E-08	9.0E-09	1.1E-08	1.9E-08	1.9E-08	1.9E-08	2.3E-08	3.0E-08	1.6E-08	1.9E-08	2.0E-08	2.0E-08	2.9E-08	5.3E-08	5.6E-08
1.4E-08	8.5E-09	5.8E-09	6.8E-09	1.2E-08	1.2E-08	1.2E-08	1.5E-08	2.0E-08	1.0E-08	1.2E-08	1.3E-08	1.3E-08	1.9E-08	3.5E-08	3.7E-08
1.4E-08	8.8E-09	6.0E-09	7.1E-09	1.3E-08	1.3E-08	1.3E-08	1.5E-08	2.0E-08	1.0E-08	1.2E-08	1.4E-08	1.3E-08	2.0E-08	3.5E-08	3.7E-08
16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.
24.0 KM															
1.2E-08	7.6E-09	5.2E-09	5.9E-09	9.8E-09	1.1E-08	1.0E-08	1.1E-08	1.6E-08	8.6E-09	1.0E-08	1.1E-08	1.1E-08	1.7E-08	3.3E-08	3.3E-08
7.4E-09	4.7E-09	3.2E-09	3.6E-09	6.1E-09	6.6E-09	6.3E-09	6.5E-09	1.0E-08	5.3E-09	6.2E-09	6.5E-09	6.9E-09	1.1E-08	2.0E-08	2.0E-08
3.9E-11	2.0E-11	7.8E-12	8.9E-12	1.9E-11	2.6E-11	3.3E-11	2.9E-11	3.2E-11	1.7E-11	2.2E-11	1.8E-11	2.3E-11	3.0E-11	6.4E-11	1.1E-10
1.1E-08	7.1E-09	4.8E-09	5.5E-09	9.3E-09	1.0E-08	9.7E-09	1.0E-08	1.5E-08	8.0E-09	9.6E-09	1.0E-08	1.1E-08	1.7E-08	3.2E-08	3.1E-08
1.2E-08	7.5E-09	5.1E-09	5.8E-09	9.7E-09	1.1E-08	1.0E-08	1.0E-08	1.6E-08	8.4E-09	9.9E-09	1.0E-08	1.1E-08	1.7E-08	3.3E-08	3.2E-08
7.1E-09	4.4E-09	2.9E-09	3.4E-09	5.7E-09	6.2E-09	6.0E-09	6.2E-09	9.5E-09	5.0E-09	5.9E-09	6.1E-09	6.6E-09	1.0E-08	2.0E-08	1.9E-08
7.3E-09	4.6E-09	3.1E-09	3.6E-09	6.0E-09	6.5E-09	6.2E-09	6.4E-09	9.9E-09	5.2E-09	6.1E-09	6.4E-09	6.8E-09	1.1E-08	2.0E-08	2.0E-08
24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.
32.0 KM															
8.3E-09	5.0E-09	3.4E-09	3.9E-09	5.9E-09	6.9E-09	6.9E-09	6.4E-09	1.1E-08	6.0E-09	6.5E-09	7.1E-09	7.4E-09	1.1E-08	2.3E-08	2.2E-08
4.8E-09	2.9E-09	2.0E-09	2.3E-09	3.4E-09	4.0E-09	4.0E-09	3.7E-09	6.3E-09	3.5E-09	3.8E-09	4.1E-09	4.3E-09	6.5E-09	1.3E-08	1.3E-08
2.3E-11	1.2E-11	4.4E-12	5.1E-12	9.8E-12	1.4E-11	1.9E-11	1.5E-11	1.8E-11	1.0E-11	1.2E-11	1.1E-11	1.3E-11	1.6E-11	3.7E-11	6.2E-11
7.8E-09	4.6E-09	3.1E-09	3.6E-09	5.5E-09	6.3E-09	6.4E-09	6.0E-09	1.0E-08	5.5E-09	6.1E-09	6.6E-09	7.0E-09	1.1E-08	2.2E-08	2.1E-08
8.1E-09	4.9E-09	3.3E-09	3.8E-09	5.8E-09	6.7E-09	6.8E-09	6.3E-09	1.1E-08	5.9E-09	6.4E-09	6.9E-09	7.3E-09	1.1E-08	2.2E-08	2.2E-08
4.5E-09	2.7E-09	1.8E-09	2.1E-09	3.2E-09	3.7E-09	3.7E-09	3.5E-09	5.9E-09	3.2E-09	3.5E-09	3.8E-09	4.1E-09	6.2E-09	1.2E-08	1.2E-08
4.7E-09	2.8E-09	1.9E-09	2.2E-09	3.3E-09	3.9E-09	3.9E-09	3.6E-09	6.2E-09	3.4E-09	3.7E-09	4.0E-09	4.2E-09	6.4E-09	1.3E-08	1.3E-08
32000	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000	32000	32000.	32000.	32000.	32000.

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-62

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 05/01/73 TO 05/31/74

ANNUAL AVERAGE (GROUND)
STANDARD PTS. - T/R CORRECTED
ONSITE METEOROLOGY
DATE 25-NOV-81 TIME 08:01:25

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

40.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
6.2E-09	2.9E-09	2.0E-09	3.1E-09	4.5E-09	4.6E-09	4.6E-09	4.8E-09	7.8E-09	4.0E-09	4.4E-09	4.8E-09	5.1E-09	8.0E-09	1.5E-08	1.7E-08
3.4E-09	1.6E-09	1.1E-09	1.7E-09	2.5E-09	2.5E-09	2.5E-09	2.6E-09	4.3E-09	2.2E-09	2.4E-09	2.6E-09	2.8E-09	4.4E-09	8.0E-09	9.2E-09
1.5E-11	5.9E-12	2.3E-12	3.5E-12	6.6E-12	8.5E-12	1.1E-11	9.9E-12	1.1E-11	5.9E-12	7.1E-12	6.3E-12	8.1E-12	1.0E-11	2.1E-11	4.1E-11
5.7E-09	2.6E-09	1.8E-09	2.7E-09	4.2E-09	4.1E-09	4.2E-09	4.4E-09	7.2E-09	3.6E-09	4.1E-09	4.4E-09	4.8E-09	7.5E-09	1.4E-08	1.6E-03
6.0E-09	2.8E-09	2.0E-09	3.0E-09	4.4E-09	4.4E-09	4.5E-09	4.7E-09	7.6E-09	3.9E-09	4.3E-09	4.7E-09	5.0E-09	7.9E-09	1.4E-08	1.6E-08
3.1E-09	1.4E-09	9.8E-10	1.5E-09	2.3E-09	2.3E-09	2.3E-09	2.4E-09	3.9E-09	2.0E-09	2.2E-09	2.4E-09	2.6E-09	4.1E-09	7.5E-09	8.7E-09
3.3E-09	1.6E-09	1.1E-09	1.6E-09	2.4E-09	2.4E-09	2.5E-09	2.6E-09	4.2E-09	2.1E-09	2.4E-09	2.6E-09	2.8E-09	4.3E-09	7.9E-09	9.0E-09
40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000	40000.	40000.

48.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
4.9E-09	1.9E-09	1.4E-09	2.5E-09	3.7E-09	3.3E-09	3.2E-09	3.8E-09	6.0E-09	2.8E-09	3.2E-09	3.5E-09	3.9E-09	5.9E-09	9.7E-09	1.3E-08
2.6E-09	1.0E-09	7.1E-10	1.3E-09	1.9E-09	1.7E-09	1.7E-09	2.0E-09	3.1E-09	1.5E-09	1.7E-09	1.8E-09	2.0E-09	3.1E-09	5.1E-09	6.7E-09
1.1E-11	3.5E-12	1.4E-12	2.5E-12	4.8E-12	5.4E-12	7.2E-12	7.1E-12	7.8E-12	3.8E-12	4.6E-12	4.1E-12	5.4E-12	6.7E-12	1.3E-11	2.8E-11
4.5E-09	1.7E-09	1.1E-09	2.2E-09	3.3E-09	2.9E-09	2.9E-09	3.4E-09	5.4E-09	2.5E-09	2.9E-09	3.1E-09	3.6E-09	5.4E-09	9.0E-09	1.2E-08
4.8E-09	1.9E-09	1.3E-09	2.4E-09	3.5E-09	3.2E-09	3.1E-09	3.7E-09	5.8E-09	2.7E-09	3.1E-09	3.4E-09	3.8E-09	5.7E-09	9.5E-09	1.2E-08
2.3E-09	8.9E-10	6.0E-10	1.1E-09	1.7E-09	1.5E-09	1.5E-09	1.8E-09	2.8E-09	1.3E-09	1.5E-09	1.6E-09	1.9E-09	2.8E-09	4.7E-09	6.2E-09
2.5E-09	9.7E-10	6.7E-10	1.3E-09	1.9E-09	1.7E-09	1.6E-09	1.9E-09	3.0E-09	1.4E-09	1.6E-09	1.8E-09	2.0E-09	3.0E-09	5.0E-09	6.5E-09
48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.

56.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
4.0E-09	1.3E-09	9.5E-10	2.1E-09	3.0E-09	2.5E-09	2.5E-09	3.1E-09	4.8E-09	2.2E-09	2.4E-09	2.6E-09	3.0E-09	4.5E-09	6.8E-09	1.0E-08
2.0E-09	6.8E-10	4.8E-10	1.0E-09	1.5E-09	1.2E-09	1.2E-09	1.5E-09	2.4E-09	1.1E-09	1.2E-09	1.3E-09	1.5E-09	2.3E-09	3.4E-09	5.0E-09
7.9E-12	2.2E-12	8.6E-13	1.9E-12	3.6E-12	3.7E-12	5.0E-12	5.2E-12	5.7E-12	2.6E-12	3.2E-12	2.8E-12	3.8E-12	4.7E-12	8.0E-12	2.0E-11
3.6E-09	1.2E-09	7.8E-10	1.8E-09	2.7E-09	2.1E-09	2.2E-09	2.7E-09	4.3E-09	1.9E-09	2.1E-09	2.3E-09	2.7E-09	4.1E-09	6.2E-09	9.2E-09
3.9E-09	1.3E-09	8.9E-10	2.0E-09	2.9E-09	2.4E-09	2.4E-09	3.0E-09	4.7E-09	2.1E-09	2.3E-09	2.5E-09	2.9E-09	4.4E-09	6.6E-09	9.8E-09
1.8E-09	5.9E-10	3.9E-10	8.9E-10	1.3E-09	1.1E-09	1.1E-09	1.4E-09	2.2E-09	9.4E-10	1.1E-09	1.2E-09	1.4E-09	2.1E-09	3.1E-09	4.6E-09
2.0E-09	6.5E-10	4.5E-10	1.0E-09	1.5E-09	1.2E-09	1.2E-09	1.5E-09	2.3E-09	1.0E-09	1.2E-09	1.3E-09	1.5E-09	2.2E-09	3.3E-09	4.9E-09
56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000

64.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
3.1E-09	9.9E-10	7.3E-10	1.4E-09	2.1E-09	1.8E-09	1.9E-09	2.4E-09	3.7E-09	1.7E-09	1.8E-09	2.1E-09	2.5E-09	3.6E-09	5.5E-09	7.8E-09
1.5E-09	4.8E-10	3.5E-10	6.6E-10	1.0E-09	8.6E-10	9.2E-10	1.2E-09	1.8E-09	8.2E-10	8.6E-10	1.0E-09	1.2E-09	1.7E-09	2.6E-09	3.8E-09
5.5E-12	1.5E-12	6.1E-13	1.1E-12	2.3E-12	2.5E-12	3.5E-12	3.7E-12	4.1E-12	1.9E-12	2.2E-12	2.1E-12	2.9E-12	3.4E-12	5.9E-12	1.4E-11
2.7E-09	8.4E-10	5.9E-10	1.1E-09	1.9E-09	1.5E-09	1.7E-09	2.1E-09	3.3E-09	1.4E-09	1.6E-09	1.9E-09	2.2E-09	3.2E-09	5.0E-09	7.1E-09
3.0E-09	9.4E-10	6.8E-10	1.3E-09	2.0E-09	1.7E-09	1.8E-09	2.3E-09	3.6E-09	1.6E-09	1.7E-09	2.0E-09	2.4E-09	3.5E-09	5.3E-09	7.6E-09
1.3E-09	4.1E-10	2.9E-10	5.5E-10	9.0E-10	7.4E-10	8.0E-10	1.0E-09	1.6E-09	6.9E-10	7.6E-10	9.0E-10	1.1E-09	1.6E-09	2.4E-09	3.4E-09
1.4E-09	4.6E-10	3.3E-10	6.2E-10	9.9E-10	8.2E-10	8.9E-10	1.1E-09	1.7E-09	7.8E-10	8.3E-10	9.9E-10	1.2E-09	1.7E-09	2.6E-09	3.7E-09
64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER.LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

72.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.4E-09	7.6E-10	5.8E-10	9.3E-10	1.6E-09	1.3E-09	1.5E-09	1.9E-09	3.0E-09	1.4E-09	1.3E-09	1.8E-09	2.1E-09	2.9E-09	4.4E-09	6.2E-09
1.1E-09	3.5E-10	2.7E-10	4.3E-10	7.4E-10	6.1E-10	7.0E-10	9.1E-10	1.4E-09	6.4E-10	6.2E-10	8.2E-10	9.8E-10	1.4E-09	2.1E-09	2.9E-09
3.9E-12	1.1E-12	4.5E-13	7.1E-13	1.6E-12	1.7E-12	2.6E-12	2.8E-12	3.0E-12	1.4E-12	1.5E-12	1.6E-12	2.3E-12	2.6E-12	4.4E-12	1.1E-11
2.1E-09	6.3E-10	4.6E-10	7.6E-10	1.4E-09	1.1E-09	1.3E-09	1.7E-09	2.6E-09	1.1E-09	1.2E-09	1.5E-09	1.9E-09	2.6E-09	4.0E-09	5.6E-09
2.3E-09	7.2E-10	5.4E-10	8.7E-10	1.5E-09	1.2E-09	1.4E-09	1.9E-09	2.8E-09	1.3E-09	1.3E-09	1.7E-09	2.0E-09	2.8E-09	4.3E-09	6.1E-09
9.6E-10	3.0E-10	2.1E-10	3.5E-10	6.4E-10	5.1E-10	6.0E-10	7.8E-10	1.2E-09	5.3E-10	5.4E-10	7.0E-10	8.7E-10	1.2E-09	1.9E-09	2.6E-09
1.1E-09	3.4E-10	2.5E-10	4.1E-10	7.1E-10	5.8E-10	6.6E-10	8.6E-10	1.3E-09	6.0E-10	6.0E-10	7.8E-10	9.4E-10	1.3E-09	2.0E-09	2.8E-09
72000	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000

80.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.9E-09	5.9E-10	4.9E-10	6.8E-10	1.2E-09	1.0E-09	1.2E-09	1.6E-09	2.4E-09	1.2E-09	1.1E-09	1.5E-09	1.8E-09	2.4E-09	3.7E-09	5.0E-09
8.7E-10	2.6E-10	2.2E-10	3.1E-10	5.5E-10	4.6E-10	5.6E-10	7.0E-10	1.1E-09	5.3E-10	4.8E-10	6.6E-10	8.0E-10	1.1E-09	1.7E-09	2.3E-09
3.0E-12	7.6E-13	3.5E-13	4.9E-13	1.1E-12	1.2E-12	2.0E-12	2.1E-12	2.2E-12	1.1E-12	1.1E-12	1.2E-12	1.8E-12	2.0E-12	3.4E-12	8.0E-12
1.7E-09	4.8E-10	3.8E-10	5.5E-10	1.0E-09	8.4E-10	1.0E-09	1.3E-09	2.0E-09	9.6E-10	9.2E-10	1.2E-09	1.6E-09	2.1E-09	3.3E-09	4.5E-09
1.8E-09	5.5E-10	4.5E-10	6.4E-10	1.2E-09	9.6E-10	1.2E-09	1.5E-09	2.2E-09	1.1E-09	1.0E-09	1.4E-09	1.7E-09	2.3E-09	3.6E-09	4.9E-09
7.4E-10	2.2E-10	1.7E-10	2.5E-10	4.6E-10	3.8E-10	4.7E-10	5.9E-10	9.1E-10	4.3E-10	4.2E-10	5.6E-10	7.1E-10	9.5E-10	1.5E-09	2.0E-09
8.3E-10	2.5E-10	2.0E-10	2.9E-10	5.2E-10	4.3E-10	5.3E-10	6.7E-10	1.0E-09	5.0E-10	4.6E-10	6.3E-10	7.7E-10	1.0E-09	1.6E-09	2.2E-09
80000	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000	80000.	80000.	80000.	80000	80000

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-63

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-64

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 06/01/73 TO 05/31/74

ANNUAL AVERAGE (GROUND) — WOLF CREEK GENERATING STATION
SPECIAL PTS. - T/R CORRECTED — KANSAS GAS AND ELECTRIC CO.
ONSITE METEOROLOGY — BURLINGTON, KANSAS
DATE 23-NOV-81 TIME 08:11:25 — DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

EXCLUSION BOUNDARY

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
9.7E-07	5.5E-07	5.5E-07	7.0E-07	7.2E-07	8.8E-07	8.1E-07	8.6E-07	1.1E-06	7.8E-07	6.9E-07	9.2E-07	7.0E-07	1.2E-06	2.0E-06	2.1E-06
8.7E-07	4.9E-07	4.9E-07	6.2E-07	6.4E-07	7.8E-07	7.3E-07	7.7E-07	9.6E-07	7.0E-07	6.1E-07	8.2E-07	6.3E-07	1.1E-06	1.8E-06	1.8E-06
8.3E-09	3.9E-09	2.3E-09	2.9E-09	3.8E-09	5.7E-09	6.4E-09	5.7E-09	5.5E-09	3.9E-09	3.9E-09	4.3E-09	3.9E-09	5.6E-09	1.1E-08	1.8E-08
9.7E-07	5.5E-07	5.5E-07	7.0E-07	7.2E-07	8.7E-07	8.1E-07	8.6E-07	1.1E-06	7.8E-07	6.9E-07	9.2E-07	7.0E-07	1.2E-06	2.0E-06	2.1E-06
9.7E-07	5.5E-07	5.5E-07	7.0E-07	7.2E-07	8.8E-07	8.1E-07	8.6E-07	1.1E-06	7.8E-07	6.9E-07	9.2E-07	7.0E-07	1.2E-06	2.0E-06	2.1E-06
8.7E-07	4.9E-07	4.9E-07	6.2E-07	6.4E-07	7.8E-07	7.2E-07	7.6E-07	9.6E-07	6.9E-07	6.1E-07	8.2E-07	6.2E-07	1.1E-06	1.8E-06	1.8E-06
8.7E-07	4.9E-07	4.9E-07	6.2E-07	6.4E-07	7.8E-07	7.3E-07	7.7E-07	9.6E-07	7.0E-07	6.1E-07	8.2E-07	6.3E-07	1.1E-06	1.8E-06	1.8E-06
1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.

LOW POPULATION ZONE

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.8E-07	9.7E-08	9.1E-08	9.7E-08	1.3E-07	1.5E-07	1.5E-07	1.4E-07	1.9E-07	1.3E-07	1.2E-07	1.3E-07	1.3E-07	2.1E-07	3.6E-07	3.4E-07
1.5E-07	7.8E-08	7.3E-08	7.8E-08	1.0E-07	1.2E-07	1.2E-07	1.1E-07	1.5E-07	1.0E-07	9.9E-08	1.0E-07	1.1E-07	1.7E-07	2.9E-07	2.7E-07
1.2E-09	5.4E-10	2.9E-10	3.2E-10	5.3E-10	7.6E-10	9.7E-10	7.3E-10	7.9E-10	5.0E-10	5.3E-10	4.5E-10	5.8E-10	7.7E-10	1.5E-09	2.3E-09
1.8E-07	9.6E-08	9.0E-08	9.6E-08	1.3E-07	1.5E-07	1.5E-07	1.4E-07	1.9E-07	1.2E-07	1.2E-07	1.2E-07	1.3E-07	2.1E-07	3.6E-07	3.4E-07
1.8E-07	9.7E-08	9.1E-08	9.7E-08	1.3E-07	1.5E-07	1.5E-07	1.4E-07	1.9E-07	1.3E-07	1.2E-07	1.2E-07	1.3E-07	2.1E-07	3.6E-07	3.4E-07
1.4E-07	7.7E-08	7.2E-08	7.7E-08	1.0E-07	1.2E-07	1.2E-07	1.1E-07	1.5E-07	1.0E-07	9.8E-08	1.0E-07	1.1E-07	1.7E-07	2.9E-07	2.7E-07
1.5E-07	7.8E-08	7.3E-08	7.8E-08	1.0E-07	1.2E-07	1.2E-07	1.1E-07	1.5E-07	1.0E-07	9.9E-08	1.0E-07	1.1E-07	1.7E-07	2.9E-07	2.7E-07
4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.

NEAREST RESIDENT

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.3E-07	1.7E-07	1.4E-07	1.6E-07	2.1E-07	3.3E-07	1.1E-07	9.3E-08	1.9E-07	1.6E-07	1.1E-07	1.6E-07	1.1E-07	5.2E-07	4.2E-07	8.4E-07
1.0E-07	1.4E-07	1.2E-07	1.3E-07	1.8E-07	2.8E-07	9.0E-08	7.2E-08	1.5E-07	1.3E-07	8.7E-08	1.3E-07	8.6E-08	4.4E-07	3.4E-07	7.1E-07
8.3E-10	1.0E-09	5.0E-10	5.9E-10	9.8E-10	2.0E-09	6.8E-10	4.5E-10	7.9E-10	6.6E-10	4.7E-10	6.0E-10	4.5E-10	2.3E-09	1.8E-09	6.6E-09
1.3E-07	1.7E-07	1.4E-07	1.6E-07	2.1E-07	3.3E-07	1.1E-07	9.1E-08	1.9E-07	1.6E-07	1.1E-07	1.6E-07	1.1E-07	5.2E-07	4.1E-07	8.3E-07
1.3E-07	1.7E-07	1.4E-07	1.6E-07	2.1E-07	3.3E-07	1.1E-07	9.2E-08	1.9E-07	1.6E-07	1.1E-07	1.6E-07	1.1E-07	5.2E-07	4.2E-07	8.4E-07
1.0E-07	1.4E-07	1.2E-07	1.3E-07	1.8E-07	2.8E-07	8.9E-08	7.1E-08	1.5E-07	1.3E-07	8.7E-08	1.3E-07	8.5E-08	4.4E-07	3.4E-07	7.1E-07
1.0E-07	1.4E-07	1.2E-07	1.3E-07	1.8E-07	2.8E-07	9.0E-08	7.1E-08	1.5E-07	1.3E-07	8.7E-08	1.3E-07	8.6E-08	4.4E-07	3.4E-07	7.1E-07
4988.	2816.	3138.	2816.	2735.	2333.	4827.	5632.	4023.	3379.	4344.	3540.	4666.	2092.	3540.	2172.

NEAREST VEGETABLE

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.1E-07	1.2E-07	1.2E-07	1.6E-07	2.1E-07	3.3E-07	1.1E-07	9.3E-08	7.6E-08	9.9E-08	1.1E-07	1.6E-07	1.1E-07	4.7E-07	4.1E-07	8.4E-07
8.2E-08	1.0E-07	9.6E-08	1.3E-07	1.8E-07	2.8E-07	8.3E-08	7.2E-08	5.7E-08	7.8E-08	8.7E-08	1.3E-07	8.6E-08	4.0E-07	3.3E-07	7.1E-07
6.3E-10	7.2E-10	4.0E-10	5.9E-10	9.8E-10	2.0E-09	6.2E-10	4.5E-10	2.5E-10	3.7E-10	4.7E-10	6.0E-10	4.5E-10	2.0E-09	1.8E-09	6.6E-09
1.1E-07	1.2E-07	1.2E-07	1.6E-07	2.1E-07	3.3E-07	1.0E-07	9.1E-08	7.5E-08	9.7E-08	1.1E-07	1.6E-07	1.1E-07	4.6E-07	4.1E-07	8.3E-07
1.1E-07	1.2E-07	1.2E-07	1.6E-07	2.1E-07	3.3E-07	1.1E-07	9.2E-08	7.6E-08	9.8E-08	1.1E-07	1.6E-07	1.1E-07	4.7E-07	4.1E-07	8.4E-07
8.1E-08	1.0E-07	9.5E-08	1.3E-07	1.8E-07	2.8E-07	8.2E-08	7.1E-08	5.6E-08	7.7E-08	8.7E-08	1.3E-07	8.5E-08	3.9E-07	3.3E-07	7.1E-07
8.2E-08	1.0E-07	9.6E-08	1.3E-07	1.8E-07	2.8E-07	8.2E-08	7.1E-08	5.7E-08	7.7E-08	8.7E-08	1.3E-07	8.6E-08	4.0E-07	3.3E-07	7.1E-07
5792.	3379.	3540.	2816.	2735.	2333.	5149.	5632.	7401.	4827.	4344.	3540.	4666.	2253.	3620.	2172.

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NEAREST MEAT ANIMAL

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
8.8E-07	5.4E-07	5.5E-07	3.0E-07	3.3E-07	4.4E-07	1.1E-07	1.0E-07	1.3E-07	2.5E-07	2.3E-07	2.4E-07	1.0E-07	2.3E-07	4.8E-07	1.1E-06
7.8E-07	4.8E-07	4.9E-07	2.5E-07	2.8E-07	3.8E-07	8.3E-08	7.8E-08	1.0E-07	2.1E-07	2.0E-07	2.0E-07	8.2E-08	1.8E-07	3.9E-07	9.6E-07
7.5E-09	3.8E-09	2.3E-09	1.2E-09	1.6E-09	2.7E-09	6.2E-10	4.9E-10	5.0E-10	1.1E-09	1.2E-09	9.7E-10	4.2E-10	8.6E-10	2.2E-09	9.1E-09
8.8E-07	5.4E-07	5.5E-07	2.9E-07	3.2E-07	4.4E-07	1.0E-07	9.9E-08	1.3E-07	2.5E-07	2.3E-07	2.4E-07	1.0E-07	2.3E-07	4.8E-07	1.1E-06
8.8E-07	5.4E-07	5.5E-07	3.0E-07	3.3E-07	4.4E-07	1.1E-07	1.0E-07	1.3E-07	2.5E-07	2.3E-07	2.4E-07	1.0E-07	2.3E-07	4.8E-07	1.1E-06
7.8E-07	4.8E-07	4.9E-07	2.5E-07	2.8E-07	3.8E-07	8.2E-08	7.7E-08	1.0E-07	2.1E-07	2.0E-07	2.0E-07	8.1E-08	1.8E-07	3.9E-07	9.6E-07
7.8E-07	4.8E-07	4.9E-07	2.5E-07	2.8E-07	3.8E-07	8.2E-08	7.8E-08	1.0E-07	2.1E-07	2.0E-07	2.0E-07	8.2E-08	1.8E-07	3.9E-07	9.6E-07
1287.	1207.	1207.	1931.	2011.	1931.	5149.	5310.	5310.	2574.	2414.	2735.	4827.	3701.	3218.	1770.

NEAREST DAIRY COW

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
7.4E-08	7.4E-08		1.6E-07	3.3E-07	4.4E-07	7.6E-08				5.3E-08			1.3E-07	4.8E-07	
5.5E-08	5.8E-08		1.3E-07	2.8E-07	3.8E-07	5.8E-08				4.0E-08			1.0E-07	3.9E-07	
3.9E-10	3.8E-10	NONE	5.9E-10	1.6E-09	2.7E-09	4.2E-10	NONE	NONE	NONE	1.9E-10	NONE	NONE	4.4E-10	2.2E-09	NONE
7.3E-08	7.3E-08	IN	1.6E-07	3.2E-07	4.4E-07	7.5E-08	IN	IN	IN	5.2E-08	IN	IN	1.3E-07	4.8E-07	IN
7.4E-08	7.3E-08	THIS	1.6E-07	3.3E-07	4.4E-07	7.6E-08	THIS	THIS	THIS	5.3E-08	THIS	THIS	1.3E-07	4.8E-07	THIS
5.4E-08	5.7E-08	SECTOR	1.3E-07	2.8E-07	3.8E-07	5.7E-08	SECTOR	SECTOR	SECTOR	3.9E-08	SECTOR	SECTOR	1.0E-07	3.9E-07	SECTOR
5.5E-08	5.8E-08		1.3E-07	2.8E-07	3.8E-07	5.8E-08				3.9E-08			1.0E-07	3.9E-07	
7562.	4827.		2816.	2011.	1931.	6436.				7562.			5632.	3218.	

NEAREST PLANT BOUNDARY

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
5.8E-07	2.7E-07	2.2E-07	3.0E-07	3.5E-07	4.7E-07	1.1E-07	1.0E-07	3.2E-07	2.6E-07	2.3E-07	2.2E-07	1.7E-07	2.0E-07	7.2E-07	1.2E-06
5.0E-07	2.3E-07	1.8E-07	2.5E-07	3.0E-07	4.0E-07	9.0E-08	7.8E-08	2.7E-07	2.2E-07	2.0E-07	1.8E-07	1.4E-07	1.6E-07	6.1E-07	1.0E-06
4.7E-09	1.8E-09	8.1E-10	1.2E-09	1.7E-09	2.9E-09	6.8E-10	4.9E-10	1.5E-09	1.2E-09	1.2E-09	8.7E-10	7.7E-10	7.2E-10	3.6E-09	9.6E-09
5.8E-07	2.7E-07	2.1E-07	2.9E-07	3.4E-07	4.6E-07	1.1E-07	9.9E-08	3.2E-07	2.6E-07	2.3E-07	2.2E-07	1.7E-07	2.0E-07	7.2E-07	1.2E-06
5.8E-07	2.7E-07	2.2E-07	3.0E-07	3.5E-07	4.7E-07	1.1E-07	1.0E-07	3.2E-07	2.6E-07	2.3E-07	2.2E-07	1.7E-07	2.0E-07	7.2E-07	1.2E-06
5.0E-07	2.3E-07	1.8E-07	2.5E-07	3.0E-07	4.0E-07	8.9E-08	7.7E-08	2.6E-07	2.2E-07	2.0E-07	1.8E-07	1.4E-07	1.6E-07	6.1E-07	1.0E-06
5.0E-07	2.3E-07	1.8E-07	2.5E-07	3.0E-07	4.0E-07	9.0E-08	7.8E-08	2.7E-07	2.2E-07	2.0E-07	1.8E-07	1.4E-07	1.6E-07	6.1E-07	1.0E-06
1754.	2076.	2365.	1931.	1931.	1866.	4827.	5310.	2767.	2478.	2414.	2880.	3379.	4183.	2349.	1738.

TOTAL OBS - 8760 TOTAL INV OBS - 311 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 9.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

TABLE 2.3-65

"This Table has been deleted"

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 06/01/74 TO 05/31/75

ANNUAL AVERAGE (GROUND) | WOLF CREEK GENERATING STATION
STANDARD PTS - T/R CORRECTED | KANSAS GAS AND ELECTRIC CO.
ONSITE METEOROLOGY | BURLINGTON, KANSAS
DATE 23-NOV-81 TIME 08:12:45 | DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.4 KM															
6.4E-06	2.8E-06	2.4E-06	4.0E-06	3.6E-06	4.1E-06	4.8E-06	4.5E-06	4.5E-06	3.9E-06	4.5E-06	4.8E-06	4.1E-06	7.1E-06	1.0E-05	1.0E-05
6.0E-06	2.7E-06	2.3E-06	3.8E-06	3.4E-06	3.9E-06	4.6E-06	4.2E-06	4.3E-06	3.7E-06	4.3E-06	4.5E-06	3.9E-06	6.7E-06	9.6E-06	9.5E-06
5.8E-08	2.0E-08	1.3E-08	2.6E-08	2.2E-08	3.1E-08	4.1E-08	3.7E-08	3.4E-08	2.1E-08	2.4E-08	2.5E-08	2.8E-08	3.4E-08	5.6E-08	8.7E-08
6.4E-06	2.8E-06	2.4E-06	4.0E-06	3.6E-06	4.1E-06	4.8E-06	4.5E-06	4.5E-06	3.9E-06	4.5E-06	4.8E-06	4.1E-06	7.1E-06	1.0E-05	1.0E-05
6.4E-06	2.8E-06	2.4E-06	4.0E-06	3.6E-06	4.1E-06	4.8E-06	4.5E-06	4.5E-06	3.9E-06	4.5E-06	4.8E-06	4.1E-06	7.1E-06	1.0E-05	1.0E-05
6.0E-06	2.7E-06	2.3E-06	3.8E-06	3.4E-06	3.9E-06	4.6E-06	4.2E-06	4.3E-06	3.6E-06	4.3E-06	4.5E-06	3.9E-06	6.7E-06	9.6E-06	9.5E-06
6.0E-06	2.7E-06	2.3E-06	3.8E-06	3.4E-06	3.9E-06	4.6E-06	4.2E-06	4.3E-06	3.7E-06	4.3E-06	4.5E-06	3.9E-06	6.7E-06	9.6E-06	9.5E-06
400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400	400.	400.
0.8 KM															
1.9E-06	8.8E-07	7.6E-07	1.2E-06	1.2E-06	1.3E-06	1.4E-06	1.5E-06	1.4E-06	1.2E-06	1.4E-06	1.7E-06	1.3E-06	2.3E-06	3.3E-06	3.1E-06
1.7E-06	8.0E-07	7.0E-07	1.1E-06	1.1E-06	1.2E-06	1.3E-06	1.4E-06	1.3E-06	1.1E-06	1.3E-06	1.6E-06	1.2E-06	2.1E-06	3.0E-06	2.8E-06
1.9E-08	6.9E-09	4.3E-09	8.2E-09	8.2E-09	1.1E-08	1.3E-08	1.3E-08	1.1E-08	6.9E-09	7.9E-09	9.5E-09	9.8E-09	1.2E-08	2.0E-08	2.9E-08
1.9E-06	8.7E-07	7.6E-07	1.2E-06	1.2E-06	1.3E-06	1.4E-06	1.5E-06	1.4E-06	1.2E-06	1.4E-06	1.7E-06	1.3E-06	2.3E-06	3.3E-06	3.1E-06
1.9E-06	8.8E-07	7.6E-07	1.2E-06	1.2E-06	1.3E-06	1.4E-06	1.5E-06	1.4E-06	1.2E-06	1.4E-06	1.7E-06	1.3E-06	2.3E-06	3.3E-06	3.1E-06
1.7E-06	8.0E-07	6.9E-07	1.1E-06	1.1E-06	1.2E-06	1.3E-06	1.4E-06	1.3E-06	1.1E-06	1.3E-06	1.6E-06	1.2E-06	2.1E-06	3.0E-06	2.8E-06
1.7E-06	8.0E-07	6.9E-07	1.1E-06	1.1E-06	1.2E-06	1.3E-06	1.4E-06	1.3E-06	1.1E-06	1.3E-06	1.6E-06	1.2E-06	2.1E-06	3.0E-06	2.8E-06
800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800	800.	800.
1.2 KM															
9.5E-07	4.5E-07	3.8E-07	5.6E-07	6.4E-07	6.8E-07	7.1E-07	7.7E-07	7.3E-07	6.2E-07	7.0E-07	9.5E-07	6.5E-07	1.2E-06	1.7E-06	1.6E-06
8.5E-07	4.0E-07	3.4E-07	5.0E-07	5.7E-07	6.1E-07	6.3E-07	6.8E-07	6.5E-07	5.5E-07	6.3E-07	8.4E-07	5.8E-07	1.1E-06	1.5E-06	1.4E-06
9.6E-09	3.5E-09	2.2E-09	3.8E-09	4.2E-09	5.4E-09	6.4E-09	6.6E-09	5.7E-09	3.5E-09	3.9E-09	5.2E-09	4.7E-09	6.3E-09	9.9E-09	1.4E-08
9.5E-07	4.5E-07	3.8E-07	5.6E-07	6.4E-07	6.8E-07	7.1E-07	7.6E-07	7.3E-07	6.2E-07	7.0E-07	9.4E-07	6.5E-07	1.2E-06	1.7E-06	1.6E-06
9.5E-07	4.5E-07	3.8E-07	5.6E-07	6.4E-07	6.8E-07	7.1E-07	7.7E-07	7.3E-07	6.2E-07	7.0E-07	9.5E-07	6.5E-07	1.2E-06	1.7E-06	1.6E-06
8.5E-07	4.0E-07	3.4E-07	5.0E-07	5.7E-07	6.1E-07	6.3E-07	6.8E-07	6.5E-07	5.5E-07	6.3E-07	8.4E-07	5.8E-07	1.1E-06	1.5E-06	1.4E-06
8.5E-07	4.0E-07	3.4E-07	5.0E-07	5.7E-07	6.1E-07	6.3E-07	6.8E-07	6.5E-07	5.5E-07	6.3E-07	8.4E-07	5.8E-07	1.1E-06	1.5E-06	1.4E-06
1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200	1200.	1200.
1.6 KM															
6.5E-07	3.1E-07	2.6E-07	3.4E-07	4.1E-07	4.6E-07	4.7E-07	4.8E-07	4.8E-07	4.0E-07	4.4E-07	5.9E-07	4.3E-07	8.0E-07	1.1E-06	1.1E-06
5.6E-07	2.7E-07	2.3E-07	3.0E-07	3.6E-07	4.0E-07	4.1E-07	4.2E-07	4.2E-07	3.5E-07	3.9E-07	5.1E-07	3.8E-07	7.0E-07	9.7E-07	9.3E-07
6.3E-09	2.3E-09	1.4E-09	2.3E-09	2.6E-09	3.5E-09	4.1E-09	4.0E-09	3.6E-09	2.2E-09	2.4E-09	3.1E-09	3.1E-09	4.0E-09	6.4E-09	9.3E-09
6.4E-07	3.1E-07	2.6E-07	3.4E-07	4.1E-07	4.6E-07	4.7E-07	4.8E-07	4.8E-07	4.0E-07	4.4E-07	5.9E-07	4.3E-07	8.0E-07	1.1E-06	1.1E-06
6.4E-07	3.1E-07	2.6E-07	3.4E-07	4.1E-07	4.6E-07	4.7E-07	4.8E-07	4.8E-07	4.0E-07	4.4E-07	5.9E-07	4.3E-07	8.0E-07	1.1E-06	1.1E-06
5.6E-07	2.7E-07	2.3E-07	3.0E-07	3.6E-07	4.0E-07	4.1E-07	4.2E-07	4.2E-07	3.5E-07	3.9E-07	5.1E-07	3.8E-07	6.9E-07	9.7E-07	9.3E-07
5.6E-07	2.7E-07	2.3E-07	3.0E-07	3.6E-07	4.0E-07	4.1E-07	4.2E-07	4.2E-07	3.5E-07	3.9E-07	5.1E-07	3.8E-07	7.0E-07	9.7E-07	9.3E-07
1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600	1600.	1600

TOTAL OBS - 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.4 KM															
3.8E-07	1.8E-07	1.5E-07	1.8E-07	2.2E-07	2.6E-07	2.6E-07	2.5E-07	2.6E-07	2.2E-07	2.4E-07	3.1E-07	2.3E-07	4.3E-07	6.0E-07	5.6E-07
3.2E-07	1.6E-07	1.3E-07	1.5E-07	1.9E-07	2.2E-07	2.2E-07	2.1E-07	2.2E-07	1.9E-07	2.0E-07	2.6E-07	1.9E-07	3.6E-07	5.0E-07	4.7E-07
3.4E-09	1.2E-09	7.7E-10	1.1E-09	1.3E-09	1.8E-09	2.1E-09	1.9E-09	1.9E-09	1.1E-09	1.2E-09	1.5E-09	1.5E-09	2.0E-09	3.1E-09	4.5E-09
3.8E-07	1.8E-07	1.5E-07	1.8E-07	2.2E-07	2.5E-07	2.6E-07	2.5E-07	2.6E-07	2.2E-07	2.4E-07	3.1E-07	2.3E-07	4.3E-07	5.9E-07	5.6E-07
3.8E-07	1.8E-07	1.5E-07	1.8E-07	2.2E-07	2.6E-07	2.6E-07	2.5E-07	2.6E-07	2.2E-07	2.4E-07	3.1E-07	2.3E-07	4.3E-07	5.9E-07	5.6E-07
3.2E-07	1.6E-07	1.3E-07	1.5E-07	1.9E-07	2.2E-07	2.2E-07	2.1E-07	2.2E-07	1.9E-07	2.0E-07	2.6E-07	1.9E-07	3.6E-07	5.0E-07	4.7E-07
3.2E-07	1.6E-07	1.3E-07	1.5E-07	1.9E-07	2.2E-07	2.2E-07	2.1E-07	2.2E-07	1.9E-07	2.0E-07	2.6E-07	1.9E-07	3.6E-07	5.0E-07	4.7E-07
2400.	2400.	2400.	2400.	2400.	2400.	2400	2400.	2400.	2400.	2400	2400.	2400.	2400	2400.	2400.
3.2 KM															
2.4E-07	1.2E-07	9.1E-08	1.2E-07	1.5E-07	1.6E-07	1.8E-07	1.7E-07	1.8E-07	1.4E-07	1.6E-07	1.9E-07	1.7E-07	2.9E-07	4.1E-07	3.7E-07
2.0E-07	1.0E-07	7.5E-08	9.5E-08	1.3E-07	1.3E-07	1.5E-07	1.4E-07	1.5E-07	1.1E-07	1.3E-07	1.6E-07	1.4E-07	2.4E-07	3.4E-07	3.0E-07
2.0E-09	7.7E-10	4.4E-10	6.5E-10	8.5E-10	1.1E-09	1.4E-09	1.2E-09	1.2E-09	6.7E-10	7.7E-10	8.8E-10	1.0E-09	1.3E-09	2.0E-09	2.8E-09
2.4E-07	1.2E-07	9.1E-08	1.1E-07	1.5E-07	1.6E-07	1.8E-07	1.7E-07	1.8E-07	1.4E-07	1.6E-07	1.9E-07	1.7E-07	2.9E-07	4.1E-07	3.7E-07
2.4E-07	1.2E-07	9.1E-08	1.1E-07	1.5E-07	1.6E-07	1.8E-07	1.7E-07	1.8E-07	1.4E-07	1.6E-07	1.9E-07	1.7E-07	2.9E-07	4.1E-07	3.7E-07
2.0E-07	1.0E-07	7.5E-08	9.4E-08	1.2E-07	1.3E-07	1.5E-07	1.4E-07	1.5E-07	1.1E-07	1.3E-07	1.6E-07	1.4E-07	2.4E-07	3.4E-07	3.0E-07
2.0E-07	1.0E-07	7.5E-08	9.4E-08	1.3E-07	1.3E-07	1.5E-07	1.4E-07	1.5E-07	1.1E-07	1.3E-07	1.6E-07	1.4E-07	2.4E-07	3.4E-07	3.0E-07
3200	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200	3200.	3200
4.0 KM															
1.7E-07	8.3E-08	6.3E-08	8.4E-08	1.1E-07	1.2E-07	1.4E-07	1.2E-07	1.3E-07	1.0E-07	1.2E-07	1.3E-07	1.3E-07	2.0E-07	3.0E-07	2.7E-07
1.4E-07	6.7E-08	5.0E-08	6.7E-08	9.2E-08	9.4E-08	1.1E-07	1.0E-07	1.1E-07	8.2E-08	1.0E-07	1.0E-07	1.0E-07	1.6E-07	2.4E-07	2.2E-07
1.3E-09	4.9E-10	2.8E-10	4.4E-10	5.9E-10	7.4E-10	9.9E-10	8.6E-10	8.4E-10	4.6E-10	5.5E-10	5.6E-10	7.2E-10	8.2E-10	1.4E-09	1.9E-09
1.7E-07	8.2E-08	6.2E-08	8.3E-08	1.1E-07	1.2E-07	1.3E-07	1.2E-07	1.3E-07	1.0E-07	1.2E-07	1.3E-07	1.2E-07	2.0E-07	3.0E-07	2.7E-07
1.7E-07	8.3E-08	6.3E-08	8.3E-08	1.1E-07	1.2E-07	1.3E-07	1.2E-07	1.3E-07	1.0E-07	1.2E-07	1.3E-07	1.3E-07	2.0E-07	3.0E-07	2.7E-07
1.4E-07	6.6E-08	5.0E-08	6.7E-08	9.1E-08	9.3E-08	1.1E-07	1.0E-07	1.1E-07	8.2E-08	9.9E-08	1.0E-07	1.0E-07	1.6E-07	2.4E-07	2.1E-07
1.4E-07	6.7E-08	5.0E-08	6.7E-08	9.2E-08	9.4E-08	1.1E-07	1.0E-07	1.1E-07	8.2E-08	1.0E-07	1.0E-07	1.0E-07	1.6E-07	2.4E-07	2.2E-07
4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000	4000.	4000.
4.8 KM															
1.4E-07	6.3E-08	4.5E-08	5.7E-08	8.5E-08	8.6E-08	1.0E-07	9.9E-08	9.9E-08	8.0E-08	9.6E-08	1.1E-07	9.7E-08	1.7E-07	2.4E-07	2.1E-07
1.1E-07	4.9E-08	3.6E-08	4.5E-08	6.7E-08	6.8E-08	8.0E-08	7.8E-08	7.8E-08	6.3E-08	7.6E-08	8.5E-08	7.7E-08	1.3E-07	1.9E-07	1.7E-07
9.9E-10	3.5E-10	1.9E-10	2.8E-10	4.2E-10	5.2E-10	7.0E-10	6.4E-10	5.9E-10	3.4E-10	4.0E-10	4.3E-10	5.2E-10	6.3E-10	1.0E-09	1.4E-09
1.4E-07	6.2E-08	4.5E-08	5.7E-08	8.4E-08	8.5E-08	1.0E-07	9.8E-08	9.9E-08	7.9E-08	9.5E-08	1.1E-07	9.7E-08	1.6E-07	2.4E-07	2.1E-07
1.4E-07	6.2E-08	4.5E-08	5.7E-08	8.5E-08	8.6E-08	1.0E-07	9.8E-08	9.9E-08	8.0E-08	9.6E-08	1.1E-07	9.7E-08	1.7E-07	2.4E-07	2.1E-07
1.1E-07	4.9E-08	3.5E-08	4.5E-08	6.7E-08	6.7E-08	7.9E-08	7.7E-08	7.8E-08	6.2E-08	7.5E-08	8.4E-08	7.6E-08	1.3E-07	1.9E-07	1.7E-07
1.1E-07	4.9E-08	3.5E-08	4.5E-08	6.7E-08	6.8E-08	8.0E-08	7.8E-08	7.8E-08	6.3E-08	7.5E-08	8.5E-08	7.7E-08	1.3E-07	1.9E-07	1.7E-07
4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800	4800	4800

TOTAL OBS - 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 06/01/74 TO 05/31/75

ANNUAL AVERAGE (GROUND)
STANDARD PTS - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 08:12:45

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
5.6 KM															
1.2E-07	5.0E-08	3.4E-08	4.2E-08	6.8E-08	6.3E-08	8.1E-08	8.5E-08	8.5E-08	6.6E-08	7.8E-08	8.9E-08	8.0E-08	1.4E-07	2.0E-07	1.7E-07
9.0E-08	3.8E-08	2.7E-08	3.2E-08	5.3E-08	4.9E-08	6.3E-08	6.6E-08	6.6E-08	5.1E-08	6.0E-08	6.9E-08	6.2E-08	1.1E-07	1.5E-07	1.3E-07
8.0E-10	2.6E-10	1.4E-10	2.0E-10	3.2E-10	3.6E-10	5.3E-10	5.3E-10	4.8E-10	2.7E-10	3.1E-10	3.4E-10	4.0E-10	4.9E-10	7.8E-10	1.1E-09
1.2E-07	4.9E-08	3.4E-08	4.1E-08	6.8E-08	6.2E-08	8.1E-08	8.4E-08	8.5E-08	6.6E-08	7.7E-08	8.8E-08	7.9E-08	1.4E-07	1.9E-07	1.7E-07
1.2E-07	4.9E-08	3.4E-08	4.2E-08	6.8E-08	6.3E-08	8.1E-08	8.5E-08	8.5E-08	6.6E-08	7.8E-08	8.8E-08	7.9E-08	1.4E-07	2.0E-07	1.7E-07
9.0E-08	3.8E-08	2.6E-08	3.2E-08	5.2E-08	4.8E-08	6.2E-08	6.5E-08	6.5E-08	5.1E-08	6.0E-08	6.8E-08	6.1E-08	1.1E-07	1.5E-07	1.3E-07
9.0E-08	3.8E-08	2.6E-08	3.2E-08	5.3E-08	4.8E-08	6.3E-08	6.6E-08	6.6E-08	5.1E-08	6.0E-08	6.8E-08	6.1E-08	1.1E-07	1.5E-07	1.3E-07
5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600	5600.
6.4 KM															
9.4E-08	4.1E-08	2.7E-08	3.5E-08	5.8E-08	5.3E-08	6.7E-08	7.1E-08	6.6E-08	5.5E-08	6.6E-08	7.7E-08	6.6E-08	1.1E-07	1.6E-07	1.4E-07
7.1E-08	3.1E-08	2.0E-08	2.7E-08	4.4E-08	4.0E-08	5.1E-08	5.4E-08	5.0E-08	4.2E-08	5.0E-08	5.8E-08	5.0E-08	8.7E-08	1.2E-07	1.1E-07
6.1E-10	2.1E-10	1.0E-10	1.6E-10	2.6E-10	2.8E-10	4.2E-10	4.2E-10	3.6E-10	2.1E-10	2.5E-10	2.8E-10	3.2E-10	3.9E-10	6.1E-10	8.4E-10
9.3E-08	4.1E-08	2.6E-08	3.5E-08	5.7E-08	5.2E-08	6.6E-08	7.0E-08	6.5E-08	5.4E-08	6.5E-08	7.6E-08	6.6E-08	1.1E-07	1.6E-07	1.4E-07
9.3E-08	4.1E-08	2.7E-08	3.5E-08	5.8E-08	5.2E-08	6.7E-08	7.0E-08	6.6E-08	5.5E-08	6.6E-08	7.6E-08	6.6E-08	1.1E-07	1.6E-07	1.4E-07
7.1E-08	3.1E-08	2.0E-08	2.6E-08	4.4E-08	4.0E-08	5.1E-08	5.3E-08	5.0E-08	4.1E-08	5.0E-08	5.8E-08	5.0E-08	8.6E-08	1.2E-07	1.1E-07
7.1E-08	3.1E-08	2.0E-08	2.7E-08	4.4E-08	4.0E-08	5.1E-08	5.4E-08	5.0E-08	4.2E-08	5.0E-08	5.8E-08	5.0E-08	8.7E-08	1.2E-07	1.1E-07
6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.
7.2 KM															
8.0E-08	3.5E-08	2.1E-08	3.0E-08	4.9E-08	4.5E-08	5.7E-08	6.1E-08	5.3E-08	4.6E-08	5.7E-08	6.6E-08	5.7E-08	9.2E-08	1.4E-07	1.2E-07
6.0E-08	2.6E-08	1.6E-08	2.3E-08	3.7E-08	3.4E-08	4.2E-08	4.5E-08	4.0E-08	3.5E-08	4.3E-08	4.9E-08	4.3E-08	6.9E-08	1.1E-07	8.9E-08
5.0E-10	1.7E-10	7.8E-11	1.3E-10	2.1E-10	2.3E-10	3.4E-10	3.4E-10	2.8E-10	1.7E-10	2.1E-10	2.3E-10	2.6E-10	3.0E-10	5.2E-10	6.8E-10
7.9E-08	3.4E-08	2.1E-08	3.0E-08	4.9E-08	4.4E-08	5.6E-08	6.0E-08	5.3E-08	4.6E-08	5.6E-08	6.5E-08	5.6E-08	9.1E-08	1.4E-07	1.2E-07
7.9E-08	3.5E-08	2.1E-08	3.0E-08	4.9E-08	4.5E-08	5.6E-08	6.0E-08	5.3E-08	4.6E-08	5.7E-08	6.6E-08	5.7E-08	9.2E-08	1.4E-07	1.2E-07
5.9E-08	2.6E-08	1.6E-08	2.2E-08	3.6E-08	3.3E-08	4.2E-08	4.5E-08	3.9E-08	3.4E-08	4.2E-08	4.9E-08	4.2E-08	6.8E-08	1.1E-07	8.8E-08
6.0E-08	2.6E-08	1.6E-08	2.3E-08	3.7E-08	3.4E-08	4.2E-08	4.5E-08	4.0E-08	3.4E-08	4.3E-08	4.9E-08	4.3E-08	6.9E-08	1.1E-07	8.8E-08
7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.
8.0 KM															
6.9E-08	3.1E-08	1.7E-08	2.6E-08	4.4E-08	4.0E-08	4.9E-08	5.3E-08	4.5E-08	4.0E-08	5.0E-08	5.8E-08	4.9E-08	7.9E-08	1.2E-07	1.0E-07
5.1E-08	2.3E-08	1.3E-08	1.9E-08	3.2E-08	2.9E-08	3.6E-08	3.9E-08	3.3E-08	3.0E-08	3.7E-08	4.3E-08	3.6E-08	5.9E-08	9.2E-08	7.4E-08
4.1E-10	1.4E-10	6.1E-11	1.1E-10	1.8E-10	2.0E-10	2.8E-10	2.9E-10	2.2E-10	1.4E-10	1.7E-10	1.9E-10	2.2E-10	2.4E-10	4.3E-10	5.6E-10
6.8E-08	3.0E-08	1.7E-08	2.6E-08	4.3E-08	3.9E-08	4.8E-08	5.2E-08	4.4E-08	4.0E-08	5.0E-08	5.7E-08	4.9E-08	7.8E-08	1.2E-07	9.9E-08
6.9E-08	3.0E-08	1.7E-08	2.6E-08	4.3E-08	3.9E-08	4.9E-08	5.3E-08	4.5E-08	4.0E-08	5.0E-08	5.8E-08	4.9E-08	7.9E-08	1.2E-07	1.0E-07
5.0E-08	2.2E-08	1.3E-08	1.9E-08	3.2E-08	2.9E-08	3.6E-08	3.9E-08	3.3E-08	2.9E-08	3.7E-08	4.2E-08	3.6E-08	5.8E-08	9.1E-08	7.3E-08
5.1E-08	2.3E-08	1.3E-08	1.9E-08	3.2E-08	2.9E-08	3.6E-08	3.9E-08	3.3E-08	3.0E-08	3.7E-08	4.3E-08	3.6E-08	5.9E-08	9.2E-08	7.4E-08
8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.

TOTAL OBS -- 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
12.0 KM															
3.5E-08	1.7E-08	9.7E-09	1.3E-08	2.5E-08	2.2E-08	2.6E-08	3.1E-08	2.8E-08	2.0E-08	2.9E-08	3.3E-08	2.8E-08	4.5E-08	6.9E-08	6.1E-08
2.5E-08	1.2E-08	6.8E-09	9.2E-09	1.7E-08	1.5E-08	1.8E-08	2.1E-08	2.0E-08	1.4E-08	2.0E-08	2.3E-08	2.0E-08	3.2E-08	4.8E-08	4.3E-08
1.8E-10	6.9E-11	2.9E-11	4.7E-11	8.7E-11	9.4E-11	1.3E-10	1.4E-10	1.2E-10	6.1E-11	8.5E-11	9.4E-11	1.1E-10	1.2E-10	2.0E-10	2.9E-10
3.5E-08	1.7E-08	9.5E-09	1.3E-08	2.4E-08	2.2E-08	2.6E-08	3.0E-08	2.7E-08	2.0E-08	2.8E-08	3.2E-08	2.8E-08	4.4E-08	6.7E-08	6.0E-08
3.5E-08	1.7E-08	9.6E-09	1.3E-08	2.5E-08	2.2E-08	2.6E-08	3.0E-08	2.8E-08	2.0E-08	2.9E-08	3.3E-08	2.8E-08	4.5E-08	6.8E-08	6.1E-08
2.4E-08	1.2E-08	6.6E-09	9.1E-09	1.7E-08	1.5E-08	1.8E-08	2.1E-08	1.9E-08	1.4E-08	2.0E-08	2.3E-08	1.9E-08	3.1E-08	4.7E-08	4.2E-08
2.5E-08	1.2E-08	6.7E-09	9.2E-09	1.7E-08	1.5E-08	1.8E-08	2.1E-08	1.9E-08	1.4E-08	2.0E-08	2.3E-08	2.0E-08	3.1E-08	4.8E-08	4.2E-08
12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.
16.0 KM															
2.2E-08	1.1E-08	6.2E-09	8.4E-09	1.7E-08	1.5E-08	1.7E-08	2.1E-08	2.0E-08	1.3E-08	1.9E-08	2.1E-08	1.9E-08	3.0E-08	4.5E-08	4.3E-08
1.5E-08	7.5E-09	4.1E-09	5.6E-09	1.1E-08	1.0E-08	1.1E-08	1.4E-08	1.4E-08	8.5E-09	1.3E-08	1.4E-08	1.2E-08	2.0E-08	3.0E-08	2.9E-08
1.0E-10	3.9E-11	1.6E-11	2.6E-11	5.1E-11	5.6E-11	7.5E-11	8.8E-11	7.7E-11	3.4E-11	4.9E-11	5.3E-11	6.2E-11	6.8E-11	1.1E-10	1.8E-10
2.2E-08	1.1E-08	6.0E-09	8.2E-09	1.6E-08	1.5E-08	1.7E-08	2.1E-08	2.0E-08	1.2E-08	1.9E-08	2.1E-08	1.8E-08	2.9E-08	4.4E-08	4.2E-08
2.2E-08	1.1E-08	6.1E-09	8.4E-09	1.7E-08	1.5E-08	1.7E-08	2.1E-08	2.0E-08	1.3E-08	1.9E-08	2.1E-08	1.9E-08	3.0E-08	4.5E-08	4.3E-08
1.4E-08	7.3E-09	4.0E-09	5.5E-09	1.1E-08	9.7E-09	1.1E-08	1.4E-08	1.3E-08	8.3E-09	1.2E-08	1.4E-08	1.2E-08	2.0E-08	2.9E-08	2.8E-08
1.5E-08	7.5E-09	4.1E-09	5.6E-09	1.1E-08	9.9E-09	1.1E-08	1.4E-08	1.3E-08	8.4E-09	1.3E-08	1.4E-08	1.2E-08	2.0E-08	3.0E-08	2.9E-08
16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.
24.0 KM															
1.2E-08	6.4E-09	3.5E-09	4.6E-09	8.5E-09	8.2E-09	9.4E-09	9.8E-09	1.1E-08	7.0E-09	1.0E-08	1.1E-08	1.1E-08	1.8E-08	2.8E-08	2.5E-08
7.6E-09	4.0E-09	2.2E-09	2.8E-09	5.2E-09	5.1E-09	5.8E-09	6.0E-09	6.6E-09	4.3E-09	6.4E-09	6.7E-09	6.5E-09	1.1E-08	1.7E-08	1.5E-08
4.5E-11	1.8E-11	7.4E-12	1.2E-11	2.1E-11	2.5E-11	3.3E-11	3.3E-11	3.3E-11	1.5E-11	2.2E-11	2.2E-11	2.8E-11	3.3E-11	5.8E-11	8.6E-11
1.2E-08	6.2E-09	3.3E-09	4.4E-09	8.0E-09	7.9E-09	9.0E-09	9.5E-09	1.0E-08	6.7E-09	1.0E-08	1.0E-08	1.0E-08	1.7E-08	2.7E-08	2.4E-08
1.2E-08	6.4E-09	3.4E-09	4.5E-09	8.3E-09	8.1E-09	9.3E-09	9.7E-09	1.1E-08	6.9E-09	1.0E-08	1.1E-08	1.0E-08	1.8E-08	2.7E-08	2.5E-08
7.3E-09	3.8E-09	2.0E-09	2.7E-09	4.9E-09	4.9E-09	5.5E-09	5.8E-09	6.3E-09	4.1E-09	6.1E-09	6.5E-09	6.3E-09	1.0E-08	1.6E-08	1.5E-08
7.5E-09	3.9E-09	2.1E-09	2.8E-09	5.1E-09	5.0E-09	5.7E-09	6.0E-09	6.5E-09	4.3E-09	6.3E-09	6.6E-09	6.4E-09	1.1E-08	1.7E-08	1.5E-08
24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000	24000.	24000.	24000.	24000.	24000.	24000.
32.0 KM															
8.5E-09	4.3E-09	2.3E-09	3.0E-09	5.1E-09	5.3E-09	6.4E-09	6.0E-09	7.2E-09	4.9E-09	6.7E-09	7.4E-09	7.0E-09	1.2E-08	1.9E-08	1.7E-08
4.9E-09	2.5E-09	1.3E-09	1.7E-09	2.9E-09	3.1E-09	3.7E-09	3.5E-09	4.1E-09	2.9E-09	3.9E-09	4.3E-09	4.0E-09	6.7E-09	1.1E-08	9.8E-09
2.6E-11	1.0E-11	4.2E-12	6.7E-12	1.1E-11	1.4E-11	1.9E-11	1.7E-11	1.9E-11	9.2E-12	1.2E-11	1.3E-11	1.6E-11	1.8E-11	3.4E-11	5.0E-11
8.0E-09	4.0E-09	2.2E-09	2.9E-09	4.7E-09	5.0E-09	6.0E-09	5.7E-09	6.8E-09	4.7E-09	6.4E-09	7.0E-09	6.6E-09	1.1E-08	1.8E-08	1.6E-08
8.3E-09	4.2E-09	2.3E-09	3.0E-09	5.0E-09	5.2E-09	6.3E-09	5.9E-09	7.1E-09	4.8E-09	6.6E-09	7.2E-09	6.9E-09	1.1E-08	1.9E-08	1.7E-08
4.6E-09	2.3E-09	1.2E-09	1.7E-09	2.7E-09	2.9E-09	3.5E-09	3.3E-09	3.9E-09	2.7E-09	3.7E-09	4.0E-09	3.8E-09	6.3E-09	1.0E-08	9.4E-09
4.8E-09	2.4E-09	1.3E-09	1.7E-09	2.9E-09	3.0E-09	3.6E-09	3.4E-09	4.1E-09	2.8E-09	3.8E-09	4.2E-09	4.0E-09	6.6E-09	1.1E-08	9.7E-09
32000.	32000	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000	32000.	32000.	32000	32000.	32000

TOTAL OBS -- 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD - 06/01/74 TO 05/31/75

ANNUAL AVERAGE (GROUND)
STANDARD PTS. - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 08:12:45

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
40.0 KM															
6.3E-09	2.5E-09	1.4E-09	2.3E-09	3.9E-09	3.5E-09	4.2E-09	4.5E-09	5.1E-09	3.3E-09	4.6E-09	5.0E-09	4.8E-09	8.2E-09	1.2E-08	1.3E-08
3.5E-09	1.4E-09	7.5E-10	1.3E-09	2.1E-09	1.9E-09	2.3E-09	2.4E-09	2.8E-09	1.8E-09	2.5E-09	2.7E-09	2.7E-09	4.5E-09	6.7E-09	7.0E-09
1.7E-11	5.3E-12	2.2E-12	4.6E-12	7.3E-12	8.1E-12	1.1E-11	1.1E-11	1.2E-11	5.4E-12	7.3E-12	7.7E-12	9.8E-12	1.1E-11	1.9E-11	3.3E-11
5.9E-09	2.3E-09	1.3E-09	2.2E-09	3.6E-09	3.3E-09	4.0E-09	4.2E-09	4.8E-09	3.1E-09	4.3E-09	4.7E-09	4.6E-09	7.7E-09	1.1E-08	1.2E-08
6.2E-09	2.4E-09	1.3E-09	2.3E-09	3.8E-09	3.4E-09	4.2E-09	4.4E-09	5.0E-09	3.2E-09	4.5E-09	4.9E-09	4.8E-09	8.0E-09	1.2E-08	1.3E-08
3.3E-09	1.3E-09	6.9E-10	1.2E-09	2.0E-09	1.8E-09	2.2E-09	2.3E-09	2.6E-09	1.7E-09	2.3E-09	2.6E-09	2.5E-09	4.2E-09	6.3E-09	6.6E-09
3.4E-09	1.3E-09	7.4E-10	1.3E-09	2.1E-09	1.9E-09	2.3E-09	2.4E-09	2.8E-09	1.8E-09	2.5E-09	2.7E-09	2.6E-09	4.4E-09	6.6E-09	6.9E-09
40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.
48.0 KM															
5.1E-09	1.6E-09	9.1E-10	1.9E-09	3.1E-09	2.5E-09	3.0E-09	3.6E-09	3.9E-09	2.3E-09	3.3E-09	3.6E-09	3.6E-09	6.0E-09	8.1E-09	9.7E-09
2.6E-09	8.5E-10	4.7E-10	9.9E-10	1.6E-09	1.3E-09	1.6E-09	1.9E-09	2.0E-09	1.2E-09	1.7E-09	1.9E-09	1.9E-09	3.1E-09	4.2E-09	5.1E-09
1.2E-11	3.1E-12	1.3E-12	3.3E-12	5.3E-12	5.2E-12	7.2E-12	8.2E-12	8.2E-12	3.4E-12	4.7E-12	5.0E-12	6.6E-12	7.3E-12	1.1E-11	2.3E-11
4.7E-09	1.5E-09	8.2E-10	1.7E-09	2.8E-09	2.3E-09	2.8E-09	3.3E-09	3.6E-09	2.2E-09	3.0E-09	3.3E-09	3.4E-09	5.5E-09	7.5E-09	9.0E-09
4.9E-09	1.6E-09	8.8E-10	1.9E-09	3.0E-09	2.5E-09	3.0E-09	3.5E-09	3.8E-09	2.3E-09	3.2E-09	3.5E-09	3.6E-09	5.9E-09	7.9E-09	9.5E-09
2.4E-09	7.8E-10	4.3E-10	9.2E-10	1.5E-09	1.2E-09	1.5E-09	1.7E-09	1.9E-09	1.1E-09	1.6E-09	1.8E-09	1.8E-09	2.9E-09	3.9E-09	4.7E-09
2.6E-09	8.3E-10	4.6E-10	9.7E-10	1.6E-09	1.3E-09	1.5E-09	1.8E-09	2.0E-09	1.2E-09	1.7E-09	1.9E-09	1.9E-09	3.1E-09	4.2E-09	5.0E-09
48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.
56.0 KM															
4.1E-09	1.1E-09	6.3E-10	1.6E-09	2.6E-09	1.9E-09	2.3E-09	2.9E-09	3.1E-09	1.8E-09	2.5E-09	2.7E-09	2.8E-09	4.6E-09	5.7E-09	7.6E-09
2.1E-09	5.7E-10	3.2E-10	7.9E-10	1.3E-09	9.5E-10	1.2E-09	1.4E-09	1.6E-09	9.0E-10	1.2E-09	1.4E-09	1.4E-09	2.3E-09	2.9E-09	3.8E-09
9.2E-12	2.0E-12	8.1E-13	2.5E-12	3.9E-12	3.6E-12	5.0E-12	6.0E-12	6.0E-12	2.4E-12	3.2E-12	3.4E-12	4.6E-12	5.1E-12	7.2E-12	1.6E-11
3.8E-09	1.0E-09	5.6E-10	1.4E-09	2.3E-09	1.7E-09	2.1E-09	2.7E-09	2.9E-09	1.6E-09	2.3E-09	2.5E-09	2.6E-09	4.2E-09	5.2E-09	7.0E-09
4.0E-09	1.1E-09	6.1E-10	1.5E-09	2.5E-09	1.8E-09	2.3E-09	2.8E-09	3.1E-09	1.7E-09	2.4E-09	2.6E-09	2.8E-09	4.5E-09	5.5E-09	7.4E-09
1.9E-09	5.2E-10	2.8E-10	7.2E-10	1.1E-09	8.6E-10	1.1E-09	1.3E-09	1.4E-09	8.1E-10	1.1E-09	1.2E-09	1.3E-09	2.1E-09	2.6E-09	3.5E-09
2.0E-09	5.6E-10	3.1E-10	7.7E-10	1.3E-09	9.3E-10	1.1E-09	1.4E-09	1.5E-09	8.7E-10	1.2E-09	1.3E-09	1.4E-09	2.3E-09	2.8E-09	3.7E-09
56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.
64.0 KM															
3.2E-09	8.4E-10	4.9E-10	1.0E-09	1.8E-09	1.4E-09	1.8E-09	2.2E-09	2.4E-09	1.4E-09	1.9E-09	2.2E-09	2.4E-09	3.7E-09	4.6E-09	5.9E-09
1.5E-09	4.1E-10	2.4E-10	5.0E-10	8.8E-10	6.6E-10	8.7E-10	1.1E-09	1.2E-09	6.7E-10	9.0E-10	1.1E-09	1.1E-09	1.8E-09	2.2E-09	2.9E-09
6.4E-12	1.3E-12	5.8E-13	1.5E-12	2.5E-12	2.4E-12	3.6E-12	4.3E-12	4.2E-12	1.7E-12	2.2E-12	2.5E-12	3.6E-12	3.7E-12	5.3E-12	1.2E-11
2.8E-09	7.5E-10	4.3E-10	9.2E-10	1.6E-09	1.2E-09	1.6E-09	2.0E-09	2.2E-09	1.2E-09	1.7E-09	2.0E-09	2.1E-09	3.3E-09	4.2E-09	5.4E-09
3.1E-09	8.1E-10	4.7E-10	1.0E-09	1.8E-09	1.3E-09	1.7E-09	2.2E-09	2.3E-09	1.4E-09	1.8E-09	2.2E-09	2.3E-09	3.6E-09	4.4E-09	5.8E-09
1.4E-09	3.6E-10	2.1E-10	4.5E-10	7.7E-10	5.9E-10	7.8E-10	9.9E-10	1.1E-09	6.0E-10	8.1E-10	9.7E-10	1.0E-09	1.6E-09	2.0E-09	2.6E-09
1.5E-09	3.9E-10	2.3E-10	4.8E-10	8.5E-10	6.4E-10	8.4E-10	1.1E-09	1.1E-09	6.5E-10	8.7E-10	1.0E-09	1.1E-09	1.7E-09	2.1E-09	2.8E-09
64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000

TOTAL OBS - 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3) ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2) ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
72.0 KM															
2.4E-09	6.4E-10	3.9E-10	7.0E-10	1.4E-09	1.0E-09	1.4E-09	1.8E-09	1.9E-09	1.1E-09	1.4E-09	1.8E-09	2.0E-09	3.0E-09	3.7E-09	4.7E-09
1.1E-09	3.0E-10	1.8E-10	3.3E-10	6.3E-10	4.7E-10	6.5E-10	8.5E-10	9.0E-10	5.3E-10	6.5E-10	8.5E-10	9.2E-10	1.4E-09	1.7E-09	2.2E-09
4.6E-12	9.5E-13	4.2E-13	9.4E-13	1.7E-12	1.6E-12	2.6E-12	3.2E-12	3.1E-12	1.3E-12	1.5E-12	1.9E-12	2.8E-12	2.8E-12	4.0E-12	8.6E-12
2.2E-09	5.7E-10	3.4E-10	6.2E-10	1.2E-09	8.9E-10	1.2E-09	1.6E-09	1.7E-09	1.0E-09	1.2E-09	1.6E-09	1.8E-09	2.7E-09	3.3E-09	4.3E-09
2.3E-09	6.2E-10	3.7E-10	6.8E-10	1.3E-09	9.7E-10	1.4E-09	1.8E-09	1.9E-09	1.1E-09	1.4E-09	1.8E-09	1.9E-09	2.9E-09	3.6E-09	4.6E-09
1.0E-09	2.6E-10	1.6E-10	2.9E-10	5.4E-10	4.1E-10	5.8E-10	7.7E-10	8.0E-10	4.6E-10	5.8E-10	7.6E-10	8.3E-10	1.2E-09	1.6E-09	2.0E-09
1.1E-09	2.9E-10	1.7E-10	3.2E-10	6.0E-10	4.5E-10	6.3E-10	8.3E-10	8.7E-10	5.1E-10	6.3E-10	8.2E-10	8.9E-10	1.4E-09	1.7E-09	2.1E-09
72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000	72000.	72000.	72000.
80.0 KM															
2.0E-09	5.0E-10	3.3E-10	5.2E-10	1.0E-09	7.9E-10	1.2E-09	1.5E-09	1.5E-09	9.7E-10	1.1E-09	1.5E-09	1.7E-09	2.5E-09	3.1E-09	3.8E-09
8.9E-10	2.2E-10	1.5E-10	2.3E-10	4.7E-10	3.5E-10	5.3E-10	6.6E-10	6.9E-10	4.4E-10	5.1E-10	6.9E-10	7.6E-10	1.1E-09	1.4E-09	1.7E-09
3.5E-12	6.8E-13	3.3E-13	6.4E-13	1.2E-12	1.2E-12	2.0E-12	2.4E-12	2.3E-12	1.0E-12	1.1E-12	1.5E-12	2.2E-12	2.1E-12	3.1E-12	6.4E-12
1.7E-09	4.3E-10	2.8E-10	4.5E-10	8.7E-10	6.8E-10	1.0E-09	1.3E-09	1.3E-09	8.5E-10	9.8E-10	1.3E-09	1.5E-09	2.2E-09	2.8E-09	3.4E-09
1.9E-09	4.8E-10	3.1E-10	5.0E-10	9.8E-10	7.5E-10	1.1E-09	1.4E-09	1.5E-09	9.3E-10	1.1E-09	1.5E-09	1.6E-09	2.4E-09	3.0E-09	3.7E-09
7.9E-10	1.9E-10	1.3E-10	2.0E-10	3.9E-10	3.1E-10	4.6E-10	5.9E-10	6.1E-10	3.8E-10	4.4E-10	6.1E-10	6.8E-10	9.8E-10	1.2E-09	1.5E-09
8.6E-10	2.1E-10	1.4E-10	2.2E-10	4.4E-10	3.4E-10	5.1E-10	6.4E-10	6.7E-10	4.2E-10	4.9E-10	6.6E-10	7.4E-10	1.1E-09	1.4E-09	1.7E-09
80000	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000

TOTAL OBS - 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3) ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2) ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 8 - DISTANCE IN METERS

TABLE 2.3-67

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 06/01/74 TO 05/31/75

ANNUAL AVERAGE (GROUND)
SPECIAL PTS. - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 08:18:53

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
EXCLUSION BOUNDARY															
9.5E-07	4.5E-07	3.8E-07	5.6E-07	6.4E-07	6.8E-07	7.1E-07	7.7E-07	7.3E-07	6.2E-07	7.0E-07	9.5E-07	6.5E-07	1.2E-06	1.7E-06	1.6E-06
8.5E-07	4.0E-07	3.4E-07	5.0E-07	5.7E-07	6.1E-07	6.3E-07	6.8E-07	6.5E-07	5.5E-07	6.3E-07	8.4E-07	5.8E-07	1.1E-06	1.5E-06	1.4E-06
9.6E-07	3.5E-09	2.2E-09	3.8E-09	4.2E-09	5.4E-09	6.4E-09	6.6E-09	5.7E-09	3.5E-09	3.9E-09	5.2E-09	4.7E-09	6.3E-09	9.9E-09	1.4E-08
9.5E-07	4.5E-07	3.8E-07	5.6E-07	6.4E-07	6.8E-07	7.1E-07	7.6E-07	7.3E-07	6.2E-07	7.0E-07	9.4E-07	6.5E-07	1.2E-06	1.7E-06	1.6E-06
9.5E-07	4.5E-07	3.8E-07	5.6E-07	6.4E-07	6.8E-07	7.1E-07	7.7E-07	7.3E-07	6.2E-07	7.0E-07	9.5E-07	6.5E-07	1.2E-06	1.7E-06	1.6E-06
8.5E-07	4.0E-07	3.4E-07	5.0E-07	5.7E-07	6.1E-07	6.3E-07	6.8E-07	6.5E-07	5.5E-07	6.3E-07	8.4E-07	5.8E-07	1.1E-06	1.5E-06	1.4E-06
8.5E-07	4.0E-07	3.4E-07	5.0E-07	5.7E-07	6.1E-07	6.3E-07	6.8E-07	6.5E-07	5.5E-07	6.3E-07	8.4E-07	5.8E-07	1.1E-06	1.5E-06	1.4E-06
1200	1200	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.
LOW POPULATION ZONE															
1.8E-07	8.3E-08	6.2E-08	8.1E-08	1.1E-07	1.1E-07	1.3E-07	1.2E-07	1.3E-07	1.0E-07	1.2E-07	1.3E-07	1.2E-07	2.1E-07	3.0E-07	2.6E-07
1.5E-07	6.7E-08	5.0E-08	6.5E-08	9.1E-08	9.2E-08	1.1E-07	9.8E-08	1.0E-07	8.1E-08	9.8E-08	1.0E-07	1.0E-07	1.7E-07	2.4E-07	2.1E-07
1.4E-09	4.9E-10	2.8E-10	4.3E-10	5.8E-10	7.2E-10	9.7E-10	8.5E-10	8.2E-10	4.5E-10	5.4E-10	5.5E-10	7.1E-10	8.5E-10	1.4E-09	1.8E-09
1.8E-07	8.2E-08	6.2E-08	8.1E-08	1.1E-07	1.1E-07	1.3E-07	1.2E-07	1.3E-07	1.0E-07	1.2E-07	1.3E-07	1.2E-07	2.1E-07	3.0E-07	2.6E-07
1.8E-07	8.3E-08	6.2E-08	8.1E-08	1.1E-07	1.1E-07	1.3E-07	1.2E-07	1.3E-07	1.0E-07	1.2E-07	1.3E-07	1.2E-07	2.1E-07	3.0E-07	2.6E-07
1.5E-07	6.6E-08	5.0E-08	6.5E-08	9.0E-08	9.1E-08	1.1E-07	9.8E-08	1.0E-07	8.0E-08	9.7E-08	1.0E-07	1.0E-07	1.7E-07	2.4E-07	2.1E-07
1.5E-07	6.7E-08	5.0E-08	6.5E-08	9.0E-08	9.2E-08	1.1E-07	9.8E-08	1.0E-07	8.1E-08	9.8E-08	1.0E-07	1.0E-07	1.7E-07	2.4E-07	2.1E-07
4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.
NEAREST RESIDENT															
1.3E-07	1.4E-07	9.7E-08	1.3E-07	1.9E-07	2.6E-07	1.0E-07	8.4E-08	1.3E-07	1.3E-07	1.1E-07	1.6E-07	1.0E-07	5.2E-07	3.5E-07	6.5E-07
1.1E-07	1.2E-07	8.0E-08	1.1E-07	1.6E-07	2.2E-07	7.9E-08	6.5E-08	1.0E-07	1.0E-07	8.7E-08	1.3E-07	8.0E-08	4.5E-07	2.9E-07	5.5E-07
9.6E-10	9.4E-10	4.7E-10	7.7E-10	1.1E-09	1.9E-09	6.9E-10	5.2E-10	8.2E-10	6.0E-10	4.7E-10	7.2E-10	5.5E-10	2.5E-09	1.7E-09	5.3E-09
1.3E-07	1.4E-07	9.7E-08	1.3E-07	1.9E-07	2.6E-07	9.9E-08	8.3E-08	1.3E-07	1.3E-07	1.1E-07	1.6E-07	1.0E-07	5.2E-07	3.5E-07	6.5E-07
1.3E-07	1.4E-07	9.7E-08	1.3E-07	1.9E-07	2.6E-07	1.0E-07	8.3E-08	1.3E-07	1.3E-07	1.1E-07	1.6E-07	1.0E-07	5.2E-07	3.5E-07	6.5E-07
1.0E-07	1.2E-07	8.0E-08	1.1E-07	1.6E-07	2.2E-07	7.8E-08	6.4E-08	1.0E-07	1.0E-07	8.6E-08	1.3E-07	7.9E-08	4.5E-07	2.9E-07	5.5E-07
1.1E-07	1.2E-07	8.0E-08	1.1E-07	1.6E-07	2.2E-07	7.8E-08	6.4E-08	1.0E-07	1.0E-07	8.7E-08	1.3E-07	8.0E-08	4.5E-07	2.9E-07	5.5E-07
4988.	2816.	3138.	2816.	2735.	2333.	4827.	5632.	4023.	3379.	4344.	3540.	4666.	2092.	3540.	2172.
NEAREST VEGETABLE															
1.1E-07	1.0E-07	8.1E-08	1.3E-07	1.9E-07	2.6E-07	9.2E-08	8.4E-08	5.1E-08	7.9E-08	1.1E-07	1.6E-07	1.0E-07	4.7E-07	3.5E-07	6.5E-07
8.3E-08	8.6E-08	6.6E-08	1.1E-07	1.6E-07	2.2E-07	7.2E-08	6.5E-08	3.8E-08	6.2E-08	8.7E-08	1.3E-07	8.0E-08	4.0E-07	2.8E-07	5.5E-07
7.3E-10	6.5E-10	3.8E-10	7.7E-10	1.1E-09	1.9E-09	6.2E-10	5.2E-10	2.6E-10	3.4E-10	4.7E-10	7.2E-10	5.5E-10	2.2E-09	1.6E-09	5.3E-09
1.1E-07	1.0E-07	8.0E-08	1.3E-07	1.9E-07	2.6E-07	9.1E-08	8.3E-08	5.1E-08	7.8E-08	1.1E-07	1.6E-07	1.0E-07	4.7E-07	3.5E-07	6.5E-07
1.1E-07	1.0E-07	8.1E-08	1.3E-07	1.9E-07	2.6E-07	9.2E-08	8.3E-08	5.1E-08	7.9E-08	1.1E-07	1.6E-07	1.0E-07	4.7E-07	3.5E-07	6.5E-07
8.2E-08	8.5E-08	6.5E-08	1.1E-07	1.6E-07	2.2E-07	7.1E-08	6.4E-08	3.8E-08	6.2E-08	8.6E-08	1.3E-07	7.9E-08	4.0E-07	2.8E-07	5.5E-07
8.3E-08	8.6E-08	6.6E-08	1.1E-07	1.6E-07	2.2E-07	7.2E-08	6.4E-08	3.8E-08	6.2E-08	8.7E-08	1.3E-07	8.0E-08	4.0E-07	2.8E-07	5.5E-07
5792.	3379.	3540.	2816.	2735.	2333.	5149.	5632.	7401.	4827.	4344.	3540.	4666.	2253.	3620.	2172.

TOTAL OBS - 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
NEAREST MEAT ANIMAL															
8.7E-07	4.4E-07	3.8E-07	2.5E-07	2.9E-07	3.4E-07	9.2E-08	9.1E-08	9.0E-08	2.0E-07	2.3E-07	2.5E-07	9.7E-08	2.3E-07	4.1E-07	8.5E-07
7.7E-07	3.9E-07	3.4E-07	2.1E-07	2.5E-07	3.0E-07	7.2E-08	7.1E-08	7.0E-08	1.7E-07	2.0E-07	2.0E-07	7.6E-08	1.8E-07	3.3E-07	7.4E-07
8.7E-09	3.4E-09	2.2E-09	1.5E-09	1.8E-09	2.6E-09	6.2E-10	5.7E-10	5.2E-10	1.0E-09	1.2E-09	1.2E-09	5.1E-10	9.5E-10	2.0E-09	7.3E-09
8.7E-07	4.4E-07	3.8E-07	2.4E-07	2.9E-07	3.4E-07	9.1E-08	9.0E-08	8.9E-08	2.0E-07	2.3E-07	2.4E-07	9.6E-08	2.3E-07	4.0E-07	8.5E-07
8.7E-07	4.4E-07	3.8E-07	2.4E-07	2.9E-07	3.4E-07	9.2E-08	9.0E-08	8.9E-08	2.0E-07	2.3E-07	2.5E-07	9.6E-08	2.3E-07	4.1E-07	8.5E-07
7.7E-07	3.9E-07	3.4E-07	2.1E-07	2.5E-07	3.0E-07	7.1E-08	7.0E-08	6.9E-08	1.7E-07	2.0E-07	2.0E-07	7.6E-08	1.8E-07	3.3E-07	7.4E-07
7.7E-07	3.9E-07	3.4E-07	2.1E-07	2.5E-07	3.0E-07	7.2E-08	7.0E-08	7.0E-08	1.7E-07	2.0E-07	2.0E-07	7.6E-08	1.8E-07	3.3E-07	7.4E-07
1287.	1207.	1207.	1931.	2011.	1931.	5149.	5310.	5310.	2574.	2414.	2735.	4827.	3701.	3218.	1770.
NEAREST DAIRY COW															
7.5E-08	6.3E-08		1.3E-07	2.9E-07	3.4E-07	6.7E-08				5.4E-08			1.4E-07	4.1E-07	
5.6E-08	4.9E-08		1.1E-07	2.5E-07	3.0E-07	5.1E-08				4.0E-08			1.0E-07	3.3E-07	
4.6E-10	3.5E-10	NONE	7.7E-10	1.8E-09	2.6E-09	4.2E-10	NONE	NONE	NONE	1.9E-10	NONE	NONE	4.8E-10	2.0E-09	NONE
7.4E-08	6.2E-08	IN	1.3E-07	2.9E-07	3.4E-07	6.7E-08	IN	IN	IN	5.3E-08	IN	IN	1.3E-07	4.0E-07	IN
7.4E-08	6.3E-08	THIS	1.3E-07	2.9E-07	3.4E-07	6.7E-08	THIS	THIS	THIS	5.4E-08	THIS	THIS	1.4E-07	4.1E-07	THIS
5.5E-08	4.9E-08	SECTOR	1.1E-07	2.5E-07	3.0E-07	5.1E-08	SECTOR	SECTOR	SECTOR	4.0E-08	SECTOR	SECTOR	1.0E-07	3.3E-07	SECTOR
5.5E-08	4.9E-08		1.1E-07	2.5E-07	3.0E-07	5.1E-08				4.0E-08			1.0E-07	3.3E-07	
7562.	4827.		2816.	2011.	1931.	6436.				7562.			5632.	3218.	
NEAREST PLANT BOUNDARY															
5.7E-07	2.3E-07	1.5E-07	2.5E-07	3.1E-07	3.6E-07	1.0E-07	9.1E-08	2.2E-07	2.1E-07	2.3E-07	2.2E-07	1.6E-07	2.0E-07	6.1E-07	9.0E-07
5.0E-07	1.9E-07	1.3E-07	2.1E-07	2.6E-07	3.1E-07	7.9E-08	7.1E-08	1.8E-07	1.7E-07	2.0E-07	1.8E-07	1.3E-07	1.6E-07	5.2E-07	7.8E-07
5.4E-09	1.6E-09	7.7E-10	1.5E-09	1.9E-09	2.7E-09	6.9E-10	5.7E-10	1.5E-09	1.1E-09	1.2E-09	1.1E-09	9.4E-10	7.9E-10	3.2E-09	7.7E-09
5.7E-07	2.3E-07	1.5E-07	2.4E-07	3.1E-07	3.6E-07	9.9E-08	9.0E-08	2.2E-07	2.1E-07	2.3E-07	2.2E-07	1.5E-07	2.0E-07	6.1E-07	9.0E-07
5.7E-07	2.3E-07	1.5E-07	2.4E-07	3.1E-07	3.6E-07	1.0E-07	9.0E-08	2.2E-07	2.1E-07	2.3E-07	2.2E-07	1.6E-07	2.0E-07	6.1E-07	9.0E-07
4.9E-07	1.9E-07	1.3E-07	2.1E-07	2.6E-07	3.1E-07	7.8E-08	7.0E-08	1.8E-07	1.7E-07	2.0E-07	1.8E-07	1.3E-07	1.6E-07	5.2E-07	7.8E-07
5.0E-07	1.9E-07	1.3E-07	2.1E-07	2.6E-07	3.1E-07	7.8E-08	7.0E-08	1.8E-07	1.7E-07	2.0E-07	1.8E-07	1.3E-07	1.6E-07	5.2E-07	7.8E-07
1754.	2076.	2365.	1931.	1931.	1866.	4827.	5310.	2767.	2478.	2414	2880.	3379.	4183.	2349	1738.

TOTAL OBS - 8760 TOTAL INV OBS - 166 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

TABLE 2.3-68

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-69

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-70

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 03/05/79 TO 03/04/80

ANNUAL AVERAGE (GROUND)
STANDARD PTS - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 14:34:25

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

0.4 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
6.6E-06	3.2E-06	3.7E-06	6.9E-06	4.8E-06	5.3E-06	4.8E-06	5.1E-06	4.8E-06	5.6E-06	6.1E-06	6.2E-06	6.5E-06	9.0E-06	1.1E-05	1.3E-05
6.5E-06	3.0E-06	3.5E-06	6.5E-06	4.6E-06	5.0E-06	4.5E-06	4.9E-06	4.5E-06	5.3E-06	5.8E-06	5.9E-06	6.2E-06	8.5E-06	1.0E-05	1.3E-05
5.8E-08	1.8E-08	1.5E-08	3.2E-08	1.8E-08	2.2E-08	3.6E-08	3.9E-08	3.2E-08	2.8E-08	2.8E-08	3.0E-08	2.7E-08	3.2E-08	4.7E-08	9.7E-08
6.8E-06	3.2E-06	3.7E-06	6.9E-06	4.8E-06	5.3E-06	4.8E-06	5.1E-06	4.8E-06	5.6E-06	6.1E-06	6.2E-06	6.5E-06	8.9E-06	1.1E-05	1.3E-05
6.8E-06	3.2E-06	3.7E-06	6.9E-06	4.8E-06	5.3E-06	4.8E-06	5.1E-06	4.8E-06	5.6E-06	6.1E-06	6.2E-06	6.5E-06	8.9E-06	1.1E-05	1.3E-05
6.5E-06	3.0E-06	3.5E-06	6.5E-06	4.6E-06	5.0E-06	4.5E-06	4.9E-06	4.5E-06	5.3E-06	5.8E-06	5.9E-06	6.2E-06	8.5E-06	1.0E-05	1.3E-05
6.5E-06	3.0E-06	3.5E-06	6.5E-06	4.6E-06	5.0E-06	4.5E-06	4.9E-06	4.5E-06	5.3E-06	5.8E-06	5.9E-06	6.2E-06	8.5E-06	1.0E-05	1.3E-05
400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.

0.8 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.2E-06	1.0E-06	1.2E-06	2.1E-06	1.7E-06	1.7E-06	1.4E-06	1.8E-06	1.5E-06	1.8E-06	1.9E-06	2.2E-06	2.1E-06	3.0E-06	3.5E-06	4.2E-06
2.0E-06	9.5E-07	1.1E-06	1.9E-06	1.5E-06	1.5E-06	1.3E-06	1.6E-06	1.4E-06	1.6E-06	1.8E-06	2.0E-06	2.0E-06	2.7E-06	3.2E-06	3.8E-06
1.9E-08	6.3E-09	5.0E-09	1.0E-08	6.8E-09	7.4E-09	1.1E-08	1.4E-08	1.1E-08	9.4E-09	9.3E-09	1.1E-08	9.6E-09	1.1E-08	1.7E-08	3.2E-08
2.2E-06	1.0E-06	1.2E-06	2.1E-06	1.6E-06	1.7E-06	1.4E-06	1.8E-06	1.5E-06	1.8E-06	1.9E-06	2.2E-06	2.1E-06	3.0E-06	3.5E-06	4.2E-06
2.2E-06	1.0E-06	1.2E-06	2.1E-06	1.6E-06	1.7E-06	1.4E-06	1.8E-06	1.5E-06	1.8E-06	1.9E-06	2.2E-06	2.1E-06	3.0E-06	3.5E-06	4.2E-06
2.0E-06	9.5E-07	1.1E-06	1.9E-06	1.5E-06	1.5E-06	1.3E-06	1.6E-06	1.4E-06	1.6E-06	1.8E-06	2.0E-06	2.0E-06	2.7E-06	3.2E-06	3.6E-06
2.0E-06	9.5E-07	1.1E-06	1.9E-06	1.5E-06	1.5E-06	1.3E-06	1.6E-06	1.4E-06	1.6E-06	1.8E-06	2.0E-06	2.0E-06	2.7E-06	3.2E-06	3.6E-06
800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.

1.2 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.1E-06	5.4E-07	5.9E-07	9.7E-07	8.5E-07	8.7E-07	7.3E-07	9.1E-07	8.0E-07	9.3E-07	9.9E-07	1.3E-06	1.1E-06	1.5E-06	1.8E-06	2.2E-06
9.8E-07	4.8E-07	5.3E-07	8.7E-07	7.6E-07	7.8E-07	6.5E-07	8.1E-07	7.1E-07	8.3E-07	8.9E-07	1.1E-06	9.4E-07	1.4E-06	1.6E-06	1.9E-06
9.6E-09	3.2E-09	2.5E-09	4.7E-09	3.5E-09	3.8E-09	5.6E-09	7.1E-09	5.4E-09	4.8E-09	4.7E-09	6.3E-09	4.6E-09	5.9E-09	8.4E-09	1.6E-08
1.1E-06	5.4E-07	5.9E-07	9.7E-07	8.5E-07	8.7E-07	7.3E-07	9.1E-07	8.0E-07	9.3E-07	9.9E-07	1.3E-06	1.1E-06	1.5E-06	1.8E-06	2.2E-06
1.1E-06	5.4E-07	5.9E-07	9.7E-07	8.5E-07	8.7E-07	7.3E-07	9.1E-07	8.0E-07	9.3E-07	9.9E-07	1.3E-06	1.1E-06	1.5E-06	1.8E-06	2.2E-06
9.8E-07	4.8E-07	5.3E-07	8.6E-07	7.6E-07	7.7E-07	6.5E-07	8.1E-07	7.1E-07	8.3E-07	8.8E-07	1.1E-06	9.4E-07	1.4E-06	1.6E-06	1.9E-06
9.8E-07	4.8E-07	5.3E-07	8.7E-07	7.6E-07	7.7E-07	6.5E-07	8.1E-07	7.1E-07	8.3E-07	8.9E-07	1.1E-06	9.4E-07	1.4E-06	1.6E-06	1.9E-06
1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.

1.6 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
7.4E-07	3.7E-07	4.1E-07	5.9E-07	5.4E-07	5.8E-07	4.8E-07	5.7E-07	5.2E-07	6.0E-07	6.3E-07	7.8E-07	7.0E-07	1.0E-06	1.2E-06	1.5E-06
6.5E-07	3.2E-07	3.6E-07	5.1E-07	4.8E-07	5.0E-07	4.2E-07	5.0E-07	4.6E-07	5.2E-07	5.5E-07	6.8E-07	6.1E-07	8.9E-07	1.0E-06	1.3E-06
6.3E-09	2.1E-09	1.7E-09	2.8E-09	2.2E-09	2.5E-09	3.6E-09	4.3E-09	3.4E-09	3.0E-09	2.9E-09	3.8E-09	3.0E-09	3.2E-09	5.4E-09	1.0E-08
7.4E-07	3.7E-07	4.1E-07	5.9E-07	5.4E-07	5.7E-07	4.8E-07	5.7E-07	5.2E-07	6.0E-07	6.3E-07	7.8E-07	7.0E-07	1.0E-06	1.2E-06	1.5E-06
7.4E-07	3.7E-07	4.1E-07	5.9E-07	5.4E-07	5.8E-07	4.8E-07	5.7E-07	5.2E-07	6.0E-07	6.3E-07	7.8E-07	7.0E-07	1.0E-06	1.2E-06	1.5E-06
6.4E-07	3.2E-07	3.5E-07	5.1E-07	4.7E-07	5.0E-07	4.2E-07	5.0E-07	4.6E-07	5.2E-07	5.5E-07	6.8E-07	6.1E-07	8.8E-07	1.0E-06	1.3E-06
6.5E-07	3.2E-07	3.6E-07	5.1E-07	4.7E-07	5.0E-07	4.2E-07	5.0E-07	4.6E-07	5.2E-07	5.5E-07	6.8E-07	6.1E-07	8.9E-07	1.0E-06	1.3E-06
1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

2.4 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
4.2E-07	2.1E-07	2.4E-07	3.0E-07	2.9E-07	3.2E-07	2.7E-07	2.9E-07	2.9E-07	3.3E-07	3.4E-07	4.1E-07	3.7E-07	5.5E-07	6.3E-07	7.6E-07
3.6E-07	1.8E-07	2.0E-07	2.5E-07	2.5E-07	2.7E-07	2.3E-07	2.5E-07	2.4E-07	2.8E-07	2.9E-07	3.4E-07	3.1E-07	4.7E-07	5.3E-07	6.4E-07
3.4E-09	1.1E-09	8.9E-10	1.3E-09	1.1E-09	1.3E-09	1.9E-09	2.1E-09	1.8E-09	1.5E-09	1.4E-09	1.8E-09	1.5E-09	1.9E-09	2.6E-09	5.0E-09
4.2E-07	2.1E-07	2.4E-07	2.9E-07	2.9E-07	3.2E-07	2.7E-07	2.9E-07	2.9E-07	3.3E-07	3.4E-07	4.1E-07	3.7E-07	5.5E-07	6.3E-07	7.5E-07
4.2E-07	2.1E-07	2.4E-07	3.0E-07	2.9E-07	3.2E-07	2.7E-07	2.9E-07	2.9E-07	3.3E-07	3.4E-07	4.1E-07	3.7E-07	5.5E-07	6.3E-07	7.6E-07
3.6E-07	1.8E-07	2.0E-07	2.5E-07	2.5E-07	2.7E-07	2.3E-07	2.5E-07	2.4E-07	2.8E-07	2.9E-07	3.4E-07	3.1E-07	4.6E-07	5.3E-07	6.4E-07
3.6E-07	1.8E-07	2.0E-07	2.5E-07	2.5E-07	2.7E-07	2.3E-07	2.5E-07	2.4E-07	2.8E-07	2.9E-07	3.4E-07	3.1E-07	4.6E-07	5.3E-07	6.4E-07
2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.

3.2 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.7E-07	1.4E-07	1.4E-07	1.9E-07	2.0E-07	2.1E-07	1.9E-07	2.0E-07	2.0E-07	2.1E-07	2.3E-07	2.5E-07	2.7E-07	3.7E-07	4.4E-07	5.0E-07
2.2E-07	1.1E-07	1.2E-07	1.6E-07	1.6E-07	1.7E-07	1.6E-07	1.6E-07	1.6E-07	1.7E-07	1.9E-07	2.1E-07	2.2E-07	3.1E-07	3.6E-07	4.1E-07
2.0E-09	7.1E-10	5.1E-10	8.0E-10	7.0E-10	7.7E-10	1.2E-09	1.3E-09	1.1E-09	9.2E-10	9.1E-10	1.1E-09	1.0E-09	1.2E-09	1.7E-09	3.1E-09
2.7E-07	1.4E-07	1.4E-07	1.9E-07	2.0E-07	2.0E-07	1.9E-07	2.0E-07	2.0E-07	2.0E-07	2.3E-07	2.5E-07	2.7E-07	3.7E-07	4.4E-07	5.0E-07
2.7E-07	1.4E-07	1.4E-07	1.9E-07	2.0E-07	2.1E-07	1.9E-07	2.0E-07	2.0E-07	2.0E-07	2.3E-07	2.5E-07	2.7E-07	3.7E-07	4.4E-07	5.0E-07
2.2E-07	1.1E-07	1.2E-07	1.6E-07	1.6E-07	1.7E-07	1.5E-07	1.6E-07	1.6E-07	1.7E-07	1.9E-07	2.1E-07	2.2E-07	3.0E-07	3.6E-07	4.1E-07
2.2E-07	1.1E-07	1.2E-07	1.6E-07	1.6E-07	1.7E-07	1.6E-07	1.6E-07	1.6E-07	1.7E-07	1.9E-07	2.1E-07	2.2E-07	3.0E-07	3.6E-07	4.1E-07
3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.	3200.

4.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.9E-07	9.4E-08	1.0E-07	1.4E-07	1.5E-07	1.5E-07	1.4E-07	1.5E-07	1.5E-07	1.5E-07	1.8E-07	1.7E-07	2.1E-07	2.6E-07	3.2E-07	3.6E-07
1.5E-07	7.6E-08	8.0E-08	1.1E-07	1.2E-07	1.2E-07	1.1E-07	1.2E-07	1.2E-07	1.2E-07	1.4E-07	1.4E-07	1.7E-07	2.1E-07	2.6E-07	2.9E-07
1.3E-09	4.5E-10	3.3E-10	5.4E-10	4.9E-10	5.2E-10	8.6E-10	9.2E-10	7.9E-10	6.3E-10	6.5E-10	6.8E-10	7.0E-10	7.7E-10	1.1E-09	2.1E-09
1.9E-07	9.3E-08	9.9E-08	1.4E-07	1.5E-07	1.5E-07	1.4E-07	1.5E-07	1.5E-07	1.5E-07	1.8E-07	1.7E-07	2.1E-07	2.6E-07	3.2E-07	3.6E-07
1.9E-07	9.4E-08	9.9E-08	1.4E-07	1.5E-07	1.5E-07	1.4E-07	1.5E-07	1.5E-07	1.5E-07	1.8E-07	1.7E-07	2.1E-07	2.6E-07	3.2E-07	3.6E-07
1.5E-07	7.5E-08	7.9E-08	1.1E-07	1.2E-07	1.2E-07	1.1E-07	1.2E-07	1.2E-07	1.2E-07	1.4E-07	1.4E-07	1.7E-07	2.1E-07	2.5E-07	2.9E-07
1.5E-07	7.5E-08	8.0E-08	1.1E-07	1.2E-07	1.2E-07	1.1E-07	1.2E-07	1.2E-07	1.2E-07	1.4E-07	1.4E-07	1.7E-07	2.1E-07	2.6E-07	2.9E-07
4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.

4.8 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.5E-07	7.1E-08	7.2E-08	9.7E-08	1.1E-07	1.1E-07	1.1E-07	1.2E-07	1.1E-07	1.2E-07	1.4E-07	1.4E-07	1.6E-07	2.1E-07	2.5E-07	2.8E-07
1.2E-07	5.6E-08	5.7E-08	7.6E-08	9.0E-08	8.9E-08	8.3E-08	9.1E-08	8.7E-08	9.2E-08	1.1E-07	1.1E-07	1.3E-07	1.7E-07	2.0E-07	2.2E-07
9.9E-10	3.2E-10	2.2E-10	3.5E-10	3.4E-10	3.6E-10	6.1E-10	6.9E-10	5.6E-10	4.6E-10	4.6E-10	5.2E-10	5.1E-10	5.5E-10	8.6E-10	1.5E-09
1.5E-07	7.0E-08	7.1E-08	9.5E-08	1.1E-07	1.1E-07	1.0E-07	1.1E-07	1.1E-07	1.2E-07	1.4E-07	1.4E-07	1.6E-07	2.1E-07	2.5E-07	2.8E-07
1.5E-07	7.1E-08	7.2E-08	9.6E-08	1.1E-07	1.1E-07	1.1E-07	1.2E-07	1.1E-07	1.2E-07	1.4E-07	1.4E-07	1.6E-07	2.1E-07	2.5E-07	2.8E-07
1.2E-07	5.5E-08	5.6E-08	7.5E-08	8.9E-08	8.8E-08	8.2E-08	9.0E-08	8.7E-08	9.1E-08	1.1E-07	1.1E-07	1.3E-07	1.7E-07	2.0E-07	2.2E-07
1.2E-07	5.6E-08	5.6E-08	7.6E-08	9.0E-08	8.8E-08	8.3E-08	9.1E-08	8.7E-08	9.2E-08	1.1E-07	1.1E-07	1.3E-07	1.7E-07	2.0E-07	2.2E-07
4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.	4800.

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 03/05/79 TO 03/04/80

ANNUAL AVERAGE (GROUND)
STANDARD PTS - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 14:34:25

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

5.6 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.2E-07	5.6E-08	5.5E-08	7.1E-08	9.2E-08	8.3E-08	8.4E-08	9.9E-08	9.5E-08	9.8E-08	1.1E-07	1.2E-07	1.3E-07	1.6E-07	2.1E-07	2.3E-07
9.7E-08	4.3E-08	4.2E-08	5.5E-08	7.1E-08	6.4E-08	6.5E-08	7.7E-08	7.3E-08	7.5E-08	8.6E-08	9.0E-08	1.0E-07	1.4E-07	1.6E-07	1.8E-07
8.2E-10	2.4E-10	1.6E-10	2.4E-10	2.6E-10	2.5E-10	4.7E-10	5.6E-10	4.6E-10	3.6E-10	3.7E-10	4.1E-10	3.9E-10	4.6E-10	6.7E-10	1.2E-09
1.2E-07	5.5E-08	5.4E-08	7.0E-08	9.1E-08	8.2E-08	8.4E-08	9.8E-08	9.4E-08	9.6E-08	1.1E-07	1.2E-07	1.3E-07	1.8E-07	2.1E-07	2.2E-07
1.2E-07	5.6E-08	5.4E-08	7.0E-08	9.2E-08	8.2E-08	8.4E-08	9.9E-08	9.5E-08	9.7E-08	1.1E-07	1.2E-07	1.3E-07	1.6E-07	2.1E-07	2.2E-07
9.6E-08	4.3E-08	4.2E-08	5.4E-08	7.0E-08	6.3E-08	6.5E-08	7.6E-08	7.3E-08	7.5E-08	8.5E-08	8.9E-08	1.0E-07	1.4E-07	1.6E-07	1.8E-07
9.7E-08	4.3E-08	4.2E-08	5.5E-08	7.1E-08	6.4E-08	6.5E-08	7.7E-08	7.3E-08	7.5E-08	8.5E-08	9.0E-08	1.0E-07	1.4E-07	1.6E-07	1.8E-07
5600.	5600	5600.	5600	5600	5600.	5600.	5600	5600.	5600.	5600.	5600	5600.	5600.	5600.	5600.

6.4 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.0E-07	4.6E-08	4.3E-08	6.0E-08	7.9E-08	7.0E-08	6.9E-08	8.2E-08	7.4E-08	8.0E-08	9.3E-08	1.0E-07	1.1E-07	1.5E-07	1.7E-07	1.9E-07
7.7E-08	3.5E-08	3.3E-08	4.5E-08	6.3E-08	5.3E-08	5.3E-08	6.3E-08	5.6E-08	6.1E-08	7.1E-08	7.7E-08	8.3E-08	1.1E-07	1.3E-07	1.4E-07
6.1E-10	1.9E-10	1.2E-10	2.0E-10	2.1E-10	2.0E-10	3.7E-10	4.5E-10	3.4E-10	2.9E-10	2.9E-10	3.4E-10	3.1E-10	3.6E-10	5.2E-10	9.3E-10
9.9E-08	4.6E-08	4.2E-08	5.9E-08	7.7E-08	6.9E-08	6.9E-08	8.2E-08	7.3E-08	7.9E-08	9.2E-08	1.0E-07	1.1E-07	1.5E-07	1.7E-07	1.9E-07
1.0E-07	4.6E-08	4.3E-08	5.9E-08	7.8E-08	6.9E-08	6.9E-08	8.2E-08	7.3E-08	8.0E-08	9.3E-08	1.0E-07	1.1E-07	1.5E-07	1.7E-07	1.9E-07
7.6E-08	3.5E-08	3.2E-08	4.5E-08	5.9E-08	5.2E-08	5.2E-08	6.2E-08	5.6E-08	6.0E-08	7.0E-08	7.6E-08	8.2E-08	1.1E-07	1.3E-07	1.4E-07
7.6E-08	3.5E-08	3.2E-08	4.5E-08	6.0E-08	5.3E-08	5.3E-08	6.3E-08	5.5E-08	6.1E-08	7.1E-08	7.6E-08	8.3E-08	1.1E-07	1.3E-07	1.4E-07
6400	6400.	6400	6400.	6400.	6400	6400	6400	6400.	6400.	6400	6400.	6400.	6400	6400	6400.

7.2 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
8.5E-08	3.9E-08	3.4E-08	5.1E-08	6.7E-08	6.0E-08	5.8E-08	7.1E-08	5.9E-08	6.8E-08	8.1E-08	8.6E-08	9.4E-08	1.2E-07	1.5E-07	1.6E-07
6.4E-08	2.9E-08	2.6E-08	3.9E-08	5.0E-08	4.5E-08	4.4E-08	5.3E-08	4.4E-08	5.1E-08	6.0E-08	6.5E-08	7.0E-08	9.0E-08	1.1E-07	1.2E-07
5.0E-10	1.5E-10	9.0E-11	1.6E-10	1.7E-10	1.6E-10	3.0E-10	3.7E-10	2.6E-10	2.3E-10	2.4E-10	2.8E-10	2.6E-10	2.8E-10	4.4E-10	7.6E-10
8.4E-08	3.8E-08	3.4E-08	5.1E-08	6.6E-08	5.9E-08	5.8E-08	7.0E-08	5.9E-08	6.7E-08	7.9E-08	8.5E-08	9.3E-08	1.2E-07	1.5E-07	1.6E-07
8.5E-08	3.9E-08	3.4E-08	5.1E-08	6.7E-08	6.0E-08	5.8E-08	7.0E-08	5.9E-08	6.7E-08	8.0E-08	8.6E-08	9.4E-08	1.2E-07	1.5E-07	1.6E-07
6.3E-08	2.9E-08	2.5E-08	3.5E-08	5.0E-08	4.4E-08	4.3E-08	5.2E-08	4.4E-08	5.0E-08	5.9E-08	6.4E-08	6.9E-08	8.8E-08	1.1E-07	1.2E-07
6.4E-08	2.9E-08	2.5E-08	3.8E-08	5.0E-08	4.5E-08	4.4E-08	5.3E-08	4.4E-08	5.1E-08	6.0E-08	6.5E-08	7.0E-08	8.9E-08	1.1E-07	1.2E-07
7200	7200	7200	7200.	7200.	7200.	7200.	7200.	7200	7200.	7200.	7200.	7200.	7200.	7200.	7200.

8.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
7.4E-08	3.5E-08	2.8E-08	4.5E-08	6.0E-08	5.3E-08	5.1E-08	6.2E-08	5.0E-08	5.9E-08	7.1E-08	7.6E-08	8.2E-08	1.0E-07	1.3E-07	1.4E-07
5.5E-08	2.6E-08	2.0E-08	3.3E-08	4.4E-08	3.9E-08	3.7E-08	4.5E-08	3.7E-08	4.4E-08	5.2E-08	5.6E-08	6.0E-08	7.6E-08	9.5E-08	1.0E-07
4.1E-10	1.3E-10	7.0E-11	1.3E-10	1.5E-10	1.4E-10	2.5E-10	3.1E-10	2.1E-10	1.9E-10	2.1E-10	2.3E-10	2.1E-10	2.3E-10	3.7E-10	6.2E-10
7.3E-08	3.4E-08	2.7E-08	4.4E-08	5.8E-08	5.2E-08	5.0E-08	6.1E-08	4.9E-08	5.8E-08	6.9E-08	7.5E-08	8.0E-08	1.0E-07	1.3E-07	1.3E-07
7.3E-08	3.4E-08	2.7E-08	4.4E-08	5.9E-08	5.3E-08	5.0E-08	6.1E-08	5.0E-08	5.9E-08	7.0E-08	7.6E-08	8.1E-08	1.0E-07	1.3E-07	1.3E-07
5.4E-08	2.5E-08	2.0E-08	3.2E-08	4.3E-08	3.8E-08	3.7E-08	4.5E-08	3.6E-08	4.3E-08	5.1E-08	5.5E-08	5.9E-08	7.5E-08	9.7E-08	9.9E-08
5.4E-08	2.5E-08	2.0E-08	3.3E-08	4.4E-08	3.9E-08	3.7E-08	4.5E-08	3.7E-08	4.4E-08	5.2E-08	5.6E-08	6.0E-08	7.6E-08	9.8E-08	1.0E-07
8000	8000.	8000.	8000.	8000.	8000.	8000	8000.	8000	8000.	8000	8000	8000.	8000.	8000	8000

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3) ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2) ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

12.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
3.7E-08	2.0E-08	1.5E-08	2.3E-08	3.5E-08	3.0E-08	2.7E-08	3.6E-08	3.1E-08	3.0E-08	4.0E-08	4.3E-08	4.7E-08	5.9E-08	7.3E-08	8.3E-08
2.6E-08	1.4E-08	1.1E-08	1.6E-08	2.4E-08	2.1E-08	1.9E-08	2.5E-08	2.2E-08	2.1E-08	2.8E-08	3.0E-08	3.3E-08	4.1E-08	5.1E-08	5.8E-08
1.8E-10	6.3E-11	3.3E-11	5.8E-11	7.3E-11	6.6E-11	1.1E-10	1.5E-10	1.1E-10	8.3E-11	1.0E-10	1.1E-10	1.0E-10	1.1E-10	1.7E-10	3.2E-10
3.7E-08	1.9E-08	1.5E-08	2.2E-08	3.4E-08	2.9E-08	2.7E-08	3.5E-08	3.1E-08	2.9E-08	3.9E-08	4.2E-08	4.6E-08	5.7E-08	7.1E-08	8.1E-08
3.7E-08	1.9E-08	1.5E-08	2.3E-08	3.5E-08	3.0E-08	2.7E-08	3.5E-08	3.1E-08	3.0E-08	4.0E-08	4.3E-08	4.7E-08	5.8E-08	7.2E-08	8.3E-08
2.5E-08	1.3E-08	1.0E-08	1.5E-08	2.4E-08	2.0E-08	1.9E-08	2.4E-08	2.1E-08	2.0E-08	2.7E-08	2.9E-08	3.2E-08	4.0E-08	5.3E-08	5.7E-08
2.6E-08	1.4E-08	1.1E-08	1.6E-08	2.4E-08	2.1E-08	1.9E-08	2.5E-08	2.2E-08	2.1E-08	2.8E-08	3.0E-08	3.2E-08	4.1E-08	5.0E-08	5.7E-08
12000	12000	12000	12000	12000.	12000.	12000.	12000.	12000.	12000.	12000	12000.	12000.	12000	12000.	12000

16.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.3E-08	1.3E-08	9.5E-09	1.5E-08	2.3E-08	2.1E-08	1.8E-08	2.5E-08	2.3E-08	1.9E-08	2.6E-08	2.8E-08	3.1E-08	3.9E-08	4.7E-08	5.9E-08
1.6E-08	8.4E-09	6.5E-09	9.7E-09	1.6E-08	1.4E-08	1.2E-08	1.6E-08	1.3E-08	1.2E-08	1.8E-08	1.9E-08	2.1E-08	2.6E-08	3.3E-08	3.9E-08
1.0E-10	3.6E-11	1.9E-11	3.3E-11	4.2E-11	3.9E-11	6.5E-11	9.4E-11	7.2E-11	4.6E-11	5.9E-11	6.4E-11	6.0E-11	6.4E-11	9.3E-11	2.0E-10
2.2E-08	1.2E-08	9.4E-09	1.4E-08	2.3E-08	2.0E-08	1.7E-08	2.4E-08	2.2E-08	1.8E-08	2.5E-08	2.7E-08	3.0E-08	3.8E-08	4.6E-08	5.7E-08
2.3E-08	1.3E-08	9.7E-09	1.4E-08	2.3E-08	2.0E-08	1.8E-08	2.4E-08	2.2E-08	1.8E-08	2.6E-08	2.8E-08	3.1E-08	3.9E-08	4.7E-08	5.8E-08
1.5E-08	8.1E-09	6.3E-09	9.3E-09	1.5E-08	1.3E-08	1.1E-08	1.6E-08	1.5E-08	1.2E-08	1.7E-08	1.8E-08	2.0E-08	2.5E-08	3.1E-08	3.8E-08
1.5E-08	8.3E-09	6.5E-09	9.6E-09	1.5E-08	1.4E-08	1.2E-08	1.6E-08	1.5E-08	1.2E-08	1.7E-08	1.8E-08	2.1E-08	2.6E-08	3.1E-08	3.9E-08
16000	16000	16000	16000	16000.	16000.	16000.	16000	16000.	16000.	16000.	16000.	16000	16000.	16000.	16000.

24.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.2E-08	7.2E-09	5.5E-09	7.9E-09	1.2E-08	1.1E-08	9.5E-09	1.1E-08	1.2E-08	1.0E-08	1.4E-08	1.4E-08	1.8E-08	2.3E-08	2.9E-08	3.4E-08
7.8E-09	4.4E-09	3.4E-09	4.9E-09	7.3E-09	7.0E-09	5.8E-09	7.0E-09	7.3E-09	6.3E-09	8.7E-09	8.8E-09	1.1E-08	1.4E-08	1.8E-08	2.1E-08
4.5E-11	1.7E-11	8.5E-12	1.5E-11	1.7E-11	1.8E-11	2.9E-11	3.6E-11	3.1E-11	2.1E-11	2.6E-11	2.7E-11	2.8E-11	3.1E-11	4.9E-11	9.1E-11
1.2E-08	6.7E-09	5.2E-09	7.5E-09	1.1E-08	1.1E-08	9.1E-09	1.1E-08	1.1E-08	9.8E-09	1.3E-08	1.4E-08	1.7E-08	2.2E-08	2.8E-08	3.2E-08
1.2E-08	7.1E-09	5.4E-09	7.8E-09	1.2E-08	1.1E-08	9.4E-09	1.1E-08	1.2E-08	1.0E-08	1.4E-08	1.4E-08	1.7E-08	2.3E-08	2.9E-08	3.2E-08
7.4E-09	4.1E-09	3.2E-09	4.6E-09	6.9E-09	6.7E-09	5.6E-09	6.7E-09	7.0E-09	6.0E-09	8.3E-09	8.4E-09	1.0E-08	1.3E-08	1.7E-08	2.2E-08
7.7E-09	4.3E-09	3.3E-09	4.8E-09	7.2E-09	6.9E-09	5.8E-09	6.9E-09	7.2E-09	6.2E-09	8.6E-09	8.7E-09	1.1E-08	1.4E-08	1.8E-08	2.0E-08
24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000.	24000

32.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
8.7E-09	4.7E-09	3.7E-09	5.2E-09	7.2E-09	7.4E-09	6.5E-09	6.9E-09	7.9E-09	7.1E-09	9.2E-09	9.6E-09	1.2E-08	1.5E-08	2.0E-08	2.3E-08
5.1E-09	2.7E-09	2.1E-09	3.0E-09	4.2E-09	4.3E-09	3.7E-09	4.0E-09	4.6E-09	4.1E-09	5.3E-09	5.5E-09	6.7E-09	8.7E-09	1.2E-08	1.3E-08
2.6E-11	9.4E-12	4.3E-12	8.2E-12	8.4E-12	9.7E-12	1.7E-11	1.9E-11	1.6E-11	1.3E-11	1.4E-11	1.6E-11	1.6E-11	1.7E-11	2.4E-11	5.1E-11
8.1E-09	4.3E-09	3.4E-09	4.8E-09	6.6E-09	6.9E-09	6.1E-09	6.5E-09	7.6E-09	6.7E-09	8.5E-09	9.1E-09	1.1E-08	1.4E-08	1.9E-08	2.2E-08
8.5E-09	4.6E-09	3.6E-09	5.1E-09	7.0E-09	7.2E-09	6.4E-09	6.8E-09	7.8E-09	7.0E-09	9.0E-09	9.4E-09	1.1E-08	1.5E-08	2.0E-08	2.2E-08
4.7E-09	2.5E-09	1.9E-09	2.8E-09	3.8E-09	4.0E-09	3.5E-09	3.8E-09	4.4E-09	3.9E-09	4.9E-09	5.2E-09	6.3E-09	8.1E-09	1.1E-08	1.2E-08
4.9E-09	2.7E-09	2.1E-09	3.0E-09	4.1E-09	4.2E-09	3.7E-09	3.9E-09	4.5E-09	4.1E-09	5.2E-09	5.5E-09	6.6E-09	8.5E-09	1.1E-08	1.3E-08
32000	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3) ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2) ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-70 (Continued)

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 03/05/79 TO 03/04/80

ANNUAL AVERAGE (GROUND)
STANDARD PTS - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 14.34.25

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

40.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
6.5E-09	2.7E-09	2.2E-09	4.1E-09	5.5E-09	4.9E-09	4.3E-09	5.1E-09	5.6E-09	4.7E-09	6.2E-09	6.5E-09	8.1E-09	1.1E-08	1.3E-08	1.7E-08
3.6E-09	1.5E-09	1.2E-09	2.2E-09	3.0E-09	2.7E-09	2.4E-09	2.8E-09	3.1E-09	2.6E-09	3.4E-09	3.6E-09	4.4E-09	5.8E-09	7.1E-09	9.3E-09
1.7E-11	4.9E-12	2.5E-12	5.6E-12	6.0E-12	5.7E-12	9.9E-12	1.2E-11	1.1E-11	7.3E-12	8.6E-12	9.3E-12	9.6E-12	1.1E-11	1.6E-11	3.7E-11
5.9E-09	2.5E-09	2.0E-09	3.7E-09	5.0E-09	4.5E-09	4.0E-09	4.8E-09	5.3E-09	4.4E-09	5.6E-09	6.0E-09	7.5E-09	9.7E-09	1.2E-08	1.6E-08
6.3E-09	2.7E-09	2.1E-09	4.0E-09	5.4E-09	4.8E-09	4.2E-09	5.0E-09	5.5E-09	4.6E-09	6.0E-09	6.3E-09	7.9E-09	1.0E-08	1.3E-08	1.7E-08
3.3E-09	1.4E-09	1.1E-09	2.0E-09	2.8E-09	2.5E-09	2.2E-09	2.6E-09	2.9E-09	2.4E-09	3.1E-09	3.3E-09	4.1E-09	5.3E-09	6.6E-09	8.0E-09
3.5E-09	1.5E-09	1.2E-09	2.2E-09	3.0E-09	2.6E-09	2.3E-09	2.7E-09	3.0E-09	2.5E-09	3.3E-09	3.5E-09	4.3E-09	5.7E-09	6.9E-09	9.3E-09
40000	40000	40000	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000

48.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
5.2E-09	1.8E-09	1.4E-09	3.3E-09	4.5E-09	3.5E-09	3.0E-09	4.1E-09	4.3E-09	3.4E-09	4.4E-09	4.7E-09	6.1E-09	7.8E-09	8.5E-09	1.3E-08
2.7E-09	9.4E-10	7.5E-10	1.7E-09	2.3E-09	1.9E-09	1.6E-09	2.1E-09	2.3E-09	1.8E-09	2.3E-09	2.5E-09	3.2E-09	4.1E-09	4.5E-09	6.9E-09
1.2E-11	2.9E-12	1.5E-12	4.1E-12	4.3E-12	3.7E-12	6.3E-12	8.7E-12	7.7E-12	4.7E-12	5.5E-12	6.0E-12	6.4E-12	6.9E-12	9.6E-12	2.5E-11
4.7E-09	1.6E-09	1.3E-09	2.9E-09	4.0E-09	3.2E-09	2.8E-09	3.8E-09	4.0E-09	3.1E-09	4.0E-09	4.3E-09	5.5E-09	7.0E-09	7.8E-09	1.2E-08
5.0E-09	1.7E-09	1.4E-09	3.2E-09	4.3E-09	3.4E-09	3.0E-09	4.0E-09	4.2E-09	3.3E-09	4.2E-09	4.6E-09	5.9E-09	7.5E-09	8.3E-09	1.3E-08
2.4E-09	8.3E-10	6.6E-10	1.5E-09	2.1E-09	1.7E-09	1.5E-09	2.0E-09	2.1E-09	1.6E-09	2.1E-09	2.3E-09	2.9E-09	3.7E-09	4.1E-09	6.3E-09
2.6E-09	9.1E-10	7.2E-10	1.7E-09	2.3E-09	1.8E-09	1.6E-09	2.1E-09	2.2E-09	1.7E-09	2.2E-09	2.4E-09	3.1E-09	4.0E-09	4.4E-09	6.7E-09
48000	48000	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000

56.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
4.2E-09	1.3E-09	1.0E-09	2.7E-09	3.7E-09	2.7E-09	2.3E-09	3.3E-09	3.5E-09	2.6E-09	3.2E-09	3.5E-09	4.7E-09	6.0E-09	6.0E-09	1.0E-08
2.1E-09	6.3E-10	5.0E-10	1.4E-09	1.9E-09	1.3E-09	1.2E-09	1.6E-09	1.7E-09	1.3E-09	1.7E-09	1.8E-09	2.4E-09	3.0E-09	3.0E-09	5.2E-09
9.2E-12	1.2E-12	9.4E-13	3.1E-12	3.2E-12	2.5E-12	4.4E-12	6.4E-12	5.7E-12	3.2E-12	3.8E-12	4.1E-12	4.5E-12	4.6E-12	6.1E-12	1.8E-11
3.7E-09	1.1E-09	8.7E-10	2.4E-09	3.2E-09	2.4E-09	2.1E-09	3.0E-09	3.2E-09	2.3E-09	2.9E-09	3.2E-09	4.2E-09	5.3E-09	5.4E-09	9.2E-09
4.0E-09	1.2E-09	9.6E-10	2.6E-09	3.5E-09	2.6E-09	2.3E-09	3.2E-09	3.4E-09	2.5E-09	3.2E-09	3.4E-09	4.6E-09	5.8E-09	5.8E-09	1.0E-08
1.9E-09	5.4E-10	4.4E-10	1.2E-09	1.6E-09	1.2E-09	1.1E-09	1.5E-09	1.6E-09	1.2E-09	1.5E-09	1.6E-09	2.1E-09	2.7E-09	2.7E-09	4.7E-09
2.0E-09	6.0E-10	4.8E-10	1.3E-09	1.8E-09	1.3E-09	1.1E-09	1.6E-09	1.7E-09	1.3E-09	1.6E-09	1.7E-09	2.3E-09	2.9E-09	2.9E-09	5.0E-09
56000.	56000.	56000	56000.	56000.	56000.	56000.	56000	56000.	56000	56000	56000.	56000.	56000.	56000.	56000.

64.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
3.2E-09	9.3E-10	7.7E-10	1.8E-09	2.6E-09	1.9E-09	1.8E-09	2.5E-09	2.7E-09	2.0E-09	2.5E-09	2.9E-09	3.9E-09	4.8E-09	4.8E-09	8.0E-09
1.5E-09	4.5E-10	3.7E-10	8.6E-10	1.3E-09	9.3E-10	8.7E-10	1.2E-09	1.3E-09	9.7E-10	1.2E-09	1.4E-09	1.9E-09	2.3E-09	2.3E-09	3.9E-09
6.4E-12	1.2E-12	6.7E-13	1.8E-12	2.1E-12	1.7E-12	3.1E-12	4.6E-12	4.0E-12	2.3E-12	2.6E-12	3.1E-12	3.5E-12	3.5E-12	4.5E-12	1.3E-11
2.8E-09	7.8E-10	6.6E-10	1.5E-09	2.2E-09	1.7E-09	1.6E-09	2.2E-09	2.4E-09	1.8E-09	2.1E-09	2.6E-09	3.5E-09	4.2E-09	4.3E-09	7.1E-09
3.1E-09	8.8E-10	7.3E-10	1.7E-09	2.5E-09	1.9E-09	1.7E-09	2.5E-09	2.6E-09	1.9E-09	2.4E-09	2.8E-09	3.8E-09	4.6E-09	4.7E-09	7.7E-09
1.4E-09	3.8E-10	3.2E-10	7.4E-10	1.1E-09	8.1E-10	7.8E-10	1.1E-09	1.2E-09	8.6E-10	1.0E-09	1.2E-09	1.7E-09	2.0E-09	2.1E-09	3.5E-09
1.5E-09	4.2E-10	3.5E-10	8.2E-10	1.2E-09	9.0E-10	8.4E-10	1.2E-09	1.3E-09	9.3E-10	1.2E-09	1.3E-09	1.8E-09	2.2E-09	2.3E-09	3.7E-09
64000	64000.	64000.	64000.	64000.	64000	64000	64000	64000.	64000.	64000	64000.	64000.	64000.	64000.	64000.

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

72.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.5E-09	7.1E-10	6.1E-10	1.2E-09	1.9E-09	1.4E-09	1.4E-09	2.1E-09	2.1E-09	1.6E-09	1.9E-09	2.4E-09	3.3E-09	3.9E-09	3.9E-09	6.4E-09
1.1E-09	3.3E-10	2.9E-10	5.7E-10	9.1E-10	6.6E-10	6.6E-10	9.7E-10	9.9E-10	7.5E-10	8.7E-10	1.1E-09	1.5E-09	1.8E-09	1.8E-09	3.0E-09
4.6E-12	8.8E-13	4.9E-13	1.2E-12	1.4E-12	1.1E-12	2.2E-12	3.4E-12	2.9E-12	1.7E-12	1.8E-12	2.3E-12	2.7E-12	2.6E-12	3.4E-12	9.5E-12
2.1E-09	5.8E-10	5.1E-10	1.0E-09	1.6E-09	1.2E-09	1.3E-09	1.9E-09	1.9E-09	1.4E-09	1.6E-09	2.1E-09	2.9E-09	3.3E-09	3.4E-09	5.6E-09
2.3E-09	6.7E-10	5.8E-10	1.2E-09	1.8E-09	1.4E-09	1.4E-09	2.0E-09	2.1E-09	1.6E-09	1.8E-09	2.3E-09	3.2E-09	3.7E-09	3.8E-09	6.2E-09
9.9E-10	2.7E-10	2.4E-10	4.8E-10	7.7E-10	5.7E-10	5.8E-10	8.5E-10	8.9E-10	6.5E-10	7.4E-10	9.8E-10	1.3E-09	1.6E-09	1.6E-09	2.6E-09
1.1E-09	3.1E-10	2.7E-10	5.4E-10	8.6E-10	6.3E-10	6.3E-10	9.4E-10	9.6E-10	7.2E-10	8.2E-10	1.1E-09	1.5E-09	1.7E-09	1.8E-09	2.9E-09
72000	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000	72000.	72000	72000.	72000	72000

80.0 KM

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.0E-09	5.4E-10	5.2E-10	9.0E-10	1.5E-09	1.1E-09	1.2E-09	1.7E-09	1.7E-09	1.4E-09	1.5E-09	2.0E-09	2.8E-09	3.2E-09	3.3E-09	5.2E-09
9.0E-10	2.5E-10	2.3E-10	4.0E-10	6.7E-10	5.0E-10	5.3E-10	7.5E-10	7.6E-10	6.2E-10	6.7E-10	8.9E-10	1.3E-09	1.4E-09	1.5E-09	2.3E-09
3.5E-12	6.3E-13	3.8E-13	7.9E-13	1.0E-12	8.1E-13	1.7E-12	2.6E-12	2.2E-12	1.4E-12	1.3E-12	1.6E-12	2.1E-12	2.0E-12	2.6E-12	7.1E-12
1.7E-09	4.4E-10	4.3E-10	7.4E-10	1.2E-09	9.3E-10	1.0E-09	1.5E-09	1.5E-09	1.2E-09	1.2E-09	1.7E-09	2.4E-09	2.7E-09	2.8E-09	4.5E-09
1.9E-09	5.1E-10	4.9E-10	8.5E-10	1.4E-09	1.1E-09	1.1E-09	1.6E-09	1.6E-09	1.3E-09	1.4E-09	1.9E-09	2.7E-09	3.1E-09	3.1E-09	4.9E-09
7.7E-10	2.0E-10	1.9E-10	3.3E-10	5.6E-10	4.2E-10	4.6E-10	6.6E-10	6.8E-10	5.4E-10	5.6E-10	7.8E-10	1.1E-09	1.2E-09	1.3E-09	2.0E-09
8.6E-10	2.3E-10	2.2E-10	3.8E-10	6.3E-10	4.7E-10	5.1E-10	7.3E-10	7.3E-10	6.0E-10	6.4E-10	8.6E-10	1.2E-09	1.4E-09	1.4E-09	2.2E-09
80000	80000.	80000	80000.	80000	80000	80000.	80000.	80000	80000.	80000	80000	80000	80000	80000.	80000

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-71

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 03/05/79 TO 03/04/80

ANNUAL AVERAGE (GROUND)
SPECIAL PTS. - T/R CORRECTED
ONSITE METEOROLOGY
DATE 23-NOV-81 TIME 14:39:46

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DANES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
EXCLUSION BOUNDARY																
	1.1E-06	5.4E-07	5.9E-07	9.7E-07	8.5E-07	8.7E-07	7.3E-07	9.1E-07	8.0E-07	9.3E-07	9.9E-07	1.3E-06	1.1E-06	1.5E-06	1.8E-06	2.2E-06
	9.8E-07	4.8E-07	5.3E-07	8.7E-07	7.6E-07	7.8E-07	6.5E-07	8.1E-07	7.1E-07	8.3E-07	8.9E-07	1.1E-06	9.4E-07	1.4E-06	1.6E-06	1.9E-06
	9.6E-09	3.2E-09	2.5E-09	4.7E-09	3.5E-09	3.8E-09	5.6E-09	7.1E-09	5.4E-09	4.8E-09	4.7E-09	6.3E-09	4.6E-09	5.9E-09	8.4E-09	1.6E-08
	1.1E-06	5.4E-07	5.9E-07	9.7E-07	8.5E-07	8.7E-07	7.3E-07	9.1E-07	8.0E-07	9.3E-07	9.9E-07	1.3E-06	1.1E-06	1.5E-06	1.8E-06	2.2E-06
	1.1E-06	5.4E-07	5.9E-07	9.7E-07	8.5E-07	8.7E-07	7.3E-07	9.1E-07	8.0E-07	9.3E-07	9.9E-07	1.3E-06	1.1E-06	1.5E-06	1.8E-06	2.2E-06
	9.6E-07	4.8E-07	5.3E-07	8.6E-07	7.6E-07	7.7E-07	6.5E-07	8.1E-07	7.1E-07	8.3E-07	8.8E-07	1.1E-06	9.4E-07	1.4E-06	1.6E-06	1.9E-06
	9.8E-07	4.8E-07	5.3E-07	8.7E-07	7.6E-07	7.7E-07	6.5E-07	8.1E-07	7.1E-07	8.3E-07	8.9E-07	1.1E-06	9.4E-07	1.4E-06	1.6E-06	1.9E-06
	1200	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.
LOW POPULATION ZONE																
	2.0E-07	9.4E-08	9.9E-08	1.4E-07	1.5E-07	1.5E-07	1.4E-07	1.4E-07	1.4E-07	1.5E-07	1.8E-07	1.7E-07	2.0E-07	2.7E-07	3.2E-07	3.6E-07
	1.6E-07	7.6E-08	8.0E-08	1.1E-07	1.2E-07	1.2E-07	1.1E-07	1.2E-07	1.2E-07	1.2E-07	1.4E-07	1.4E-07	1.6E-07	2.2E-07	2.6E-07	2.9E-07
	1.4E-09	4.5E-10	3.2E-10	5.3E-10	4.8E-10	5.1E-10	8.5E-10	9.0E-10	7.8E-10	6.2E-10	6.4E-10	6.6E-10	6.9E-10	8.0E-10	1.2E-09	2.0E-09
	2.0E-07	9.3E-08	9.8E-08	1.4E-07	1.5E-07	1.5E-07	1.4E-07	1.4E-07	1.4E-07	1.5E-07	1.7E-07	1.7E-07	2.0E-07	2.7E-07	3.2E-07	3.5E-07
	2.0E-07	9.4E-08	9.9E-08	1.4E-07	1.5E-07	1.5E-07	1.4E-07	1.4E-07	1.4E-07	1.5E-07	1.8E-07	1.7E-07	2.0E-07	2.7E-07	3.2E-07	3.6E-07
	1.6E-07	7.5E-08	7.9E-08	1.1E-07	1.2E-07	1.2E-07	1.1E-07	1.1E-07	1.2E-07	1.2E-07	1.4E-07	1.3E-07	1.6E-07	2.2E-07	2.6E-07	2.8E-07
	1.6E-07	7.5E-08	7.9E-08	1.1E-07	1.2E-07	1.2E-07	1.1E-07	1.2E-07	1.2E-07	1.2E-07	1.4E-07	1.4E-07	1.6E-07	2.2E-07	2.6E-07	2.9E-07
	4023	4023.	4023.	4023.	4023.	4023	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.
NEAREST RESIDENT																
	1.5E-07	1.7E-07	1.5E-07	2.2E-07	2.5E-07	3.3E-07	1.0E-07	9.8E-08	1.4E-07	1.9E-07	1.6E-07	2.1E-07	1.7E-07	6.7E-07	3.8E-07	8.8E-07
	1.1E-07	1.4E-07	1.3E-07	1.9E-07	2.1E-07	2.8E-07	8.2E-08	7.6E-08	1.2E-07	1.5E-07	1.2E-07	1.7E-07	1.3E-07	5.7E-07	3.1E-07	7.5E-07
	9.6E-10	8.6E-10	5.5E-10	9.6E-10	8.9E-10	1.3E-09	6.0E-10	5.5E-10	7.8E-10	8.2E-10	5.6E-10	8.7E-10	5.3E-10	2.4E-09	1.4E-09	5.9E-09
	1.4E-07	1.6E-07	1.5E-07	2.2E-07	2.4E-07	3.3E-07	1.0E-07	9.7E-08	1.4E-07	1.8E-07	1.5E-07	2.1E-07	1.6E-07	6.7E-07	3.7E-07	8.8E-07
	1.4E-07	1.6E-07	1.5E-07	2.2E-07	2.5E-07	3.3E-07	1.0E-07	9.7E-08	1.4E-07	1.9E-07	1.6E-07	2.1E-07	1.7E-07	6.7E-07	3.8E-07	8.8E-07
	1.1E-07	1.4E-07	1.3E-07	1.8E-07	2.0E-07	2.8E-07	8.1E-08	7.5E-08	1.2E-07	1.5E-07	1.2E-07	1.7E-07	1.3E-07	5.7E-07	3.0E-07	7.5E-07
	1.1E-07	1.4E-07	1.3E-07	1.9E-07	2.0E-07	2.8E-07	8.1E-08	7.5E-08	1.2E-07	1.5E-07	1.2E-07	1.7E-07	1.3E-07	5.7E-07	3.1E-07	7.5E-07
	4988.	2816.	3138.	2816.	2735.	2333.	4827.	5632.	4023.	3379.	4344.	3540.	4566.	2092.	3540.	2172
NEAREST VEGETABLE																
	1.2E-07	1.2E-07	1.3E-07	2.2E-07	2.5E-07	3.3E-07	9.6E-08	9.8E-08	5.7E-08	1.2E-07	1.6E-07	2.1E-07	1.7E-07	6.0E-07	3.7E-07	8.8E-07
	8.9E-08	9.7E-08	1.0E-07	1.9E-07	2.1E-07	2.8E-07	7.5E-08	7.6E-08	4.3E-08	9.2E-08	1.2E-07	1.7E-07	1.3E-07	5.1E-07	3.0E-07	7.5E-07
	7.3E-10	5.9E-10	4.4E-10	9.6E-10	8.9E-10	1.3E-09	5.4E-10	5.5E-10	2.5E-10	4.6E-10	5.6E-10	8.7E-10	5.3E-10	2.1E-09	1.4E-09	5.9E-09
	1.1E-07	1.2E-07	1.3E-07	2.2E-07	2.4E-07	3.3E-07	9.5E-08	9.7E-08	5.6E-08	1.2E-07	1.5E-07	2.1E-07	1.6E-07	6.0E-07	3.7E-07	8.8E-07
	1.2E-07	1.2E-07	1.3E-07	2.2E-07	2.5E-07	3.3E-07	9.5E-08	9.7E-08	5.7E-08	1.2E-07	1.6E-07	2.1E-07	1.7E-07	6.0E-07	3.7E-07	8.8E-07
	8.8E-08	9.6E-08	1.0E-07	1.8E-07	2.0E-07	2.8E-07	7.4E-08	7.5E-08	4.2E-08	9.1E-08	1.2E-07	1.7E-07	1.3E-07	5.1E-07	3.0E-07	7.5E-07
	8.9E-08	9.7E-08	1.0E-07	1.9E-07	2.0E-07	2.8E-07	7.5E-08	7.5E-08	4.2E-08	9.1E-08	1.2E-07	1.7E-07	1.3E-07	5.1E-07	3.0E-07	7.5E-07
	5792.	3379.	3540.	2816.	2735.	2333.	5149.	5632.	7401.	4827.	4344.	3540.	4566.	2253.	3620.	2172

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
NEAREST MEAT ANIMAL																
	1.0E-06	5.3E-07	5.9E-07	4.2E-07	3.8E-07	4.3E-07	9.6E-08	1.1E-07	1.0E-07	3.0E-07	3.4E-07	3.2E-07	1.6E-07	2.9E-07	4.3E-07	1.2E-06
	8.9E-07	4.7E-07	5.3E-07	3.6E-07	3.3E-07	3.7E-07	7.5E-08	8.3E-08	7.8E-08	2.5E-07	2.8E-07	2.7E-07	1.2E-07	2.4E-07	3.6E-07	1.0E-06
	8.7E-09	3.1E-09	2.5E-09	1.9E-09	1.5E-09	1.8E-09	5.4E-10	6.1E-10	4.9E-10	1.4E-09	1.4E-09	1.4E-09	5.0E-10	8.9E-10	1.7E-09	8.1E-09
	1.0E-06	5.3E-07	5.9E-07	4.1E-07	3.8E-07	4.3E-07	9.5E-08	1.1E-07	9.9E-08	3.0E-07	3.3E-07	3.2E-07	1.6E-07	2.9E-07	4.3E-07	1.2E-06
	1.0E-06	5.3E-07	5.9E-07	4.2E-07	3.8E-07	4.3E-07	9.5E-08	1.1E-07	9.9E-08	3.0E-07	3.3E-07	3.2E-07	1.6E-07	2.9E-07	4.3E-07	1.2E-06
	8.9E-07	4.7E-07	5.3E-07	3.6E-07	3.2E-07	3.7E-07	7.4E-08	8.2E-08	7.7E-08	2.5E-07	2.8E-07	2.7E-07	1.2E-07	2.4E-07	3.5E-07	1.0E-06
	8.9E-07	4.7E-07	5.3E-07	3.6E-07	3.3E-07	3.7E-07	7.5E-08	8.2E-08	7.7E-08	2.5E-07	2.8E-07	2.7E-07	1.2E-07	2.4E-07	3.5E-07	1.0E-06
	1207.	1207.	1207.	1931.	2011.	1931.	5149.	5310.	5310.	2574.	2414.	2735.	4827.	3701.	3218.	1770.
NEAREST DAIRY COW																
	8.0E-08	7.1E-08		2.2E-07	3.8E-07	4.3E-07	7.0E-08				7.6E-08			1.8E-07	4.3E-07	
	5.9E-08	5.6E-08		1.9E-07	3.3E-07	3.7E-07	5.3E-08				5.6E-08			1.4E-07	3.6E-07	
	4.6E-10	3.2E-10	NONE	9.6E-10	1.5E-09	1.8E-09	3.7E-10	NONE	NONE	NONE	2.3E-10	NONE	NONE	4.5E-10	1.7E-09	NONE
	7.8E-08	7.0E-08	IN	2.2E-07	3.8E-07	4.3E-07	6.9E-08	IN	IN	IN	7.4E-08	IN	IN	1.7E-07	4.3E-07	IN
	7.9E-08	7.1E-08	THIS	2.2E-07	3.8E-07	4.3E-07	6.9E-08	THIS	THIS	THIS	7.5E-08	THIS	THIS	1.7E-07	4.3E-07	THIS
	5.8E-08	5.5E-08	SECTOR	1.8E-07	3.2E-07	3.7E-07	5.2E-08	SECTOR	SECTOR	SECTOR	5.5E-08	SECTOR	SECTOR	1.3E-07	3.5E-07	SECTOR
	5.9E-08	5.6E-08		1.9E-07	3.3E-07	3.7E-07	5.3E-08				5.6E-08			1.4E-07	3.5E-07	
	7562.	4827.		2816.	2011.	1931.	6436.				7562.			5632.	3218.	
NEAREST PLANT BOUNDARY																
	6.5E-07	2.6E-07	2.4E-07	4.2E-07	4.0E-07	4.6E-07	1.0E-07	1.1E-07	2.4E-07	3.1E-07	3.4E-07	2.9E-07	2.5E-07	2.6E-07	6.5E-07	1.2E-06
	5.7E-07	2.3E-07	2.0E-07	3.6E-07	3.5E-07	4.0E-07	8.2E-08	8.3E-08	2.0E-07	2.6E-07	2.8E-07	2.4E-07	2.1E-07	2.1E-07	5.5E-07	1.1E-06
	5.4E-09	1.5E-09	8.8E-10	1.9E-09	1.6E-09	1.9E-09	6.0E-10	6.1E-10	1.5E-09	1.4E-09	1.4E-09	1.3E-09	9.1E-10	7.5E-10	2.7E-09	8.6E-09
	6.5E-07	2.6E-07	2.3E-07	4.1E-07	4.0E-07	4.6E-07	1.0E-07	1.1E-07	2.4E-07	3.1E-07	3.3E-07	2.9E-07	2.5E-07	2.6E-07	6.5E-07	1.2E-06
	6.5E-07	2.6E-07	2.3E-07	4.2E-07	4.0E-07	4.6E-07	1.0E-07	1.1E-07	2.4E-07	3.1E-07	3.3E-07	2.9E-07	2.5E-07	2.6E-07	6.5E-07	1.2E-06
	5.6E-07	2.2E-07	2.0E-07	3.6E-07	3.5E-07	4.0E-07	8.1E-08	8.2E-08	2.0E-07	2.6E-07	2.8E-07	2.4E-07	2.1E-07	2.0E-07	5.5E-07	1.1E-06
	5.6E-07	2.3E-07	2.0E-07	3.6E-07	3.5E-07	4.0E-07	8.1E-08	8.2E-08	2.0E-07	2.6E-07	2.8E-07	2.4E-07	2.1E-07	2.1E-07	5.5E-07	1.1E-06
	1754.	2076.	2365.	1931.	1931.	1866.	4827.	5310.	2767.	2478.	2414.	2880.	3379.	4183.	2349.	17[illegible].

TOTAL OBS - 8784 TOTAL INV OBS - 1270 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 3.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-72

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-73

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-74

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 06/01/73 TO 03/04/80

ANNUAL AVERAGE (GROUND)
STANDARD PTS. - T/R CORRECTED
ONSITE METEOROLOGY - 3 YEARS
DATE 23-NOV-81 TIME 18:13:10

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.4 KM															
6.5E-06	3.1E-06	3.2E-06	5.3E-06	4.1E-06	4.9E-06	5.0E-06	4.8E-06	5.3E-06	4.7E-06	4.9E-06	5.1E-06	4.9E-06	7.6E-06	1.1E-05	[illegible]
6.1E-06	3.0E-06	3.0E-06	5.0E-06	3.9E-06	4.6E-06	4.7E-06	4.5E-06	5.0E-06	4.4E-06	4.7E-06	4.9E-06	4.6E-06	7.2E-06	1.0E-05	[illegible]
5.5E-08	2.0E-08	1.4E-08	2.5E-08	2.0E-08	2.8E-08	4.0E-08	3.6E-08	3.2E-08	2.4E-08	2.5E-08	2.5E-08	2.6E-08	3.2E-08	5.5E-08	9.7E-08
6.5E-06	3.1E-06	3.2E-06	5.3E-06	4.1E-06	4.8E-06	5.0E-06	4.8E-06	5.3E-06	4.7E-06	4.9E-06	5.1E-06	4.9E-06	7.6E-06	1.1E-05	[illegible]
6.5E-06	3.1E-06	3.2E-06	5.3E-06	4.1E-06	4.8E-06	5.0E-06	4.8E-06	5.3E-06	4.7E-06	4.9E-06	5.1E-06	4.9E-06	7.6E-06	1.1E-05	[illegible]
6.1E-06	2.9E-06	3.0E-06	5.0E-06	3.9E-06	4.6E-06	4.7E-06	4.5E-06	5.0E-06	4.4E-06	4.7E-06	4.9E-06	4.6E-06	7.2E-06	1.0E-05	1.1E-05
6.1E-06	3.0E-06	3.0E-06	5.0E-06	3.9E-06	4.6E-06	4.7E-06	4.5E-06	5.0E-06	4.4E-06	4.7E-06	4.9E-06	4.6E-06	7.2E-06	1.0E-05	1.1E-05
400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400.	400	400.
0.8 KM															
2.0E-06	9.9E-07	1.0E-06	1.6E-06	1.4E-06	1.5E-06	1.5E-06	1.7E-06	1.7E-06	1.5E-06	1.5E-06	1.8E-06	1.6E-06	2.5E-06	3.6E-06	3.7E-06
1.8E-06	9.1E-07	9.2E-07	1.4E-06	1.3E-06	1.4E-06	1.3E-06	1.5E-06	1.5E-06	1.3E-06	1.4E-06	1.7E-06	1.5E-06	2.3E-06	3.2E-06	3.4E-06
1.8E-08	7.0E-09	4.6E-09	8.1E-09	7.5E-09	9.7E-09	1.2E-08	1.3E-08	1.1E-08	7.9E-09	8.3E-09	9.5E-09	9.1E-09	1.2E-08	2.0E-08	3.2E-08
2.0E-06	9.9E-07	1.0E-06	1.6E-06	1.4E-06	1.5E-06	1.5E-06	1.6E-06	1.7E-06	1.5E-06	1.5E-06	1.8E-06	1.6E-06	2.5E-06	3.5E-06	3.7E-06
2.0E-06	9.9E-07	1.0E-06	1.6E-06	1.4E-06	1.5E-06	1.5E-06	1.6E-06	1.7E-06	1.5E-06	1.5E-06	1.8E-06	1.6E-06	2.5E-06	3.5E-06	3.7E-06
1.8E-06	9.1E-07	9.2E-07	1.4E-06	1.3E-06	1.4E-06	1.3E-06	1.5E-06	1.5E-06	1.3E-06	1.4E-06	1.7E-06	1.5E-06	2.3E-06	3.2E-06	3.4E-06
1.8E-06	9.1E-07	9.2E-07	1.4E-06	1.3E-06	1.4E-06	1.3E-06	1.5E-06	1.5E-06	1.3E-06	1.4E-06	1.7E-06	1.5E-06	2.3E-06	3.2E-06	3.4E-06
800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.
1.2 KM															
1.0E-06	5.1E-07	5.0E-07	7.3E-07	7.3E-07	8.1E-07	7.5E-07	8.4E-07	8.7E-07	7.7E-07	7.9E-07	1.0E-06	7.9E-07	1.3E-06	1.8E-06	1.9E-06
9.0E-07	4.6E-07	4.5E-07	6.6E-07	6.5E-07	7.2E-07	6.7E-07	7.5E-07	7.7E-07	6.9E-07	7.0E-07	9.2E-07	7.0E-07	1.2E-06	1.6E-06	1.7E-06
9.2E-09	3.5E-09	2.3E-09	3.8E-09	3.8E-09	5.0E-09	6.2E-09	6.4E-09	5.5E-09	4.1E-09	4.2E-09	5.2E-09	4.4E-09	6.0E-09	9.8E-09	1.6E-08
1.0E-06	5.1E-07	5.0E-07	7.3E-07	7.3E-07	8.0E-07	7.5E-07	8.4E-07	8.7E-07	7.7E-07	7.9E-07	1.0E-06	7.9E-07	1.3E-06	1.8E-06	1.9E-06
1.0E-06	5.1E-07	5.0E-07	7.3E-07	7.3E-07	8.1E-07	7.5E-07	8.4E-07	8.7E-07	7.7E-07	7.9E-07	1.0E-06	7.9E-07	1.3E-06	1.8E-06	1.9E-06
9.0E-07	4.6E-07	4.5E-07	6.5E-07	6.5E-07	7.2E-07	6.7E-07	7.5E-07	7.7E-07	6.8E-07	7.0E-07	9.2E-07	7.0E-07	1.2E-06	1.6E-06	1.7E-06
9.0E-07	4.6E-07	4.5E-07	6.6E-07	6.5E-07	7.2E-07	6.7E-07	7.5E-07	7.7E-07	6.8E-07	7.0E-07	9.2E-07	7.0E-07	1.2E-06	1.6E-06	1.7E-06
1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.
1.6 KM															
6.8E-07	3.5E-07	3.5E-07	4.5E-07	4.7E-07	5.4E-07	5.0E-07	5.3E-07	5.7E-07	4.9E-07	5.0E-07	6.4E-07	5.2E-07	8.6E-07	1.2E-06	1.3E-06
5.9E-07	3.1E-07	3.0E-07	3.9E-07	4.1E-07	4.7E-07	4.3E-07	4.6E-07	5.0E-07	4.3E-07	4.4E-07	5.6E-07	4.6E-07	7.5E-07	1.1E-06	1.1E-06
6.0E-09	2.4E-09	1.5E-09	2.2E-09	2.4E-09	3.3E-09	4.0E-09	3.9E-09	3.5E-09	2.5E-09	2.6E-09	3.1E-09	2.8E-09	3.8E-09	6.3E-09	1.0E-08
6.8E-07	3.5E-07	3.4E-07	4.4E-07	4.7E-07	5.3E-07	5.0E-07	5.2E-07	5.7E-07	4.9E-07	5.0E-07	6.4E-07	5.2E-07	8.6E-07	1.2E-06	1.3E-06
6.8E-07	3.5E-07	3.4E-07	4.5E-07	4.7E-07	5.4E-07	5.0E-07	5.3E-07	5.7E-07	4.9E-07	5.0E-07	6.4E-07	5.2E-07	8.6E-07	1.2E-06	1.3E-06
5.9E-07	3.1E-07	3.0E-07	3.9E-07	4.1E-07	4.7E-07	4.3E-07	4.6E-07	4.9E-07	4.3E-07	4.4E-07	5.6E-07	4.6E-07	7.5E-07	1.1E-06	1.1E-06
5.9E-07	3.1E-07	3.0E-07	3.9E-07	4.1E-07	4.7E-07	4.3E-07	4.6E-07	5.0E-07	4.3E-07	4.4E-07	5.6E-07	4.6E-07	7.5E-07	1.1E-06	1.1E-06
1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.	1600.

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
2.4 KM															
3.9E-07	2.1E-07	2.0E-07	2.2E-07	2.5E-07	3.0E-07	2.8E-07	2.7E-07	3.1E-07	2.7E-07	2.7E-07	3.4E-07	2.8E-07	4.7E-07	6.4E-07	6.8E-07
3.3E-07	1.7E-07	1.7E-07	1.9E-07	2.2E-07	2.5E-07	2.3E-07	2.3E-07	2.6E-07	2.3E-07	2.3E-07	2.8E-07	2.3E-07	3.9E-07	5.4E-07	5.7E-07
3.2E-09	1.3E-09	8.3E-10	1.0E-09	1.2E-09	1.7E-09	2.1E-09	1.9E-09	1.8E-09	1.3E-09	1.3E-09	1.5E-09	1.4E-09	1.9E-09	3.1E-09	5.0E-09
3.9E-07	2.0E-07	2.0E-07	2.2E-07	2.5E-07	3.0E-07	2.7E-07	2.7E-07	3.1E-07	2.7E-07	2.7E-07	3.3E-07	2.8E-07	4.6E-07	6.4E-07	6.7E-07
3.9E-07	2.1E-07	2.0E-07	2.2E-07	2.5E-07	3.0E-07	2.7E-07	2.7E-07	3.1E-07	2.7E-07	2.7E-07	3.3E-07	2.8E-07	4.7E-07	6.4E-07	6.8E-07
3.3E-07	1.7E-07	1.7E-07	1.9E-07	2.1E-07	2.5E-07	2.3E-07	2.3E-07	2.6E-07	2.3E-07	2.3E-07	2.8E-07	2.3E-07	3.9E-07	5.4E-07	5.7E-07
3.3E-07	1.7E-07	1.7E-07	1.9E-07	2.1E-07	2.5E-07	2.3E-07	2.3E-07	2.6E-07	2.3E-07	2.3E-07	2.8E-07	2.3E-07	3.9E-07	5.4E-07	5.7E-07
2400	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400.	2400
3.2 KM															
2.5E-07	1.4E-07	1.2E-07	1.5E-07	1.7E-07	1.9E-07	1.9E-07	1.8E-07	2.1E-07	1.7E-07	1.8E-07	2.1E-07	2.0E-07	3.1E-07	4.5E-07	4.5E-07
2.1E-07	1.1E-07	1.0E-07	1.2E-07	1.4E-07	1.6E-07	1.6E-07	1.5E-07	1.7E-07	1.4E-07	1.5E-07	1.7E-07	1.7E-07	2.6E-07	3.7E-07	3.7E-07
1.9E-09	7.8E-10	4.7E-10	6.4E-10	7.8E-10	1.0E-09	1.4E-09	1.2E-09	1.2E-09	7.7E-10	8.1E-10	8.8E-10	9.6E-10	1.2E-09	2.0E-09	3.1E-09
2.5E-07	1.3E-07	1.2E-07	1.4E-07	1.7E-07	1.9E-07	1.9E-07	1.8E-07	2.1E-07	1.7E-07	1.8E-07	2.1E-07	2.0E-07	3.1E-07	4.4E-07	4.4E-07
2.5E-07	1.3E-07	1.2E-07	1.5E-07	1.7E-07	1.9E-07	1.9E-07	1.8E-07	2.1E-07	1.7E-07	1.8E-07	2.1E-07	2.0E-07	3.1E-07	4.5E-07	4.5E-07
2.0E-07	1.1E-07	9.9E-08	1.2E-07	1.4E-07	1.6E-07	1.6E-07	1.5E-07	1.7E-07	1.4E-07	1.5E-07	1.7E-07	1.7E-07	2.6E-07	3.7E-07	3.6E-07
2.0E-07	1.1E-07	1.0E-07	1.2E-07	1.4E-07	1.6E-07	1.6E-07	1.5E-07	1.7E-07	1.4E-07	1.5E-07	1.7E-07	1.7E-07	2.6E-07	3.7E-07	3.7E-07
3200	3200.	3200.	3200.	3200.	3200	3200.	3200.	3200.	3200.	3200.	3200.	3200	3200.	3200	3200
4.0 KM															
1.8E-07	9.1E-08	8.4E-08	1.1E-07	1.3E-07	1.4E-07	1.4E-07	1.4E-07	1.6E-07	1.3E-07	1.4E-07	1.4E-07	1.5E-07	2.2E-07	3.2E-07	3.2E-07
1.4E-07	7.3E-08	6.7E-08	8.6E-08	1.1E-07	1.1E-07	1.2E-07	1.1E-07	1.3E-07	1.0E-07	1.1E-07	1.1E-07	1.2E-07	1.8E-07	2.6E-07	2.6E-07
1.3E-09	4.9E-10	3.0E-10	4.4E-10	5.4E-10	6.8E-10	9.5E-10	8.4E-10	8.1E-10	5.3E-10	5.8E-10	5.6E-10	6.7E-10	7.8E-10	1.3E-09	2.1E-09
1.8E-07	9.0E-08	8.3E-08	1.1E-07	1.3E-07	1.4E-07	1.4E-07	1.4E-07	1.6E-07	1.2E-07	1.4E-07	1.4E-07	1.5E-07	2.2E-07	3.2E-07	3.2E-07
1.8E-07	9.1E-08	8.4E-08	1.1E-07	1.3E-07	1.4E-07	1.4E-07	1.4E-07	1.6E-07	1.3E-07	1.4E-07	1.4E-07	1.5E-07	2.2E-07	3.2E-07	3.2E-07
1.4E-07	7.3E-08	6.7E-08	8.5E-08	1.0E-07	1.1E-07	1.1E-07	1.1E-07	1.3E-07	1.0E-07	1.1E-07	1.1E-07	1.2E-07	1.8E-07	2.6E-07	2.6E-07
1.4E-07	7.3E-08	6.7E-08	8.5E-08	1.1E-07	1.1E-07	1.2E-07	1.1E-07	1.3E-07	1.0E-07	1.1E-07	1.1E-07	1.2E-07	1.8E-07	2.6E-07	2.6E-07
4000	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000.	4000	4000.	4000	4000	4000.
4.8 KM															
1.4E-07	6.9E-08	6.1E-08	7.3E-08	9.8E-08	1.0E-07	1.1E-07	1.1E-07	1.2E-07	9.8E-08	1.1E-07	1.2E-07	1.2E-07	1.8E-07	2.6E-07	[illegible]
1.1E-07	5.4E-08	4.6E-08	5.8E-08	7.8E-08	8.1E-08	8.5E-08	8.5E-08	9.3E-08	7.7E-08	8.6E-08	9.2E-08	9.3E-08	1.4E-07	2.0E-07	2.0E-07
9.5E-10	3.5E-10	2.0E-10	2.8E-10	3.8E-10	4.0E-10	6.7E-10	6.3E-10	5.8E-10	3.9E-10	4.2E-10	4.4E-10	4.8E-10	6.0E-10	1.0E-09	[illegible]
1.4E-07	6.8E-08	6.0E-08	7.2E-08	9.7E-08	1.0E-07	1.1E-07	1.1E-07	1.2E-07	9.7E-08	1.1E-07	1.2E-07	1.2E-07	1.8E-07	2.6E-07	[illegible]
1.4E-07	6.9E-08	6.0E-08	7.3E-08	9.8E-08	1.0E-07	1.1E-07	1.1E-07	1.2E-07	9.7E-08	1.1E-07	1.2E-07	1.2E-07	1.8E-07	2.6E-07	[illegible]
1.1E-07	5.4E-08	4.7E-08	5.7E-08	7.7E-08	8.0E-08	8.4E-08	8.4E-08	9.2E-08	7.6E-08	8.5E-08	9.1E-08	9.3E-08	1.4E-07	2.0E-07	2.0E-07
1.1E-07	5.4E-08	4.8E-08	5.8E-08	7.7E-08	8.1E-08	8.5E-08	8.4E-08	9.3E-08	7.7E-08	8.6E-08	9.2E-08	9.3E-08	1.4E-07	2.0E-07	2.0E-07
4300	4000.	4800.	4300	4800.	4800.	4800	4800.	4800.	4000.	4800	4800.	4800.	4000.	4800	4800

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 06/01/73 TO 03/04/80

ANNUAL AVERAGE (GROUND)
STANDARD PTS. - T/R CORRECTED
ONSITE METEOROLOGY - 3 YEARS
DATE 23-NOV-81 TIME 18:13:10

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
5.6 KM															
1.2E-07	5.5E-08	4.6E-08	5.4E-08	7.9E-08	7.5E-08	8.6E-08	9.2E-08	1.0E-07	8.1E-08	8.8E-08	9.6E-08	9.7E-08	1.5E-07	2.1E-07	2.0E-07
9.2E-08	4.2E-08	3.6E-08	4.2E-08	6.1E-08	5.8E-08	6.7E-08	7.2E-08	7.9E-08	6.3E-08	6.8E-08	7.5E-08	7.5E-08	1.2E-07	1.6E-07	1.6E-07
7.6E-10	2.6E-10	1.5E-10	1.9E-10	2.9E-10	3.3E-10	5.1E-10	5.1E-10	4.7E-10	3.1E-10	3.2E-10	3.4E-10	3.7E-10	4.7E-10	7.8E-10	1.2E-09
1.2E-07	5.4E-08	4.5E-08	5.3E-08	7.8E-08	7.4E-08	8.5E-08	9.1E-08	1.0E-07	8.0E-08	8.7E-08	9.5E-08	9.6E-08	1.5E-07	2.1E-07	2.0E-07
1.2E-07	5.4E-08	4.6E-08	5.4E-08	7.9E-08	7.5E-08	8.6E-08	9.2E-08	1.0E-07	8.1E-08	8.8E-08	9.6E-08	9.7E-08	1.5E-07	2.1E-07	2.0E-07
9.1E-08	4.2E-08	3.5E-08	4.1E-08	6.0E-08	5.7E-08	6.6E-08	7.1E-08	7.8E-08	6.2E-08	6.7E-08	7.4E-08	7.4E-08	1.1E-07	1.6E-07	1.6E-07
9.2E-08	4.2E-08	3.5E-08	4.1E-08	6.1E-08	5.8E-08	6.6E-08	7.1E-08	7.9E-08	6.3E-08	6.8E-08	7.4E-08	7.5E-08	1.2E-07	1.6E-07	1.6E-07
5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.	5600.
6.4 KM															
9.6E-08	4.5E-08	3.6E-08	4.5E-08	6.7E-08	6.3E-08	7.1E-08	7.7E-08	7.9E-08	6.7E-08	7.4E-08	8.3E-08	8.1E-08	1.2E-07	1.7E-07	1.7E-07
7.3E-08	3.4E-08	2.7E-08	3.4E-08	5.1E-08	4.8E-08	5.4E-08	5.8E-08	6.0E-08	5.1E-08	5.7E-08	6.3E-08	6.2E-08	9.5E-08	1.3E-07	1.3E-07
5.8E-10	2.1E-10	1.1E-10	1.6E-10	2.3E-10	2.6E-10	4.0E-10	4.1E-10	3.5E-10	2.4E-10	2.6E-10	2.8E-10	3.0E-10	3.7E-10	6.0E-10	9.4E-10
9.5E-08	4.4E-08	3.5E-08	4.5E-08	6.6E-08	6.2E-08	7.0E-08	7.6E-08	7.8E-08	6.6E-08	7.3E-08	8.2E-08	8.0E-08	1.2E-07	1.7E-07	1.7E-07
9.5E-08	4.5E-08	3.6E-08	4.5E-08	6.7E-08	6.3E-08	7.1E-08	7.6E-08	7.9E-08	6.7E-08	7.4E-08	8.3E-08	8.1E-08	1.2E-07	1.7E-07	1.7E-07
7.2E-08	3.4E-08	2.7E-08	3.4E-08	5.0E-08	4.7E-08	5.3E-08	5.8E-08	6.0E-08	5.0E-08	5.6E-08	6.3E-08	6.1E-08	9.4E-08	1.3E-07	1.3E-07
7.3E-08	3.4E-08	2.7E-08	3.4E-08	5.1E-08	4.8E-08	5.4E-08	5.8E-08	6.0E-08	5.1E-08	5.6E-08	6.3E-08	6.1E-08	9.4E-08	1.3E-07	1.3E-07
6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.	6400.
7.2 KM															
8.1E-08	3.8E-08	2.9E-08	3.9E-08	5.7E-08	5.4E-08	6.0E-08	6.6E-08	6.4E-08	5.6E-08	6.4E-08	7.1E-08	7.0E-08	1.0E-07	1.5E-07	1.4E-07
6.1E-08	2.9E-08	2.2E-08	2.9E-08	4.3E-08	4.1E-08	4.5E-08	4.9E-08	4.8E-08	4.2E-08	4.8E-08	5.4E-08	5.2E-08	7.5E-08	1.2E-07	1.1E-07
4.7E-10	1.7E-10	8.3E-11	1.3E-10	1.9E-10	2.2E-10	3.2E-10	3.4E-10	2.7E-10	1.9E-10	2.2E-10	2.3E-10	2.4E-10	2.8E-10	5.1E-10	7.6E-10
8.0E-08	3.8E-08	2.8E-08	3.8E-08	5.6E-08	5.3E-08	5.9E-08	6.5E-08	6.3E-08	5.6E-08	6.3E-08	7.1E-08	6.9E-08	9.9E-08	1.5E-07	1.4E-07
8.1E-08	3.8E-08	2.9E-08	3.9E-08	5.7E-08	5.4E-08	5.9E-08	6.5E-08	6.4E-08	5.6E-08	6.4E-08	7.1E-08	6.9E-08	1.0E-07	1.5E-07	1.4E-07
6.0E-08	2.8E-08	2.1E-08	2.9E-08	4.2E-08	4.0E-08	4.4E-08	4.9E-08	4.7E-08	4.2E-08	4.7E-08	5.3E-08	5.1E-08	7.4E-08	1.1E-07	1.1E-07
6.1E-08	2.9E-08	2.2E-08	2.9E-08	4.3E-08	4.0E-08	4.5E-08	4.9E-08	4.8E-08	4.2E-08	4.8E-08	5.3E-08	5.2E-08	7.5E-08	1.2E-07	1.1E-07
7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.	7200.
8.0 KM															
7.0E-08	3.4E-08	2.3E-08	3.4E-08	5.1E-08	4.8E-08	5.2E-08	5.7E-08	5.4E-08	4.9E-08	5.6E-08	6.3E-08	6.0E-08	8.6E-08	1.4E-07	1.2E-07
5.2E-08	2.5E-08	1.7E-08	2.5E-08	3.8E-08	3.5E-08	3.8E-08	4.2E-08	4.0E-08	3.6E-08	4.2E-08	4.7E-08	4.5E-08	6.4E-08	1.0E-07	9.0E-08
3.9E-10	1.4E-10	6.5E-11	1.1E-10	1.6E-10	1.8E-10	2.7E-10	2.8E-10	2.2E-10	1.6E-10	1.8E-10	1.9E-10	2.0E-10	2.3E-10	4.3E-10	6.2E-10
6.9E-08	3.3E-08	2.3E-08	3.3E-08	5.0E-08	4.7E-08	5.1E-08	5.6E-08	5.3E-08	4.8E-08	5.5E-08	6.2E-08	5.9E-08	8.5E-08	1.3E-07	1.2E-07
7.0E-08	3.4E-08	2.3E-08	3.4E-08	5.0E-08	4.7E-08	5.1E-08	5.7E-08	5.3E-08	4.9E-08	5.6E-08	6.3E-08	6.0E-08	8.6E-08	1.3E-07	1.2E-07
5.1E-08	2.4E-08	1.7E-08	2.5E-08	3.7E-08	3.5E-08	3.8E-08	4.2E-08	3.9E-08	3.6E-08	4.1E-08	4.6E-08	4.4E-08	6.3E-08	9.9E-08	8.8E-08
5.2E-08	2.5E-08	1.7E-08	2.5E-08	3.7E-08	3.5E-08	3.8E-08	4.2E-08	4.0E-08	3.6E-08	4.1E-08	4.6E-08	4.4E-08	6.4E-08	1.0E-07	8.9E-08
8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.	8000.

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
12.0 KM															
3.6E-08	1.9E-08	1.3E-08	1.7E-08	2.9E-08	2.7E-08	2.8E-08	3.3E-08	3.4E-08	2.5E-08	3.2E-08	3.6E-08	3.5E-08	4.9E-08	7.4E-08	7.4E-08
2.5E-08	1.3E-08	9.1E-09	1.2E-08	2.1E-08	1.9E-08	1.9E-08	2.3E-08	2.3E-08	1.7E-08	2.2E-08	2.5E-08	2.4E-08	3.4E-08	5.2E-08	5.2E-08
1.7E-10	7.0E-11	3.1E-11	4.7E-11	7.9E-11	8.7E-11	1.2E-10	1.4E-10	1.2E-10	7.0E-11	8.9E-11	9.4E-11	9.9E-11	1.1E-10	2.0E-10	3.2E-10
3.5E-08	1.9E-08	1.3E-08	1.7E-08	2.9E-08	2.6E-08	2.7E-08	3.2E-08	3.3E-08	2.4E-08	3.1E-08	3.5E-08	3.4E-08	4.8E-08	7.3E-08	7.3E-08
3.6E-08	1.9E-08	1.3E-08	1.7E-08	2.9E-08	2.7E-08	2.8E-08	3.2E-08	3.3E-08	2.5E-08	3.2E-08	3.6E-08	3.4E-08	4.9E-08	7.4E-08	7.4E-08
2.4E-08	1.3E-08	8.8E-09	1.2E-08	2.0E-08	1.8E-08	1.9E-08	2.3E-08	2.3E-08	1.7E-08	2.2E-08	2.4E-08	2.4E-08	3.3E-08	5.1E-08	5.1E-08
2.5E-08	1.3E-08	9.0E-09	1.2E-08	2.0E-08	1.9E-08	1.9E-08	2.3E-08	2.3E-08	1.7E-08	2.2E-08	2.5E-08	2.4E-08	3.4E-08	5.2E-08	5.2E-08
12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.	12000.
16.0 KM															
2.3E-08	1.2E-08	8.3E-09	1.1E-08	2.0E-08	1.8E-08	1.8E-08	2.3E-08	2.5E-08	1.6E-08	2.1E-08	2.3E-08	2.3E-08	3.3E-08	4.9E-08	5.5E-08
1.5E-08	8.3E-09	5.5E-09	7.4E-09	1.3E-08	1.2E-08	1.2E-08	1.5E-08	1.6E-08	1.0E-08	1.4E-08	1.5E-08	1.5E-08	2.2E-08	3.2E-08	3.5E-08
9.5E-11	4.0E-11	1.7E-11	2.6E-11	4.7E-11	5.2E-11	7.1E-11	8.5E-11	7.4E-11	3.9E-11	5.2E-11	5.3E-11	5.8E-11	6.5E-11	1.1E-10	2.0E-10
2.2E-08	1.2E-08	8.0E-09	1.1E-08	1.9E-08	1.8E-08	1.7E-08	2.2E-08	2.4E-08	1.5E-08	2.1E-08	2.2E-08	2.2E-08	3.2E-08	4.7E-08	5.2E-08
2.2E-08	1.2E-08	8.2E-09	1.1E-08	2.0E-08	1.8E-08	1.8E-08	2.2E-08	2.4E-08	1.5E-08	2.1E-08	2.3E-08	2.3E-08	3.2E-08	4.8E-08	5.2E-08
1.4E-08	8.0E-09	5.3E-09	7.1E-09	1.3E-08	1.2E-08	1.2E-08	1.5E-08	1.6E-08	1.0E-08	1.4E-08	1.5E-08	1.5E-08	2.1E-08	3.1E-08	3.4E-08
1.5E-08	8.2E-09	5.5E-09	7.3E-09	1.3E-08	1.2E-08	1.2E-08	1.5E-08	1.6E-08	1.0E-08	1.4E-08	1.5E-08	1.5E-08	2.2E-08	3.2E-08	3.5E-08
16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.	16000.
24.0 KM															
1.2E-08	7.1E-09	4.7E-09	6.1E-09	1.0E-08	1.0E-08	9.7E-09	1.1E-08	1.3E-08	8.5E-09	1.1E-08	1.2E-08	1.3E-08	1.9E-08	3.0E-08	3.0E-08
7.6E-09	4.4E-09	2.9E-09	3.7E-09	6.2E-09	6.2E-09	6.0E-09	6.5E-09	8.0E-09	5.2E-09	7.1E-09	7.3E-09	8.0E-09	1.2E-08	1.8E-08	1.9E-08
4.3E-11	1.9E-11	7.9E-12	1.2E-11	1.9E-11	2.3E-11	3.2E-11	3.2E-11	3.2E-11	1.8E-11	2.3E-11	2.2E-11	2.7E-11	3.1E-11	5.7E-11	9.6E-11
1.2E-08	6.7E-09	4.4E-09	5.7E-09	9.5E-09	9.5E-09	9.3E-09	1.0E-08	1.2E-08	8.1E-09	1.1E-08	1.1E-08	1.2E-08	1.8E-08	2.9E-08	2.9E-08
1.2E-08	7.0E-09	4.6E-09	6.0E-09	9.9E-09	9.9E-09	9.6E-09	1.0E-08	1.3E-08	8.4E-09	1.1E-08	1.1E-08	1.3E-08	1.9E-08	3.0E-08	3.0E-08
7.2E-09	4.1E-09	2.7E-09	3.5E-09	5.8E-09	5.9E-09	5.7E-09	6.2E-09	7.6E-09	5.0E-09	6.7E-09	6.9E-09	7.6E-09	1.1E-08	1.8E-08	1.8E-08
7.5E-09	4.3E-09	2.8E-09	3.7E-09	6.1E-09	6.1E-09	5.9E-09	6.4E-09	7.9E-09	5.2E-09	6.9E-09	7.2E-09	7.9E-09	1.2E-08	1.8E-08	1.8E-08
24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.	24000.
32.0 KM															
8.5E-09	4.7E-09	3.1E-09	4.0E-09	6.0E-09	6.5E-09	6.6E-09	6.4E-09	8.7E-09	6.0E-09	7.4E-09	7.9E-09	8.5E-09	1.3E-08	2.1E-08	2.1E-08
4.9E-09	2.7E-09	1.8E-09	2.3E-09	3.5E-09	3.7E-09	3.8E-09	3.7E-09	5.0E-09	3.5E-09	4.3E-09	4.6E-09	4.9E-09	7.3E-09	1.2E-08	1.2E-08
2.5E-11	1.1E-11	4.5E-12	6.6E-12	9.9E-12	1.3E-11	1.9E-11	1.7E-11	1.8E-11	1.1E-11	1.3E-11	1.3E-11	1.5E-11	1.7E-11	3.4E-11	5.6E-11
8.0E-09	4.3E-09	2.8E-09	3.7E-09	5.6E-09	6.0E-09	6.2E-09	6.0E-09	8.2E-09	5.6E-09	6.9E-09	7.5E-09	8.1E-09	1.2E-08	2.0E-08	2.0E-08
8.3E-09	4.6E-09	3.0E-09	3.9E-09	5.9E-09	6.3E-09	6.5E-09	6.3E-09	8.5E-09	5.9E-09	7.3E-09	7.8E-09	8.4E-09	1.2E-08	2.0E-08	2.0E-08
4.6E-09	2.5E-09	1.6E-09	2.1E-09	3.2E-09	3.5E-09	3.6E-09	3.5E-09	4.7E-09	3.2E-09	4.0E-09	4.3E-09	4.7E-09	6.8E-09	1.1E-08	1.1E-08
4.8E-09	2.6E-09	1.8E-09	2.3E-09	3.4E-09	3.7E-09	3.7E-09	3.6E-09	4.9E-09	3.4E-09	4.2E-09	4.5E-09	4.9E-09	7.1E-09	1.2E-08	1.2E-08
32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.	32000.

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD . 06/01/73 TO 03/04/80

ANNUAL AVERAGE (GROUND)
STANDARD PTS. - T/R CORRECTED
ONSITE METEOROLOGY - 3 YEARS
DATE 23-NOV-81 TIME 18:13:10

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
40.0 KM															
6.3E-09	2.7E-09	1.8E-09	3.1E-09	4.6E-09	4.3E-09	4.4E-09	4.8E-09	6.2E-09	4.0E-09	5.0E-09	5.4E-09	5.9E-09	8.9E-09	1.3E-08	1.6E-08
3.5E-09	1.5E-09	1.0E-09	1.7E-09	2.5E-09	2.4E-09	2.4E-09	2.6E-09	3.4E-09	2.2E-09	2.7E-09	3.0E-09	3.3E-09	4.9E-09	7.3E-09	8.5E-09
1.7E-11	5.4E-12	2.3E-12	4.5E-12	6.7E-12	7.5E-12	1.1E-11	1.1E-11	1.2E-11	6.2E-12	7.6E-12	7.7E-12	9.1E-12	1.1E-11	1.9E-11	3.2E-11
5.9E-09	2.5E-09	1.7E-09	2.8E-09	4.2E-09	3.9E-09	4.1E-09	4.4E-09	5.8E-09	3.6E-09	4.6E-09	5.0E-09	5.5E-09	8.2E-09	1.2E-08	1.5E-08
6.2E-09	2.6E-09	1.8E-09	3.0E-09	4.5E-09	4.2E-09	4.3E-09	4.7E-09	6.1E-09	3.9E-09	4.9E-09	5.3E-09	5.8E-09	8.7E-09	1.3E-08	1.5E-08
3.2E-09	1.4E-09	9.1E-10	1.6E-09	2.3E-09	2.2E-09	2.2E-09	2.4E-09	3.2E-09	2.0E-09	2.5E-09	2.7E-09	3.0E-09	4.5E-09	6.8E-09	8.0E-09
3.4E-09	1.4E-09	9.8E-10	1.7E-09	2.5E-09	2.3E-09	2.3E-09	2.6E-09	3.3E-09	2.1E-09	2.7E-09	2.9E-09	3.2E-09	4.8E-09	7.1E-09	8.4E-09
40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.	40000.
48.0 KM															
5.1E-09	1.8E-09	1.2E-09	2.5E-09	3.7E-09	3.1E-09	3.1E-09	3.8E-09	4.7E-09	2.8E-09	3.6E-09	3.9E-09	4.4E-09	6.5E-09	8.8E-09	1.2E-08
2.6E-09	9.3E-10	6.4E-10	1.3E-09	2.0E-09	1.6E-09	1.6E-09	2.0E-09	2.5E-09	1.5E-09	1.9E-09	2.0E-09	2.3E-09	3.4E-09	4.6E-09	6.2E-09
1.2E-11	3.2E-12	1.4E-12	3.3E-12	4.8E-12	4.8E-12	6.9E-12	8.0E-12	7.9E-12	3.9E-12	4.9E-12	5.0E-12	6.1E-12	7.0E-12	1.1E-11	2.5E-11
4.6E-09	1.6E-09	1.1E-09	2.3E-09	3.3E-09	2.8E-09	2.8E-09	3.5E-09	4.3E-09	2.6E-09	3.3E-09	3.6E-09	4.1E-09	5.9E-09	8.1E-09	1.1E-08
4.9E-09	1.7E-09	1.2E-09	2.4E-09	3.6E-09	3.0E-09	3.0E-09	3.7E-09	4.6E-09	2.7E-09	3.5E-09	3.8E-09	4.3E-09	6.3E-09	8.6E-09	1.2E-08
2.4E-09	8.3E-10	5.6E-10	1.2E-09	1.8E-09	1.5E-09	1.5E-09	1.8E-09	2.3E-09	1.3E-09	1.7E-09	1.9E-09	2.1E-09	3.1E-09	4.3E-09	5.7E-09
2.6E-09	9.0E-10	6.1E-10	1.3E-09	1.9E-09	1.6E-09	1.6E-09	1.9E-09	2.4E-09	1.4E-09	1.8E-09	2.0E-09	2.3E-09	3.3E-09	4.5E-09	6.0E-09
48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.	48000.
56.0 KM															
4.1E-09	1.2E-09	8.5E-10	2.1E-09	3.1E-09	2.3E-09	2.4E-09	3.1E-09	3.8E-09	2.2E-09	2.7E-09	2.9E-09	3.4E-09	5.0E-09	6.1E-09	9.3E-09
2.1E-09	6.3E-10	4.3E-10	1.1E-09	1.5E-09	1.2E-09	1.2E-09	1.5E-09	1.9E-09	1.1E-09	1.4E-09	1.5E-09	1.7E-09	2.5E-09	3.1E-09	4.7E-09
8.7E-12	2.0E-12	8.7E-13	2.5E-12	3.6E-12	3.3E-12	4.8E-12	5.9E-12	5.8E-12	2.7E-12	3.4E-12	3.4E-12	4.3E-12	4.9E-12	7.1E-12	1.8E-11
3.7E-09	1.1E-09	7.3E-10	1.8E-09	2.7E-09	2.1E-09	2.1E-09	2.8E-09	3.5E-09	1.9E-09	2.4E-09	2.6E-09	3.1E-09	4.5E-09	5.6E-09	8.5E-09
4.0E-09	1.2E-09	8.1E-10	2.0E-09	3.0E-09	2.2E-09	2.3E-09	3.0E-09	3.7E-09	2.1E-09	2.6E-09	2.8E-09	3.4E-09	4.9E-09	6.0E-09	9.0E-09
1.9E-09	5.5E-10	3.7E-10	9.3E-10	1.4E-09	1.0E-09	1.1E-09	1.4E-09	1.7E-09	9.6E-10	1.2E-09	1.3E-09	1.6E-09	2.3E-09	2.8E-09	4.3E-09
2.0E-09	6.0E-10	4.1E-10	1.0E-09	1.5E-09	1.1E-09	1.2E-09	1.5E-09	1.9E-09	1.0E-09	1.3E-09	1.4E-09	1.7E-09	2.4E-09	3.0E-09	4.5E-09
56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.	56000.
64.0 KM															
3.1E-09	9.2E-10	6.6E-10	1.4E-09	2.2E-09	1.7E-09	1.8E-09	2.4E-09	2.9E-09	1.7E-09	2.0E-09	2.4E-09	2.9E-09	4.0E-09	4.9E-09	7.2E-09
1.5E-09	4.4E-10	3.2E-10	6.6E-10	1.1E-09	8.1E-10	8.9E-10	1.2E-09	1.4E-09	8.1E-10	9.8E-10	1.2E-09	1.4E-09	1.9E-09	2.4E-09	3.5E-09
6.1E-12	1.4E-12	6.1E-13	1.5E-12	2.3E-12	2.2E-12	3.4E-12	4.2E-12	4.1E-12	1.9E-12	2.3E-12	2.5E-12	3.3E-12	3.6E-12	5.3E-12	1.3E-11
2.8E-09	7.9E-10	5.5E-10	1.2E-09	1.9E-09	1.5E-09	1.6E-09	2.1E-09	2.6E-09	1.5E-09	1.8E-09	2.1E-09	2.6E-09	3.6E-09	4.5E-09	6.5E-09
3.0E-09	8.8E-10	6.2E-10	1.3E-09	2.1E-09	1.6E-09	1.8E-09	2.3E-09	2.8E-09	1.6E-09	2.0E-09	2.3E-09	2.8E-09	3.9E-09	4.8E-09	7.0E-09
1.3E-09	3.8E-10	2.7E-10	5.7E-10	9.1E-10	7.1E-10	7.9E-10	1.0E-09	1.3E-09	7.1E-10	8.6E-10	1.0E-09	1.2E-09	1.7E-09	2.2E-09	3.2E-09
1.5E-09	4.2E-10	3.0E-10	6.3E-10	1.0E-09	7.8E-10	8.6E-10	1.1E-09	1.4E-09	7.8E-10	9.4E-10	1.1E-09	1.3E-09	1.9E-09	2.3E-09	3.4E-09
64000	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.	64000.

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
72.0 KM															
2.4E-09	7.0E-10	5.2E-10	9.4E-10	1.6E-09	1.2E-09	1.4E-09	1.9E-09	2.3E-09	1.4E-09	1.5E-09	2.0E-09	2.4E-09	3.3E-09	4.0E-09	5.8E-09
1.1E-09	3.3E-10	2.4E-10	4.4E-10	7.5E-10	5.7E-10	6.7E-10	9.1E-10	1.1E-09	6.3E-10	7.1E-10	9.2E-10	1.1E-09	1.5E-09	1.9E-09	2.7E-09
4.3E-12	9.6E-13	4.5E-13	9.3E-13	1.6E-12	1.5E-12	2.5E-12	3.1E-12	3.0E-12	1.5E-12	1.6E-12	1.9E-12	2.6E-12	2.7E-12	3.9E-12	9.5E-12
2.1E-09	5.9E-10	4.3E-10	7.9E-10	1.4E-09	1.1E-09	1.3E-09	1.7E-09	2.1E-09	1.2E-09	1.3E-09	1.7E-09	2.1E-09	2.9E-09	3.6E-09	5.2E-09
2.3E-09	6.7E-10	4.9E-10	8.9E-10	1.5E-09	1.2E-09	1.4E-09	1.9E-09	2.2E-09	1.3E-09	1.5E-09	1.9E-09	2.3E-09	3.1E-09	3.9E-09	5.6E-09
9.8E-10	2.8E-10	2.0E-10	3.7E-10	6.4E-10	4.9E-10	5.9E-10	8.0E-10	9.6E-10	5.5E-10	6.2E-10	8.1E-10	1.0E-09	1.3E-09	1.7E-09	2.4E-09
1.1E-09	3.1E-10	2.3E-10	4.2E-10	7.2E-10	5.5E-10	6.4E-10	8.7E-10	1.0E-09	6.1E-10	6.8E-10	8.8E-10	1.1E-09	1.5E-09	1.8E-09	2.6E-09
72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000.	72000	72000.
80.0 KM															
2.0E-09	5.4E-10	4.4E-10	6.9E-10	1.2E-09	9.6E-10	1.2E-09	1.6E-09	1.9E-09	1.2E-09	1.2E-09	1.6E-09	2.1E-09	2.7E-09	3.4E-09	4.7E-09
8.9E-10	2.4E-10	2.0E-10	3.1E-10	5.6E-10	4.3E-10	5.4E-10	7.0E-10	8.4E-10	5.3E-10	5.5E-10	7.4E-10	9.3E-10	1.2E-09	1.5E-09	2.1E-09
3.3E-12	6.9E-13	3.5E-13	6.3E-13	1.1E-12	1.1E-12	1.9E-12	2.4E-12	2.2E-12	1.2E-12	1.2E-12	1.5E-12	2.0E-12	2.0E-12	3.1E-12	7.2E-12
1.7E-09	4.5E-10	3.6E-10	5.7E-10	1.0E-09	8.1E-10	1.0E-09	1.4E-09	1.6E-09	9.9E-10	1.0E-09	1.4E-09	1.8E-09	2.3E-09	3.0E-09	4.1E-09
1.9E-09	5.1E-10	4.2E-10	6.5E-10	1.2E-09	9.2E-10	1.1E-09	1.5E-09	1.8E-09	1.1E-09	1.2E-09	1.6E-09	2.0E-09	2.6E-09	3.2E-09	4.5E-09
7.7E-10	2.0E-10	1.6E-10	2.6E-10	4.7E-10	3.7E-10	4.7E-10	6.1E-10	7.3E-10	4.5E-10	4.7E-10	6.4E-10	8.1E-10	1.0E-09	1.3E-09	1.9E-09
8.5E-10	2.3E-10	1.9E-10	2.9E-10	5.3E-10	4.1E-10	5.2E-10	6.8E-10	8.1E-10	5.0E-10	5.2E-10	7.1E-10	8.9E-10	1.2E-09	1.5E-09	2.0E-09
80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000.	80000

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-75

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD 05/01/73 TO 03/04/80

ANNUAL AVERAGE (GROUND)
SPECIAL PTS - I/R CORRECTED
ONSITE METEOROLOGY - 3 YEARS
DATE 23-NOV-81 TIME 18.21.28

WOLF CREEK GENERATING STATION
KANSAS GAS AND ELECTRIC CO.
BURLINGTON, KANSAS
DAMES AND MOORE JOB 7699-064-07

AFFECTED SECTORS

EXCLUSION BOUNDARY

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.0E-06	5.1E-07	5.0E-07	7.3E-07	7.3E-07	8.1E-07	7.5E-07	8.4E-07	8.7E-07	7.7E-07	7.9E-07	1.0E-06	7.9E-07	1.3E-06	1.8E-06	1.7E-06
9.0E-07	4.6E-07	4.5E-07	6.6E-07	6.5E-07	7.2E-07	6.7E-07	7.5E-07	7.7E-07	6.9E-07	7.0E-07	9.2E-07	7.0E-07	1.2E-06	1.6E-06	1.7E-06
9.2E-09	3.5E-09	2.3E-09	3.8E-09	3.8E-09	5.0E-09	6.2E-09	6.4E-09	5.5E-09	4.1E-09	4.2E-09	5.2E-09	4.4E-09	6.0E-09	9.8E-09	1.6E-08
1.0E-06	5.1E-07	5.0E-07	7.3E-07	7.3E-07	8.0E-07	7.5E-07	8.4E-07	8.7E-07	7.7E-07	7.9E-07	1.0E-06	7.9E-07	1.3E-06	1.8E-06	1.9E-06
1.0E-06	5.1E-07	5.0E-07	7.3E-07	7.3E-07	8.1E-07	7.5E-07	8.4E-07	8.7E-07	7.7E-07	7.9E-07	1.0E-06	7.9E-07	1.3E-06	1.8E-06	1.9E-06
9.0E-07	4.6E-07	4.5E-07	6.5E-07	6.5E-07	7.2E-07	6.7E-07	7.5E-07	7.7E-07	6.8E-07	7.0E-07	9.2E-07	7.0E-07	1.2E-06	1.6E-06	1.7E-06
9.0E-07	4.6E-07	4.5E-07	6.6E-07	6.5E-07	7.2E-07	6.7E-07	7.5E-07	7.7E-07	6.8E-07	7.0E-07	9.2E-07	7.0E-07	1.2E-06	1.6E-06	1.7E-06
1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.	1200.

LOW POPULATION ZONE

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.9E-07	9.2E-08	8.3E-08	1.0E-07	1.3E-07	1.4E-07	1.4E-07	1.3E-07	1.5E-07	1.2E-07	1.4E-07	1.4E-07	1.5E-07	2.3E-07	3.3E-07	3.2E-07
1.5E-07	7.4E-08	6.7E-08	8.3E-08	1.0E-07	1.1E-07	1.1E-07	1.1E-07	1.2E-07	9.9E-08	1.1E-07	1.1E-07	1.2E-07	1.8E-07	2.6E-07	2.6E-07
1.3E-09	4.9E-10	3.0E-10	4.2E-10	5.3E-10	6.7E-10	9.3E-10	8.2E-10	8.0E-10	5.2E-10	5.7E-10	5.5E-10	6.6E-10	8.1E-10	1.4E-09	2.1E-09
1.9E-07	9.1E-08	8.2E-08	1.0E-07	1.3E-07	1.3E-07	1.4E-07	1.3E-07	1.5E-07	1.2E-07	1.4E-07	1.4E-07	1.5E-07	2.3E-07	3.3E-07	3.2E-07
1.9E-07	9.1E-08	8.3E-08	1.0E-07	1.3E-07	1.4E-07	1.4E-07	1.3E-07	1.5E-07	1.2E-07	1.4E-07	1.4E-07	1.5E-07	2.3E-07	3.3E-07	3.2E-07
1.5E-07	7.3E-08	6.6E-08	8.3E-08	1.0E-07	1.1E-07	1.1E-07	1.1E-07	1.2E-07	9.8E-08	1.1E-07	1.1E-07	1.2E-07	1.8E-07	2.6E-07	2.5E-07
1.5E-07	7.3E-08	6.7E-08	8.3E-08	1.0E-07	1.1E-07	1.1E-07	1.1E-07	1.2E-07	9.9E-08	1.1E-07	1.1E-07	1.2E-07	1.8E-07	2.6E-07	2.6E-07
4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023	4023.

NEAREST RESIDENT

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.4E-07	1.6E-07	1.3E-07	1.7E-07	2.1E-07	3.1E-07	1.1E-07	9.1E-08	1.5E-07	1.6E-07	1.2E-07	1.8E-07	1.2E-07	5.7E-07	3.8E-07	7.8E-07
1.1E-07	1.3E-07	1.1E-07	1.4E-07	1.8E-07	2.6E-07	8.3E-08	7.0E-08	1.2E-07	1.3E-07	9.9E-08	1.4E-07	9.7E-08	4.9E-07	3.1E-07	6.7E-07
9.1E-10	9.5E-10	5.0E-10	7.7E-10	9.9E-10	1.7E-09	6.6E-10	5.0E-10	8.0E-10	6.9E-10	5.0E-10	7.2E-10	5.1E-10	2.4E-09	1.6E-09	5.9E-09
1.4E-07	1.6E-07	1.3E-07	1.7E-07	2.1E-07	3.1E-07	1.1E-07	9.0E-08	1.5E-07	1.5E-07	1.2E-07	1.7E-07	1.2E-07	5.7E-07	3.8E-07	7.8E-07
1.4E-07	1.6E-07	1.3E-07	1.7E-07	2.1E-07	3.1E-07	1.1E-07	9.1E-08	1.5E-07	1.5E-07	1.2E-07	1.8E-07	1.2E-07	5.7E-07	3.8E-07	7.8E-07
1.1E-07	1.3E-07	1.1E-07	1.4E-07	1.8E-07	2.6E-07	8.3E-08	7.0E-08	1.2E-07	1.3E-07	9.8E-08	1.4E-07	9.7E-08	4.8E-07	3.1E-07	6.7E-07
1.1E-07	1.3E-07	1.1E-07	1.4E-07	1.8E-07	2.6E-07	8.3E-08	7.0E-08	1.2E-07	1.3E-07	9.9E-08	1.4E-07	9.7E-08	4.9E-07	3.1E-07	6.7E-07
4988.	2816.	3138.	2816.	2735.	2333.	4827.	5632.	4023.	3379.	4344.	3540.	4666.	2092.	3540.	2172.

NEAREST VEGETABLE

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
1.1E-07	1.2E-07	1.1E-07	1.7E-07	2.1E-07	3.1E-07	9.8E-08	9.1E-08	6.1E-08	9.7E-08	1.2E-07	1.8E-07	1.2E-07	5.1E-07	3.8E-07	7.8E-07
8.5E-08	9.4E-08	8.8E-08	1.4E-07	1.8E-07	2.6E-07	7.6E-08	7.0E-08	4.6E-08	7.6E-08	9.9E-08	1.4E-07	9.7E-08	4.3E-07	3.1E-07	6.7E-07
6.9E-10	6.6E-10	4.0E-10	7.7E-10	9.9E-10	1.7E-09	6.0E-10	5.0E-10	2.6E-10	3.8E-10	5.0E-10	7.2E-10	5.1E-10	2.1E-09	1.6E-09	5.9E-09
1.1E-07	1.1E-07	1.1E-07	1.7E-07	2.1E-07	3.1E-07	9.7E-08	9.0E-08	6.1E-08	9.6E-08	1.2E-07	1.7E-07	1.2E-07	5.1E-07	3.3E-07	7.8E-07
1.1E-07	1.2E-07	1.1E-07	1.7E-07	2.1E-07	3.1E-07	9.7E-08	9.1E-08	6.1E-08	9.7E-08	1.2E-07	1.8E-07	1.2E-07	5.1E-07	3.8E-07	7.8E-07
8.4E-08	9.4E-08	8.7E-08	1.4E-07	1.8E-07	2.6E-07	7.6E-08	7.0E-08	4.5E-08	7.6E-08	9.8E-08	1.4E-07	9.7E-08	4.3E-07	3.1E-07	6.7E-07
8.4E-08	9.4E-08	8.8E-08	1.4E-07	1.8E-07	2.6E-07	7.6E-08	7.0E-08	4.6E-08	7.6E-08	9.9E-08	1.4E-07	9.7E-08	4.3E-07	3.1E-07	6.7E-07
5792.	3379.	3540.	2816.	2735.	2333.	5149.	5632.	7401.	4827.	4344.	3540.	4666.	2253.	3620.	2172.

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AFFECTED SECTORS

NEAREST MEAT ANIMAL

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
9.1E-07	5.0E-07	5.0E-07	3.2E-07	3.3E-07	4.0E-07	9.8E-08	9.9E-08	1.1E-07	2.5E-07	2.7E-07	2.7E-07	1.2E-07	2.5E-07	4.4E-07	1.0E-06
8.1E-07	4.5E-07	4.5E-07	2.7E-07	2.8E-07	3.5E-07	7.6E-08	7.7E-08	8.3E-08	2.1E-07	2.2E-07	2.2E-07	9.3E-08	2.0E-07	3.6E-07	9.0E-07
8.3E-09	3.5E-09	2.3E-09	1.5E-09	1.6E-09	2.4E-09	6.0E-10	5.6E-10	5.0E-10	1.2E-09	1.2E-09	1.2E-09	4.8E-10	9.0E-10	2.0E-09	8.1E-09
9.1E-07	5.0E-07	5.0E-07	3.1E-07	3.3E-07	4.0E-07	9.7E-08	9.8E-08	1.1E-07	2.5E-07	2.6E-07	2.7E-07	1.2E-07	2.5E-07	4.4E-07	1.0E-06
9.1E-07	5.0E-07	5.0E-07	3.1E-07	3.3E-07	4.0E-07	9.7E-08	9.8E-08	1.1E-07	2.5E-07	2.6E-07	2.7E-07	1.2E-07	2.5E-07	4.4E-07	1.0E-06
8.1E-07	4.5E-07	4.5E-07	2.7E-07	2.8E-07	3.5E-07	7.6E-08	7.6E-08	8.2E-08	2.1E-07	2.2E-07	2.2E-07	9.2E-08	2.0E-07	3.6E-07	9.0E-07
8.1E-07	4.5E-07	4.5E-07	2.7E-07	2.8E-07	3.5E-07	7.6E-08	7.7E-08	8.3E-08	2.1E-07	2.2E-07	2.2E-07	9.2E-08	2.0E-07	3.6E-07	9.0E-07
1287.	1207.	1207.	1931.	2011.	1931.	5149.	5310.	5310.	2574.	2414.	2735.	4827.	3701.	3218.	1770

NEAREST DAIRY COW

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
7.6E-08	6.9E-08		1.7E-07	3.3E-07	4.0E-07	7.1E-08				6.0E-08			1.5E-07	4.4E-07	
5.7E-08	5.4E-08		1.4E-07	2.8E-07	3.5E-07	5.4E-08				4.5E-08			1.1E-07	3.6E-07	
4.4E-10	3.5E-10	NONE	7.7E-10	1.6E-09	2.4E-09	4.0E-10	NONE	NONE	NONE	2.0E-10	NONE	NONE	4.6E-10	2.0E-09	NONE
7.5E-08	6.8E-08	IN	1.7E-07	3.3E-07	4.0E-07	7.0E-08	IN	IN	IN	6.0E-08	IN	IN	1.5E-07	4.4E-07	IN
7.6E-08	6.9E-08	THIS	1.7E-07	3.3E-07	4.0E-07	7.1E-08	THIS	THIS	THIS	6.0E-08	THIS	THIS	1.5E-07	4.4E-07	THIS
5.6E-08	5.4E-08	SECTOR	1.4E-07	2.8E-07	3.5E-07	5.3E-08	SECTOR	SECTOR	SECTOR	4.4E-08	SECTOR	SECTOR	1.1E-07	3.6E-07	SECTOR
5.6E-08	5.4E-08		1.4E-07	2.8E-07	3.5E-07	5.4E-08				4.5E-08			1.1E-07	3.6E-07	
7562.	4827.		2816.	2011.	1931.	6436.				7562.			5632.	3218.	

NEAREST PLANT BOUNDARY

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
6.0E-07	2.5E-07	2.0E-07	3.2E-07	3.5E-07	4.3E-07	1.1E-07	9.9E-08	2.6E-07	2.5E-07	2.7E-07	2.4E-07	1.9E-07	2.2E-07	6.6E-07	1.1E-06
5.2E-07	2.2E-07	1.7E-07	2.7E-07	3.0E-07	3.7E-07	8.3E-08	7.7E-08	2.2E-07	2.1E-07	2.2E-07	2.0E-07	1.5E-07	1.7E-07	5.6E-07	9.5E-07
5.2E-09	1.6E-09	8.2E-10	1.5E-09	1.7E-09	2.5E-09	6.6E-10	5.6E-10	1.5E-09	1.2E-09	1.2E-09	1.1E-09	8.7E-10	7.5E-10	3.2E-09	8.6E-09
6.0E-07	2.5E-07	2.0E-07	3.1E-07	3.5E-07	4.3E-07	1.1E-07	9.8E-08	2.6E-07	2.5E-07	2.6E-07	2.4E-07	1.9E-07	2.2E-07	6.6E-07	1.1E-06
6.0E-07	2.5E-07	2.0E-07	3.1E-07	3.5E-07	4.3E-07	1.1E-07	9.8E-08	2.6E-07	2.5E-07	2.6E-07	2.4E-07	1.9E-07	2.2E-07	6.6E-07	1.1E-06
5.2E-07	2.2E-07	1.7E-07	2.7E-07	3.0E-07	3.7E-07	8.3E-08	7.6E-08	2.2E-07	2.1E-07	2.2E-07	2.0E-07	1.5E-07	1.7E-07	5.6E-07	9.5E-07
5.2E-07	2.2E-07	1.7E-07	2.7E-07	3.0E-07	3.7E-07	8.3E-08	7.7E-08	2.2E-07	2.1E-07	2.2E-07	2.0E-07	1.5E-07	1.7E-07	5.6E-07	9.5E-07
1754	2076.	2365.	1931.	1931.	1866.	4827.	5310.	2767.	2478.	2414.	2680.	3379	4183.	2349	1758

TOTAL OBS -26304 TOTAL INV OBS - 1747 CALMS UPPER LEVEL - 0.00 CALMS LOWER LEV - 15.00
KEY ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

WOLF CREEK

TABLE 2.3-76

"This Table has been deleted"

WOLF CREEK

TABLE 2.3-77

"This Table has been deleted"

TABLE 2.3-78

VARIATION OF INTAKE K_C WITH WIND DIRECTION

UNIT VENT RELEASE

Wind Direction	Wolf Creek
N	0
NNE	0
NE	0
ENE	0.5
E	1.5
ESE	2.5
SE	1.5
SSE	0.5
S	0
SSW	0
SW	0
WSW	0
W	0
WNW	0
NW	0
NNW	0

TABLE 2.3-79

RELATIVE CONCENTRATION (X/Q) AT CONTROL BUILDING AIR INTAKE*

From Low Level Release

Percentage	Wolf Creek
5	5.33
10	3.62
20	0.66
40	0

For Unit Vent Release

Percentage	Wolf Creek
5	1.14
10	0.68
20	0.17
40	0

*Units for X/Qs are 10^{-4} m/sec^3

2.4 HYDROLOGIC ENGINEERING

2.4.1 HYDROLOGIC DESCRIPTION

2.4.1.1 Site and Facilities

The plant site is located on the east bank of Wolf Creek about 3.5 miles northeast of Burlington, Coffey County, Kansas. Wolf Creek is a tributary of the Neosho River.

Cooling water for the plant is provided by impounding water in a cooling lake on Wolf Creek. Figure 2.4-1 shows the site characteristics, general arrangement of facilities for the plant, and the cooling lake.

To create the cooling lake, an earth dam was constructed across Wolf Creek at a point about 4 miles upstream of the creek's confluence with the Neosho River, about 3 miles east of Burlington, and about 3 miles south of the plant. The drainage area of Wolf Creek at the cooling lake dam site is about 27.4 square miles.

The cooling lake supports WCGS which has an installed nominal capacity of 1,214 megawatts. It has a surface area of 5,090 acres and a capacity of 111,280 acre-feet at its normal operating level of 1,087 feet. (All elevations are mean sea level elevations in feet.) Supplemental makeup water is pumped from the John Redmond Reservoir on the Neosho River, about 4 miles northwest of the plant.

The station has a grade elevation of 1,099.5 feet and a floor elevation of 1,100.0 feet. The plant's main circulating water screenhouse is located on the east side of the lake. The circulating water is discharged back into the lake through a discharge structure located northwest of the plant (Figure 2.4-1). Baffle dikes and channels are provided to increase the travel time of the circulating water from the discharge point to the screenhouse.

A service spillway with a crest elevation of 1,088 feet and an auxiliary (emergency) spillway with a crest elevation of 1,090.5 feet are provided on the east abutment of the cooling lake dam, as shown on Figure 2.4-2, to pass floods up to and including the probable maximum flood (PMF). A low-level outlet works and discharge structure are provided for evacuation of the lake and to release the blowdown discharge. The ultimate heat sink is created within the cooling lake by constructing a submerged dam having a crest elevation of 1,070 feet. The essential service water system pumphouse is located on the northern finger of the ultimate heat sink (Figure 2.4-1).

The plant site is accessible from the Missouri Pacific Railroad, as well as U.S. Route 75. Ground topography along the plant access routes is high and the grades are located well above the PMF level in the lake. The plant access road and railroad bridge openings are designed to pass up to the 100-year flood discharge. Access to the dam is provided from local roads.

Heavily traveled roads affected by the lake have been rerouted. The township roads affected by the lake have been abandoned or relocated. The plant area is provided with a drainage system that drains into the cooling lake. This drainage system protects the plant area from flooding and is designed to pass a 100-year storm runoff without causing flooding at the plant site. The grading and drainage plans for the plant site and typical cross sections are shown in Figures 2.4-3 and 2.4-4, respectively.

2.4.1.2 Hydrosphere

The site is located in the Wolf Creek Watershed within the Neosho River Basin, as shown on Figure 2.4-5. The Wolf Creek Watershed is bounded by the Neosho River Valley to the west and Long Creek Watershed to the east. The confluence of Wolf Creek and the Neosho River is approximately 7.1 miles downstream of John Redmond Dam. The plant site is on Wolf Creek approximately 8.5 miles upstream from the confluence.

2.4.1.2.1 Surface Water

2.4.1.2.1.1 The Neosho River Basin

The Neosho River Basin in Kansas includes an elongated area of about 6,300 square miles, and lies chiefly within the Osage Plains physiographic section of the Central Lowland Province (Figure 2.4-5). The Neosho River originates in Morris County, Kansas, flows southeastward and south through the state, and drains into the Arkansas River near Muskogee, Oklahoma. The major tributary to the Neosho River above Burlington, Kansas, is the Cottonwood River, which originates in Marion County and joins the Neosho River about 6 miles east of Emporia, Kansas.

In the upper reaches of both the Neosho and Cottonwood rivers, stream gradients exceed 8 and 6 feet per mile, respectively, but then decrease to less than 2 feet per mile near Emporia. Further downstream, the channel gradient remains at about 1.5 feet per mile, being largely controlled by outcropping limestone and shale bedrock (References 21, p. 17; and 50, p. 8).

Flood control facilities on the Neosho River have been constructed to regulate the river due to frequent floods and droughts.

Overbank flows occur almost yearly on some of the streams within the basin; however, there have been sustained periods of no flow (Reference 24, p. 48). In order to reduce flood damages, a three-reservoir system located in the upper part of the basin has been constructed under the Flood Control Act of 1950. These reservoirs regulate flows, and therefore reduce flood damages and permit supplemental discharges during low-flow periods. Adequate storage to meet future increased water requirements during drought periods is provided.

The three reservoirs are illustrated on Figure 2.4-5. A fourth reservoir, the Cedar Point Dam, is to be constructed. Preconstruction planning for the Cedar Point Lake has been deferred at this time with no completion date proposed (U.S. Corps of Engineers). The regulating effects of these structures on Neosho River flows are discussed in Section 2.4.2.1. There is no major river control structure downstream of the site within the state of Kansas. The nearest downstream control structure is Pensacola Dam, near the city of Disney in Oklahoma, approximately 260 river miles from the site. The locations of principal stream gaging stations and their corresponding drainage areas are presented in Table 2.4-1 and on Figure 2.4-5.

2.4.1.2.1.2 Wolf Creek Watershed

Wolf Creek drains southward and into the Neosho River about 3.6 miles downstream of the gaging station at Burlington (Figure 2.4-6). The Wolf Creek Watershed consists of about 27.4 square miles and has a narrow, elongated shape with an average stream gradient of about 7.4 feet per mile. The upper part of the watershed is characterized by undulating to level topography, whereas the lower part is flat with well-established floodplains subject to frequent inundation (Reference 50, Plate A-16).

The stream channel is well defined and characterized by many meander bends. The channel banks are steep-sided and relatively stable. They vary in height from about 1.5 feet in the upper reaches to about 5 feet at the mouth. Aerial photographs indicate trees and heavy brush along the banks. Table 2.4-2 gives geomorphological characteristics under natural conditions for selected locations within the watershed.

The rain gauge nearest to the site is at Burlington. Data on average and maximum precipitation and snowfall for this station's period of record, 1885 to 1965, are presented in Section 2.3.

The cooling lake has a total surface area of 5,090 acres at a normal operating level of 1,087 feet. Many small farm ponds, both natural and man-made, are located within the watershed; these are utilized particularly during dry periods when natural streamflow

is minimal. Some of the ponds also serve as floodwater impoundments. These small impoundments are not significant to safety-related flooding of the site. No other control structures are located within the Wolf Creek Watershed.

2.4.1.2.1.3 Long Creek Watershed

Long Creek drains an area of about 84 square miles immediately east of the Wolf Creek Watershed. It drains southward and empties into the Neosho River about 3.5 miles southeast of the mouth of Wolf Creek. The stream channel is well defined but meanders considerably within its banks. Geomorphological and hydrological characteristics of this watershed are generally similar to those of the Wolf Creek Watershed. Flooding from Long Creek Watershed will not endanger the site.

2.4.1.2.2 Ground Water

Relatively small to moderate amounts of ground water can be obtained from the alluvial and terrace deposits of the Neosho and Cottonwood rivers. Well yields from these deposits are dependent upon the character and saturated thickness of the unconsolidated sediments. Limestone formations currently yield sufficient water of good quality for domestic and stock uses in parts of the Upper Neosho River Basin (Reference 24, pp. 60-61). However, most of the rock formations underlying the site area do not store enough water to yield useful quantities to wells.

The ground-water bearing capabilities of the Neosho River Basin are related to the geology of that region. There are only local areas in the basin where the geological conditions favor development of wells with moderate yields. Figure 2.4-7 presents a generalized geological cross section of the Neosho River Basin in Kansas. Table 2.4-3 lists brief descriptions of the upper geologic formations and related water supply characteristics in the general site vicinity. The thickness of the unconsolidated alluvium along the Neosho River near the site ranges from 0 to 40 feet. The depth to water is generally less than 20 feet in the river valley (Reference 28, pp. 12, 54, 55).

Water quality studies indicate that ground water from both the Cambrian and Ordovician formations is generally unsuitable for most water supply purposes. The quality of water supplies from the Pennsylvanian group would be suitable; however, the availability of such supplies is extremely low (Reference 24, p. 60).

Estimated ground-water yields from the alluvial and terrace deposits of the Neosho River near the site range from 10 to 100

gallons per minute and reflect local geomorphological characteristics (Reference 28, p. 55). The inferred recharge rate of the Neosho River ranges from 3 to 6 inches per year (Reference 26, p. 46).

Generalized well yields from the upland areas of both Wolf Creek and Long Creek range from 0 to 10 gallons per minute. The depth to the water table in these areas ranges from about 20 to 50 feet, except in scattered local areas where it may exceed 50 feet (Reference 26, pp. 54, 55).

2.4.1.2.3 Water Users

Water rights in Coffey County provide the basis for municipal, industrial, irrigation, and recreational uses. Owners, locations, and authorized rates of water use for this county are listed in Table 2.4-4 and shown on Figure 2.4-8. The city of LeRoy is the nearest municipal water user downstream of the Wolf Creek Watershed.

Incorporated municipal water supply systems from Coffey County to Oklahoma, which utilize the Neosho River as the source of supply, are listed in Table 2.4-5. These include domestic, commercial, industrial, and public-use water requirements.

There are 34 water rights permits granted for irrigation use along the Neosho River from the John Redmond Dam to Oklahoma. The maximum rate of appropriated surface water from the John Redmond spillway location to the Oklahoma state line is 239,404 gallons per minute, with a maximum quantity of 117,065 acre-feet (Reference 20).

Rural water districts in Kansas utilizing the Neosho River as the source of supply, either directly or indirectly, are listed in Table 2.4-5. They have been formed in those areas where ground-water resources are limited. Ground-water users within a 20-mile radius of the site are listed in Section 2.4.13.

2.4.2 FLOODS

2.4.2.1 <u>Flood History</u>

All floods of record and those of historic significance above and near the site area have been caused by excessive rainfall. Snowfall has had only a minor effect on flooding events. None of the available data or records related any flooding event to dam failure or to ice formation in lakes or along streams and rivers. Surges, seiches, and tsunamis are not applicable flood factors for the site region.

Descriptions of the flood histories of the Neosho River near the site, Wolf Creek in the project watershed, and Long Creek in the watershed immediately east of the site are presented in the sections that follow.

2.4.2.1.1 The Neosho River

Streamflow of the Neosho River near the site has been completely regulated since the John Redmond Reservoir was put into operation in 1963. The gaging station at Burlington, about 6 river miles downstream of the dam, has been in operation since June 1961 and has been monitored by the United States Geological Survey (USGS). The average discharge since 1961 is 1,605 cubic feet per second (cfs). The maximum discharge recorded was 26,200 cfs on September 13, 1961 (Reference 70, p. 320). Table 2.4-6 lists the annual maximum stage and peak discharge for this station's period of record.

Before construction of the John Redmond Dam, the nearest gage to the site was located at Strawn, about 18 river miles upstream of Burlington. Gaging at this station was carried out during the periods of June 7, 1902 to October 21, 1941; June 1, 1948 to September 30, 1950; and October 1, 1950 to June 30, 1963, by the Strawn State Bank, the U.S. Army Corps of Engineers, and the USGS, respectively (Reference 58, p. 9). The annual maximum stage and discharge measurements for the Strawn station are listed in Table 2.4-7.

The stages shown in Table 2.4-7 for water years 1885 and 1902 to 1947 are approximate, as they were derived from gage-height relations with the stages for upstream and downstream stations at Neosho Rapids and Burlington, respectively. Discharge data for this period are also approximate, based on subsequent stage-discharge relations. Data on past floods at the Strawn gaging station are summarized in three publications by the USGS and by Burns (Reference 67, p. 185; 1968, pp. 277-278; 1968, pp. 394-395; and 5, pp. 376-377). For the purpose of comparison, Table 2.4-8 includes corresponding estimated annual flood peak discharges for the John Redmond dam site under natural flow conditions for the years 1922 to 1951. Lowered peak discharges on some of the moderate floods at the present dam site can be attributed to valley storage between Strawn and Burlington.

The six greatest floods recorded at Strawn occurred in 1951, 1948, 1904, 1945, 1944, and 1909, in descending order of magnitude. The gage heights and discharges of the 1909, 1944, and 1945 floods approximated 26.0 feet and 75,000 cfs. According to the Neosho Valley Times of July 8, 1904, the flood of July 7, 1904, at Neosho Rapids was "the greatest flood that ever visited this community."

Also, the Burlington Republican of July 14, 1904, states that the "flood of July 8, 1904, was the greatest yet. -- The highest record heretofore was that of July 4, 1885" (Reference 68, p. 277).

The flood of July 1948 produced the second highest peak discharge of record at Strawn. Heavy rainfall occurred during the period July 14-22, with an accumulation of 12.5 inches at the storm's center. An average of 8.5 inches of rainfall occurred above the present John Redmond dam site (Reference 45).

The great storm of July 9-13, 1951, which was centered near the headwaters of the Neosho River, produced the maximum flood of record near the site, as it did over much of east-central Kansas. This flood falls outside the limits of reliable frequency analysis and proved to be greater in magnitude than the standard project flood on some reaches of the Neosho and Cottonwood rivers (Reference 24, p. 55; and 36, p. 299). Above normal rainfall had occurred in May and June of 1951, saturating the soils, and thereby providing optimum conditions for high yield runoff from subsequent rains. Other factors contributing to a high runoff-rainfall ratio from the area were high groundwater levels and bank storage near maximum capacity. Three distinct bursts of intense rains occurred during the period of July 9-13 which caused the record flood. An average of 11.8 inches of precipitation fell above the present John Redmond dam site, but unofficial records indicate that about 18.5 inches fell in the Neosho River headwater region during that same period (Reference 58, p. 17). Severe flooding occurred within the entire basin; Figures 2.4-9 and 2.4-10 outline those flooded areas for the month of July between Burlington and LeRoy. The flood hydrograph for the July 1951 flood at the present John Redmond dam site is presented on Figure 2.4-11.

Dependable records of flood data on the Cottonwood and Neosho rivers above Iola are not available for the years prior to 1895. However, various sources indicate that major floods had occurred in the years 1826, 1844, and 1885. The flood of 1844 was caused by a storm and conditions similar to those which caused the 1951 flood. From Indian legend, it has been inferred that the 1844 flood exceeded that of the 1951 event (Reference 67, p. 224). The subsequent stage discharge relation for the gaging station at Strawn has indicated that the July 1885 flood reached proportions of the floods of 1909, 1944, and 1945.

Two of the four reservoirs authorized for flood control purposes on the Neosho and Cottonwood rivers have been in operation since late 1964, and a third reservoir since early 1968. Subsequently, flows from Council Grove and Marion reservoirs on the upper

reaches of the Neosho and Cottonwood rivers, respectively, have been completely regulated. Flows downstream from these dams reflect partial to moderate regulation until flow is again completely regulated by the John Redmond Reservoir. If the Cedar Point Reservoir is completed it will provide further regulation of upstream flows on the Cottonwood River.

The effects of the four reservoirs on discharge frequency at the John Redmond dam site were evaluated by the U.S. Army Corps of Engineers (Reference 52, Plate A-47) and are illustrated on Figure 2.4-12. The curve shape reflects runoff generated from uncontrolled areas coincident with releases from the dams for floods of varying recurrence intervals. The sharp rise in the curve is indicative of the partial loss of control of very large floods. However, the Corps of Engineers has indicated, based on a frequency of occurrence, that a flood in the basin area above John Redmond Dam will produce a total volume greater than the flood storage allocated in the four-reservoir system only once every 16 years (Reference 52, p. 6). In addition, it would have taken more than three times the present flood storage provided in John Redmond Reservoir to control the great flood of 1951 (Reference 24, p. 74).

2.4.2.1.2 Wolf Creek Watershed

Wolf Creek is ungaged and, therefore, no streamflow records are available. Flooding of significance on Wolf Creek is that caused by inundation of the floodplain near its mouth.

During the great flood of July 1951, severe flooding occurred on the lower reaches of Wolf Creek and along the low flatland areas adjoining the Neosho River near Burlington. Several miles of the lower reaches of Wolf Creek were inundated by overbank flooding below an elevation of about 1,017 feet, as determined from high water marks at nearby locations. Had the four-reservoir system been in operation above Burlington, flood levels would have been reduced. Figure 2.4-9 delineates the floodplain for three major floods as modified by these reservoirs in the immediate site area. The stage of the 1951 flood near the mouth of Wolf Creek would have been about 2 feet lower than that actually experienced had the reservoir system been operative (Reference 50 , Plate A-16).

2.4.2.1.3 Long Creek Watershed

No gaging stations have ever been established on Long Creek. Severe flooding of the lower reaches of the stream occurred during the great flood of July 1951, as evidenced by high water levels reached at nearby locations. The high water levels near the

stream's mouth were approximately at elevation 1,010 feet (Reference 50, Plate A-15). Figure 2.4-9 illustrates the floodplain delineation of reservoir-modified flows for the floods of 1951, 1948, and 1957 in the immediate area.

2.4.2.2 Flood Design Considerations

The following flooding events are considered in arriving at the controlling event for the design-basis flood level at the plant site.

a. The probable maximum flood (PMF) in the cooling lake due to probable maximum precipitation (PMP) on the drainage area above the cooling lake dam (see Section 2.4.3 for a further discussion).

b. Flood waves due to potential failures of dams located upstream on the Neosho and Cottonwood Rivers (see Section 2.4.4 for a further discussion).

c. Effect of local intense precipitation equal to the PMP at the plant site (see Section 2.4.2.3 for a further discussion).

Surges, seiches and tsunamis are not relevant to the Wolf Creek plant site as discussed in Sections 2.4.5 and 2.4.6.

The occurrence of a landslide in the area adjacent to the cooling lake that may cause a flood wave and a higher lake flood water level is not considered possible because of the absence of topographic and geologic features conducive to landslide formation in the vicinity of the plant site. The plant grade is not affected by PMF or the backwater caused by PMF in the Neosho River or Long Creek because of the topographic ridges between the plant site and the Long Creek and Neosho River valleys.

Based on the considerations and studies made, the PMF condition in the lake is the controlling event that will produce the highest and most critical flood level in the lake.

The cooling lake dam and both the service and auxiliary spill-ways of the cooling lake are designed to withstand the effects of the PMP occurring over the entire drainage basin above the dam site.

Results of the hydrologic analyses and calculations made and discussed in Section 2.4.3 show that the PMF runoff with antecedent standard project flood (SPF) into the lake routed through the service and auxiliary spillways will raise the lake

water level to elevation 1095.0 feet at the dam site (see Section 2.4.8 for a discussion of the spillways). Superimposing the wind wave effect due to a sustained 40-mile per hour overland wind acting on the PMF water level will result in wave runup elevations of 1095.55 feet for significant waves and 1095.8 feet for maximum (one percent) waves at the station. The station's safety-related structures, with floor elevation of 1100.0 feet, are not affected by the PMF in Wolf Creek lake.

The maximum wave runup elevation at the main dam corresponding to significant waves due to a sustained 40-mph overland wind acting on the PMF water level is 1099.0 feet. The top of the dam is at elevation 1100 feet (see Section 2.3 and Appendix 3A for a further discussion of wind speed and directions at the Wolf Creek site).

Any site grading modification which could cause an impediment to the drainage around the plant (West Reach and Main Reach of Figure 2.4-3) would have to be so extensive in nature that standard engineering practice would dictate an evaluation of the storm drainage patterns for the modification. Any future extensive modifications to the site finish grade would be evaluated to determine compliance with out commitment to prevent plant storm runoff from flooding safety-related structures.

Because of 1) the natural slope of the plant compound toward the lake; 2) no credit taken in plant safety analysis for culverts and channels; 3) design of the plant compound finish grade; and 4) the commitment to evaluate extensive site grading modifications the site drainage system including grading, culverts and channels is not considered safety-related.

2.4.2.3 Effects of Local Intense Precipitation

Natural ground elevation at the plant site before plant construction varied from elevation 1114.00 feet to 1100.00 feet. The natural drainage pattern of the plant area is to the east, south, and west.

A storm drainage system was developed to drain water away from the plant buildings using catch basins, storm drain pipes and drainage ditches. All the finished grades within the plant site area are sloped away from buildings, and the storm runoff is carried away from the site toward the natural drainage courses and finally into the cooling lake. The drainage system is designed to pass a 100-year storm runoff without causing flooding at the plant site. The design rainfall intensities for one-in-100-year storm are shown in Table 2.4-9.

In the event of a local intense precipitation of the severity of a PMP at the site, the storm drainage system will drain the runoff away from the site at its design capacity. Storm runoff in excess

of the design capacity of the storm drainage system, together with the spillover from the roofs of the buildings, would overflow the peripheral roads and railroad tracks, which are at a lower elevation than the floor elevation of the safety-related structures. The peripheral roads and tracks would act as weirs, and the storm water would flow away from the plant buildings toward the east, south, and west into the cooling lake.

All safety-related buildings with flat roofs, where ponding could occur, are designed with a two inch pitch towards the roof drains. A gravel stop fastened to a 2x6 was used around the perimeter of the roofs. No parapets or curbs exist at these roofs. Therefore, the maximum possible ponding depth is approximately four inches.

The design basis for the roof drainage system is a rainfall intensity of 7.4 inches per hour with a recurrence interval of 100 years. Any rainfall in excess of this design intensity would overflow the roof curb and the building walls to the site drainage system.

During a local probable maximum precipitation, the storm drainage system carries runoff up to the design capacity. Runoff in excess of the design capacity flows outside the system to the natural drainage outlet of the site. Provision is made in the design of the plant yard grading to prevent backwater from endangering safety-related structures. In this analysis no credit is taken for the roof drains and, therefore, they are not considered to be safety-related.

2.4.2.3.1 Precipitation Distribution

The local intense precipitation (LIP) at the plant site is obtained using the methodology from NUREG/CR-7046 (Reference 75) and HMR 52 (Reference 76) in 5 minute increments over a 6-hour duration. The 1-hr, 1-mi^2 LIP at the plant site is 19.0 inches ad the 6-hr, 1-mi^2 LIP is 28.79 inches. The maximum rainfall intensities for different durations during the LIP are shown in Table 2.4-10.

2.4.2.3.2 Analysis

The site plan (Figure 2.4-3, Sheet 1) shows the location of roads and railroad tracks around the station's buildings. The plant area is graded to elevation 1099.5 feet MSL adjacent to the buildings and slopes away towards the peripheral roads. The plant floor elevation is 1100.0 feet MSL. It is conservatively assumed in the analysis that the site drainage system is not functioning at the time of the LIP.

The U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Centers Hydrologic Modeling System (HEC-HMS) (Reference 77) computer model was used to estimate runoff discharge during the LIP event at the plant site. Then, the overland flow hydraulic conditions for the estimated discharges were modeled using the USACE Hydrologic Engineering Centers River Analysis System (HEC-RAS) (Reference 78) computer model. The inputs, development, and results to these hypothetical simulations are described below.

To estimate runoff discharge, the plant area is divided into three sub-basins, as shown in Figure 2.4-3, Sheet 2. Sub-basin 1 is the area west of the powerblock and bounded by Track No. 1 and No. 5 on the north and Track No. 1 on the west and south. The storm runoff over this sub-basin flows west, away from the main plant buildings over plant roads, between gaps in the security barriers, and over Track No. 1 into the cooling lake. Sub-basin 2 contains the powerblock and is bounded by Sub-basin 1 on the west and Sub-basin 3 on the east. The storm runoff over this sub-basin flows north to south over Track No. 1 and plant roads into the cooling lake. Sub-basin 3 is the area east of Sub-basin 2 and the primary access parking area, bounded by the peripheral road on the east, Track No. 1 on the south, and natural high ground on the north. The storm runoff over this sub-basin flows north to south over Track No. 1 and plant roads into the cooling lake.

HEC-HMS requires a transformation method be specified for each sub-basin. A unit hydrograph approach was adopted from the Soil Conservation Service's (i.e. SCS, now the Natural Resources Conservation Service [NRCS]) synthetic graph. The lag time specified for HEC-HMS is also adopted from the SCS. To add conservatism to the HEC-HMS model, plant cover (canopy), surface storage, infiltration losses, and baseflow were not specified. The rainfall on the roofs of the buildings is assumed to contribute to runoff without any retention.

The area contributing to runoff from Sub-basin 1 is 0.032-mi^2. The lag time is 7 minutes. The calculated peak runoff from Sub-basin 1 is 843 cubic feet per second, with an arrival time of 11 minutes into the hydrograph. The area contributing to runoff from Sub-basin 2 is 0070-mi^2. The lag time is 14 minutes. The calculated peak runoff from Sub-basin 2 is 1,242 cubic feet per second, with an arrival time of 21 minutes into the hydrograph. The area contributing to runoff from Sub-basin 3 is 0.050-mi^2. The lag time is 17 minutes. The calculate peak runoff from Sub-basin 3 is 799 cubic feet per second, with an arrival time of 25 into the hydrograph.

The next step is to determine the LIP water surface elevation at the plant site using HEC-RAS. The HEC-RAS model is a steady state, one-dimensional hydraulic model that needs channel geometry descriptions and hydraulic properties (i.e. Manning's roughness coefficient) as input.

The topography of the plant site warranted two flow reaches within the HEC-RAS model, as shown in Fig. 2.4-3, Sheet 3. Flow in the center and east side of the plant area generally travels from north to south and was modeled as one reach (MAIN reach), while flow on the west side of the plant area travels towards the west and was modeled as a separate reach (WEST reach). The MAIN reach and WEST reach are divided by the vehicle barriers just west of Road E99,673.

The contributing flows into the MAIN reach are from Sub-basin 2 at the top of the reach with a peak discharge of 1,241.9 cfs and midway through the reach, from Sub-basin 3 with a peak discharge of 799.1 cfs, for a total flow in the bottom half of MAIN reach of 2,041 cfs. The contributing flow into the WEST reach is from Sub-basin 1 with 843.2 cfs. The Manning's roughness coefficients (n-values) into the HEC-RAS model are 0.030 for grass, 0.028 for gravel, and 0.015 for asphalt and concrete. The contraction and expansion coefficients are 0.1 and 0.3, respectively, for subcritical flow and minor contraction and expansion of flow. For situations where significant expansion and contraction occur (i.e. buildings and vehicle barriers), the coefficients were increased to 0.3 and 0.5. Roadway embankments and other topographical features running perpendicular of parallel to the flow direction are incorporated into the HEC-

RAS model as inline or lateral weirs with a weir coefficient of 2.6. The normal depth option was used as the boundary condition by inputting the energy slope to determine the normal depth. If the energy slope is not known, the slope can be approximated by the ground slope, which is 0.011 for the MAIN reach and 0.008 for the WEST reach.

The safety related buildings of the power block are all found in the MAIN reach and have a floor elevation of 1100.0 feet MSL. The maximum calculated LIP flood water elevations varies through the safety elated buildings at the power block from 1099.92 feet MSL at the north end to 1099.52 feet MSL at the south end.

2.4.2.3.3 Ice and Snow

Estimation of the snow load on the roofs of the safety-related structures is based on a frequency analysis of snowpack on the ground combined with a local winter probable maximum precipitation (PMP), which is assumed to occur in the form of snow. The assumption of PMP to occur in the form of snow is very conservative, since snowfall depends on latitude, altitude, and temperature. By combining the antecedent snowpack and the PMP in the form of snow, additional conservatism of the snowpack load is obtained.

Historical snowpack depth data at stations near the sites are analyzed statistically for the months of December through March. Frequency analysis of the maximum monthly snowpack is performed on the data, and a 100-year frequency snowpack depth for each month is selected from the analysis. Based on the analyses, the months of February and March exhibit the highest combined snowpack and winter PMP load.

In estimating the snow load on the roofs of the safety-related structures, the effects of wind action on the snowpack and snowfall are considered. This effect tends to decrease the load on elevated buildings and could increase the load on adjacent low roofs due to snow drifts.

Site drainage and plant yard grading are designed to handle the runoff from local winter PMP without endangering safety-related structures. In establishing the required grading and outlets, clogging of inlets and certain size culverts by ice is assumed in the design.

The maximum postulated ground snow loads have been developed based on frequency analyses of the maximum snowpack on the ground, combined with the local probable maximum winter precipitation in the form of snow. The roof snow load used in the design of the safety-related structures is determined by multiplying the ground snow load by the appropriate coefficient CS given in Figure 2.4-62. The minimum roof snow load used in design is taken as 0.8 times the ground snow load and is increased on the lower levels of multilevel roofs and on roof areas adjacent to projections to account for wind action and drifting. The maximum drifted snow load is taken as 3 times the enveloping ground snow load.

Two snow loading conditions are analyzed in the design of safety-related structures, as described in Section 3.8.4.3. The maximum 100-year-recurrence snowpack from each of the sites is analyzed, in combination with other live loads. The enveloping 100-year-

recurrence ground snowpack load for the sites is 91 psf, as shown in Table 2.4-41. This load is increased or decreased when applied to roofs, in accordance with the coefficients given in Figure 2.4-62.

In addition, the probable maximum winter precipitation, PMP (winter), in the form of snow, coincident with the 100-year-recurrence snowpack, is analyzed in combination with other normal operating live loads. The enveloping 100-year-recurrence ground snowpack plus PMP (winter) for the sites is 153 psf. This load is increased or decreased when applied to the roofs in accordance with the coefficients given in Figure 2.4-62.

The maximum postulated ground snow load value is shown in Table 2.4-41. The snow load is combined with other loads, in accordance with the loading combinations presented in Section 3.8.4.3.

The snow pack with 100-year recurrence interval for Topeka and Wichita, Kansas, is determined from a statistical analysis for the 25-year period of record from 1949-1973. The snow pack with a recurrence interval of 100 years for Topeka and Wichita are 19.9 inches and 20.4 inches, respectively. A conservative value of 0.23 g/cm^3 for the snow pack density is obtained from analysis of historical records. The detailed description of the analysis in arriving at the snow pack density is given in Section 2.3.

The 100-year snow pack loads on the ground at Topeka and Wichita are 23.8 psf and 24.4 psf, respectively.

To provide a conservative design, it was assumed that the 100-year snow pack load is antecedent to and superimposed on the winter PMP for a duration of 48 hours falling on an area of 10 square miles or less (Reference 73). The load of the 48-hour winter PMP is 103.0, 98.8, 111.3, and 127.9 pounds per square foot for the months of December, January, February, and March, respectively. The effects of wind erosion and drifting are neglected in estimating the snow loads on the ground.

2.4.3 PROBABLE MAXIMUM FLOOD (PMF) ON WOLF CREEK

2.4.3.1 Probable Maximum Precipitation (PMP)

The seasonal PMP over the 27.4-square mile drainage area of Wolf Creek was obtained from Reference 73. Monthly and all-season high depth-duration data for the basin, from the above publication, is given in Table 2.4-11.

The location of the dam site and watershed is characterized by Zone 4 as shown in Reference 73. The precipitation data for the

summer month of July are the most critical and are equal to the all-season high values. The PMP distribution is shown in Table 2.4-12 and on Figure 2.4-12. To maximize the runoff, the hourly rainfall distribution presented in Table 2.4-13 was based on U.S. Army Corps of Engineers procedures (Reference 44).

2.4.3.2 Precipitation Losses

The topsoil in the Wolf Creek watershed is clay loam. The U.S. Army Corps of Engineers studied the hydrology of the Neosho River basin (Reference 45). Wolf Creek watershed is a part of the lower Neosho River basin. The U.S. Army Corps of Engineers' Tulsa district used an initial loss of 1.00 inch and a constant infiltration loss of 0.04 inch per hour (Reference 45) for the John Redmond Reservoir spillway design flood calculations. A constant infiltration loss of 0.04 inch per hour was used for the Wolf Creek watershed PMF studies.

It is assumed that a SPF has preceded the PMF. For that reason the soil moisture supply within the watershed prior to the occurrence of the PMP is assumed to be above normal. Due to these assumptions, initial loss (i.e., rainfall absorbed into the ground) for PMP was not considered. These combined assumptions are conservative for calculation of the PMF. Figure 2.4-13 shows the calculated rainfall excess distribution at various periods of precipitation.

2.4.3.3 Runoff Model

The design flood hydrographs were determined by dividing the Wolf Creek watershed into three areas as shown on Figure 2.4-14. Area 1 represents the drainage area at the upstream end of the lake. Area 2 is the remaining area of the watershed excluding the lake area, and Area 3 is the lake area. The relationship between the total drainage area and the lake surface area has an influence on the hydrograph. In this case, the surface area of the lake is approximately 8.2 square miles, which is approximately 30 percent of the total drainage area of Wolf Creek at the dam site. Inflow into a reservoir traverses the reservoir length much more rapidly than along a similar length of natural stream channel. Therefore, hourly rainfall amounts over the reservoir surface area (Area 3) were converted into equivalent cubic feet per second and added to the total runoff hydrograph resulting from Areas 1 and 2. Snyder's synthetic unit hydrograph method (Reference 7) was used to derive the runoff hydrograph from Areas 1 and 2.

U.S. Army Corps of Engineers (Reference 45) made a detailed hydrologic study of the Neosho River basin in connection with the

design of the John Redmond Reservoir. Data from this study were used as input to Snyder's mathematical model to generate a unit hydrograph for the Wolf Creek drainage basin.

Table 2.4-13 presents a comparison between the important unit hydrograph parameters of the Wolf Creek drainage basin and those developed for the John Redmond and Cedar Point reservoir projects (References 45 and 58). The Wolf Creek watershed has a narrow elongated shape. The values of Snyder's coefficients C_P and C_T of the unit hydrographs developed for the Neosho River at Council Grove and for the Cottonwood River at Cottonwood Falls were used for the John Redmond reservoir drainage basin by dividing the total drainage area into a number of sub-basins. Wolf Creek watershed is adjacent to some of these sub-basins of the John Redmond watershed. Some of these sub-basin areas have drainage areas as low as 50 square miles.

The watershed for the Cedar Point project is fan-shaped, and its stream slope is steep (Reference 57, Page 3-1 and Plate 6). In contrast, Wolf Creek basin has a milder average waterway slope and a narrow elongated shape. Hence, it is more appropriate to use the John Redmond values for Wolf Creek project, since the two projects are in hydrologically similar regions. The values of C_P = 0.84 and C_T = 1.84, which are the more conservative of those used for the John Redmond reservoir, were therefore adopted for the Wolf Creek project.

The pertinent unit hydrograph parameters for pre- and post-project conditions are listed in Table 2.4-14.

2.4.3.4 Probable Maximum Flood Flow

There are no other existing or proposed dams on Wolf Creek upstream or downstream of the plant site that will affect the water level at the plant site, except the cooling lake dam for the power plant. The cooling lake dam is designed to withstand the effects of the PMF and coincident wind wave action. A service spillway with uncontrolled crest and an auxiliary spillway are provided to pass floods up to and including the PMF. The dam and the spillways are protected against erosion due to wind wave action and flood flows (see Section 2.4.8.2 for a discussion of erosion protection).

A 1-hour unit hydrograph under natural conditions (without the cooling lake) is shown on Figure 2.4-15. The 100-year and PMF flood hydrographs for Wolf Creek at the dam site under natural conditions are shown on Figure 2.4-17. From Figure 2.4-17, the PMF and the 100-year flood peaks under natural conditions are 40,877 cubic feet per second and 8,363 cubic feet per second,

respectively. These hydrographs are given for comparison purposes only. The synthetic 1-hour unit hydrographs for the sub-basin Areas 1 and 2 are shown in Figure 2.4-16. The pertinent parameters use in developing the unit hydrographs are given in Table 2.4-14. The hourly rainfall amounts over the cooling lake surface area were converted into equivalent cubic feet per second and added to the runoff hydrograph resulting form sub-basin Areas 1 and 2. The input used in computing the flood hydrographs (SPF and PMF) is shown in Table 2.4-15. The combined unit hydrograph ordinates used in the flood hydrograph computations are taken from Figure 2.4-16. The precipitation magnitudes used in the determination of SPF were assumed to be 50 percent of the corresponding values developed for PMP, with the same time distribution. The PMF hydrograph for Wolf Creek at the main dam site under modified conditions (with the cooling lake) is shown in Figure 2.4-18. The PMF peak under modified conditions is 82,089 cubic feet per second. The SPF and 100-year flood hydrographs for modified conditions are shown in Figure 2.4-19.

2.4.3.5 Lake Water Level Determinations

The maximum still water level in the cooling lake was determined by routing the PMF hydrograph with an antecedent SPF hydrograph through the lake over the 100-foot-long service spillway and the 500-foot-long auxiliary spillway. The starting pool elevation used for the flood routing computations was 1088.0 feet, which is the crest elevation of the service spillway. It was assumed that the start of the PMF hydrograph was 3 days after the end of precipitation causing the SPF. As the total duration of the precipitation causing SPF was 48 hours, the PMF hydrograph starts 120 hours after the start of the SPF, in the flood routing computations. The computer program "Spillway Rating and Flood Routing" (Reference 53) developed by the U.S. Army Hydrologic Engineering Research Center was used in the computations. The tailwater rating in the chute just downstream of the spillway was developed by the program with a downstream apron elevation of 1074.0 feet and an apron width of 30 feet. Figure 2.4-20 shows the elevation-area-capacity relation for the Wolf Creek lake.

The computer program used for spillway rating and flood routing does not take into account the semicircular plan shape of the ogee crested spillways used in the Wolf Creek Lake design (see Figure 2.4-21). The difference between the flow over straight and circular spillways is due to convergence of stream lines in the latter case, hence the coefficient of discharge for circular spillways is slightly lower (Reference 63 and 51). A comparison is made between the coefficients of discharge for the straight and circular spillways under free flow conditions as given in the Engineer Manual, "Engineering and Design, Hydraulic Design of

Spillways", (Reference 51). For the semicircular spillway crest, with a length (perimeter) of 100 feet, the radius (R) is 31.83 feet and P/R = 0.157, where P is the approach depth at spillway. For P/R = 0.15 and HD/R of about 0.2, the coefficient of discharge for a circular spillway is 3.96 (Reference 51, Plate 55), whereas the maximum coefficient for a straight spillway for H/HD = 1.0 is 4.03. (HD and H are the design head and the actual head, respectively). This means that at design head, the circular spillway crest effectively discharges 98 percent of the discharge for a straight spillway of the same length. Reflecting this change in the length of the service spillway crest, it means that the 100 foot long (perimeter) circular spillway crest is as effective as a straight spillway 98 feet wide. The maximum pool elevation for a 95-foot circular service spillway crest using the flood routing program is 1094.98 feet, and for the 100-foot straight service spillway crest it is 1094.94 feet. The above elevations are obtained when the routing is performed together with the auxiliary spillway. From this analysis, it is clear that the difference in elevations (between circular and straight spillway crests of the same length) is not significant.

The spillway rating developed by the above program was plotted and shown in Figure 2.4-22. The lake water level variation with time obtained from the flood routing computations is presented in Figure 2.4-23. The maximum water level attained at the main dam site is elevation 1095.0 feet with a peak outflow of 22,845 cubic feet per second passing over the spillways.

The loss of cooling lake capacity due to sedimentation over a period of 40 years, including the sediment in the water pumped from John Redmond reservoir is approximately 1 percent of the cooling lake capacity (Section 2.4.8.2) at normal pool elevation. The sediment from the water pumped from John Redmond reservoir settles in the entire reservoir. The sediment from Wolf Creek stream flow is only about one half of 1 percent of the lake capacity. Most of this settles below the normal pool elevation of 1087.0 feet, and only a small percentage of the sediment deposits in the upper reaches around the normal pool elevation (Reference 1). Therefore, the modification to the elevation-area-capacity information on the lake and hence its effect on the maximum still water elevation is insignificant. Further, as the plant location is not in the upper reaches but in the middle reaches of the lake, there would not be any significant change in the flood elevation at the plant site due to sedimentation.

The maximum water level at the plant site was determined by making backwater calculations from the dam site to the plant site along the cooling lake, a distance of about 3.2 miles. The backwater computations were made using the U.S. Army Corps of Engineers

computer program "Water Surface Profiles" (Reference 56) for a maximum spillway flood discharge of 22,845 cubic feet per second with a starting elevation of 1095.0 feet. Eighteen cross sections were used between the dam site and the plant site. Cross sections were taken at intervals of 1,000 feet. The values used for Manning's roughness coefficient were 0.03 for the main channel and 0.05 for the floodplain. The backwater computations resulted in a maximum water surface elevation of 1095.0 feet at the plant site, i.e. no increase in pool elevation due to backwater effect. The plant floor elevation is 1100.0 feet, and the plant grade is 1099.5 feet.

2.4.3.6 Coincident Wind Wave Activity

2.4.3.6.1 Plant Site

The effect of a sustained 40-mile per hour overland wind from a critical direction was superimposed on the PMF pool elevation at the plant site. The significant (Reference 52) and maximum (1 percent) wave heights were computed to be 2.9 feet and 4.9 feet, respectively. Wind-generated wave runup at the plant site was based on a deep water condition with an effective fetch (Figure 2.4-24) of 2 miles, a wind-tide fetch of 3 miles, a water depth of 36 feet, and the waves acting on a 30:1 (horizontal-to-vertical) smooth ground slope. From an analysis, it was found that the waves are deep water waves (References 47 and 54). The estimated runup by maximum waves is approximately 0.8 foot. Superimposing this wave runup value on the PMF level at the plant site resulted in a wave runup elevation of 1095.8 feet, which is 4.2 feet below the plant floor elevation of 1100.0 feet.

Another combination of pool elevation and wind speed, viz, pool elevation at spillway crest (1088.0 feet) and a probable maximum overland wind speed of 90 miles per hour (Section 2.4.5.1), was also tested to determine the worst combination from the viewpoint of wave runup which is reasonably possible. The estimated runup for maximum waves for this case was computed to be 2.5 feet, and corresponding wave runup elevation is 1090.5 feet. Thus, the 40-mile per hour wind superimposed on PMF pool is the governing event in deciding the minimum plant grade elevation. The plant grade elevation of 1099.5 feet is such that no safety-related structures are exposed to the floodwaters under the worst possible condition as determined above.

2.4.3.6.2 Main Dam Site

The maximum wave runup on the main dam and saddle dam V was determined by superimposing the significant wave effects of a coincident 40-mile per hour overland wind on the PMF level at the

dam site. The use of the significant wave is in accordance with the practice of U.S. Army Corps of Engineers (Reference 55) to estimate freeboard allowance for wave action above the maximum reservoir surcharge level. The wave runup calculations are based on an effective fetch (Figure 2.4-25) of 2.4 miles, a wind-tide fetch of 6.1 miles, a water depth of 51 feet, and an upstream slope of the dam of 3:1 (horizontal-to-vertical) with riprap. The runup due to significant wave effects is 3.98 feet, resulting in a wave runup elevation of 1099.0 feet at the dam site. The wave runup elevation due to a 90-mile per hour wind superimposed on a pool elevation at the spillway crest is 1097.9 feet at the dam site. An elevation of the top of the dam of 1100.0 feet is provided.

It can be seen from Table 2.4-16 that the wave runup elevation over the PMF pool elevation due to the maximum wave at the main dam is 1100.40 feet. This is 0.4 foot above the top-of-dam elevation of 1100.0 feet. A gravel service road 1 foot thick is provided above the top of the dam at elevation 1100.0 feet. The top of the road elevation is 1101.0 feet. The wave splash associated with runup due to the few waves up to the maximum wave is less than about half a foot above the top of the dam, hence potential erosion due to wave splash will not damage the dam.

2.4.3.6.3 ESWS Pumphouse

A summary of wave runup elevations at the plant site, dam site, and Seismic Category I ESWS pumphouse for both 40-mph and 90-mph wind speed, is given in Table 2.4-16.

2.4.4 POTENTIAL DAM FAILURES (SEISMICALLY INDUCED)

Appendix A of Regulatory Guide 1.59 has been replaced by ANSI Standard N170-1976, "Standards for Determining Design Basis Flooding at Power Reactor Sites." Sections 6 and 9 of that standard, "Nonhydrologic Dam Failures," and "Combined Events Criteria," respectively, have been followed in this analysis. Coincident and domino-type failures have been considered and evaluated, including instantaneous removal of the major dams.

The only water impoundments upstream of the cooling lake in the Wolf Creek Watershed are small storage ponds, both natural and man-made. These ponds vary in size from small potholes of depression storage to minor lakes of a few acres. A conservative estimate of the total volume of these small ponds is about 2,000 acre-feet, which would be less than two percent of the total cooling lake volume. If any of the water from these impoundments were released, they would have negligible effects on the cooling lake.

Breaking of the cooling lake earth embankments associated with the Probable Maximum Flood (PMF) would cause that impounded water and the runoff from the watershed upstream of the lake to discharge directly to the Neosho River floodplain. Since the plant grade is at elevation 1,099.5 feet, there would be no possibility of the plant facilities flooding due to this phenomenon. Flood potential at the plant site due to the PMF on Wolf Creek is discussed in Section 2.4.3.

The nonhydrologic dam break condition examined in this investigation included the assumption of complete and instantaneous removal of the upstream dams on the Neosho and Cottonwood rivers. In addition, the extremely conservative assumption of a coincident Standard Project Flood (SPF) and 2-year extreme wind speed for a critical direction and length of effective fetch were also considered. Their combined effects near the site are further discussed in Sections 2.4.4.1 through 2.4.4.3. This combination of the flood-causing events is consistent with NRC policy for providing adequate design floor bases (ANSI Standard N170-1976, Section 9).

There are three major reservoirs presently in operation within the Upper Neosho Basin which were proposed and authorized as part of a four-reservoir system to be utilized for flood control purposes. The John Redmond, Council Grove, and Marion reservoirs and the proposed Cedar Point reservoir are shown on Figure 2.4-5.

Physical and design criteria of the projects are listed in Table 2.4-17. Design capacity curves for the existing reservoirs are shown on Figure 2.4-26. The spillway gate regulation curves and the tailwater rating curves are shown on Figures 2.4-27 and 2.4-28.

Because the dams are assumed to fail instantaneously and with complete removal of debris, no discussion of dam seismic design criteria is presented. This assumption is conservative.

2.4.4.1 Dam Failure Permutations

The existing and proposed upstream dams are described in the preceding paragraphs. All the dams studied are situated in a region which has experienced relatively few earthquakes, all of which were minor to moderate in intensity. The history of recorded earthquakes in the region with maximum Modified Mercalli Intensities of V to VII is discussed in Section 2.5.2.

Because of the low seismicity within the Neosho River Basin, and because an earthquake of a magnitude which could cause severe damage or complete failure of these dams is unlikely, the existing

and proposed dams have not been designed for seismic acceleration. Furthermore, the plant site on Wolf Creek is at elevation 1,099.5 feet and is approximately 8.5 miles upstream from the confluence with the Neosho River. The maximum pool elevation in John Redmond Reservoir is at elevation 1,075 feet or 24.5 feet below the plant grade. Therefore, the probability of flooding to the site due to dam failure is very low. However, for the purpose of this study, a number of dam failures were postulated, and the resulting floods were evaluated.

As a conservative assumption, complete failure of the dam due to the SPF was considered. It was not necessary to relate seismic failure to either the Safe Shutdown Earthquake or the maximum historic earthquake, because the assumption of complete, instantaneous removal of the dams was considered. The floods resulting from a partial erosion failure of earth embankments due to overtopping or from a seismically induced breaching of earth embankments would not be as severe as the case of a complete dam failure coincident with the SPF.

Due to the relative distances between the dams and the site, both single dam failure and multiple dam failure were considered as follows:

a. Single dam failures;

   1. John Redmond Reservoir coincident with the SPF;

   2. Council Grove Reservoir coincident with the SPF;

   3. Marion Reservoir coincident with the SPF; and

   4. Proposed Cedar Point Reservoir coincident with the SPF;

b. Multiple dam failures;

   1. Sequential failure of Marion and Cedar Point reservoirs coincident with the SPF;

   2. Sequential failure of Marion, Cedar Point, and Council Grove reservoirs coincident with the SPF; and

   3. Sequential failure of Marion, Cedar Point, Council Grove, and John Redmond reservoirs coincident with the SPF.

By considering successive routing of the flood waves resulting from dam failure in each of the above-mentioned cases, the water levels which would be present at the site were determined.

2.4.4.2 Unsteady Flow Analysis of Potential Dam Failures

2.4.4.2.1 Dam Failure Water Release Rate

The method used to determine the outflow which results from the instantaneous failure of a dam is described by Stoker (Reference 42, pp. 333, 513). The assumptions used in this method are as follows:

a. Complete and instantaneous removal of the dam sections that are presumed to fail;

b. The actual cross section at the dam site is rectangularized and resolved into channel and overbank segments which are handled separately;

c. Vertical accelerations and cross-channel flow are ignored;

d. In the case of domino-type failures, failure of downstream dam is presumed if a flood resulting from upstream dam failure raises the water level 5 feet above the top of the downstream dam (Reference 38); and

e. A conservative constant downstream water depth of 10 feet is assumed to exist before the dam failure. In reality, the tailwater depth is increasing with time. Therefore, the computed water release rate based upon a constant tailwater depth will be higher.

Conservatively, a maximum flood control reservoir level, including the SPF, Figure 2.4-29, was assumed at the instant of complete dam failure. The initial conditions and peak discharges are summarized in Table 2.4-18. Details of each analysis of outflow rates through the dambreak section are shown on Figure 2.4-30.

The following symbols are used in the calculations of water release rate due to instantaneous removal of the dam:

H_o = the water level below the dam assumed to be maintained at the constant depth;

H_1 = the water level above the dam;

Q = the discharge through the dambreak section which is resolved into the channel and overbank segments;

dV = the volume of water released from the dambreak section;

C_i = the wave propagation speed associated with ith level;

V_i = the amount of water stored in the reservoir at ith level; and

H_i = the water level above the dam site at ith level.

According to Stoker, the discharge rate, dQ/dt, per unit width at the dam site is a function of the depth H_o and H_1. This function is reproduced on Figure 2.4-31 (Reference 42, pp. 333-513). As water flows out of the reservoir, H1 decreases and, consequently, the flow rate, dQ/dt, is reduced. For a given increment of time, dt, the discharge rate, dQ/dt, is assumed to be constant, and the amount of the water released from the reservoir is evaluated by multiplying the discharge, Q, with a time period, dt. By successive iterations, namely, defining a time increment, dt, the volume of water stored in the reservoir can be calculated by subtracting the volume of water flowing through the dambreak section from the initial reservoir storage. Therefore, a different water level, H_1, can then be computed based on the area and capacity curves of the reservoirs. By defining another H_i, other values of dQ/dt, Q, dV, and V are obtained. This analysis is discontinued when the water level, H_i, reaches the initial water level below the dam, H_o.

The above computations for the water release rate are very conservative. This is because Stoker's theoretical curve, as shown on Figure 2.4-31, was obtained by assuming "A horizontal tank of constant cross section extending to infinity in both directions. . ." (Reference 72, p. 334). As a consequence, the computed theoretical discharge rates will be higher than potential natural conditions.

2.4.4.2.2 Unsteady Flow Model

A computer program (SOCH) developed by the Tennessee Valley Authority (TVA) was used for the flood wave routing through the river channels and reservoirs of the Neosho River above the site. This mathematical model has been successfully applied to a number of complex, unsteady flow conditions in the TVA's river basin and reservoir network (Reference 14). The basic principle and input-output requirements are briefly discussed below.

The TVA model was formulated to solve the basic equations of unsteady, gradually varied flows in reservoirs and natural rivers.

The two equations of unsteady, gradually varied flow are:

a. Equation of continuity -

$$\frac{\partial(AV)}{\partial x} + B \frac{\partial h}{\partial t} - q = 0 \qquad [2.4\text{-}1]$$

b. Equation of motion -

$$g \frac{\partial h}{\partial x} + \left(V \frac{\partial V}{\partial x} + g S_f + \frac{q}{A} V \right) = 0 \qquad [2.4\text{-}2]$$

in which A = Flow area;

V = Mean velocity;

x = Distance;

B = Surface width;

h = Water surface elevation;

t = Time;

q = Lateral local inflow per unit distance and time;

g = The gravitational constant; and

S_f = The energy gradient given by

$$S_f = \frac{n^2 V|V|}{2.21R^{4/3}}$$

where n = Manning's roughness coefficient; and

R = Hydraulic radius.

Even though the TVA's unsteady flow model was derived for gradually varied flow, applications of the SOCH program to the study of the detailed bore profile of the Watts Bar Reservoir and instantaneous dam failures indicated good agreement with model studies (Reference 40 and 46). The open-channel flow is assumed to be one-dimensional. The flow characteristics, such as depth and velocity, are considered to vary with time only in the longitudinal direction. The channel geometry is three-dimensional.

The necessary input data for routing in a particular river channel or reservoir consist of upstream and downstream boundary conditions, such as discharge or water surface elevation versus time, or a stage-discharge relationship. A steady flow profile may be used as the initial condition. In addition to boundary and initial conditions, input data on local inflows, channel geometry, and boundary roughness (Manning's "n") must also be prescribed. From these input data, the model can determine flows, mean velocities, and water surface elevations at any number of desired locations and times.

2.4.4.2.3 Application of the Unsteady Flow Model

The TVA's SOCH unsteady flow model was used to estimate the potential for flooding at the site due to upstream dam failures. Detailed characteristics of the bore profile were not analyzed since the resultant flood stages were far below the plant grade. Assumption of Manning's coefficient, selection of cross sections, and time and space steps are discussed herein.

In routing the floods through various reaches of the Neosho and Cottonwood rivers, the river meanderings and channel areas were neglected. This is justified when one compares the channel areas with the total inundated flood area (Figures 2.4-9 and 2.4-10). Channel areas are less than 2 percent of the total flood area. A value of Manning's "n" of 0.05 was used throughout the analysis (Reference 6, pp. 106-114). This closely approximates the actual regional conditions of the Neosho and Cottonwood rivers' floodplain areas which are characterized by pasture and cultivation with some scattered brush and weeds. A similar value was also calculated from backwater computations using known flood discharge data and floodplain geometry.

Floodplain information for the Neosho and Cottonwood rivers was documented by the U.S. Army Corps of Engineers (Reference 50). Cross sections for the Neosho and Cottonwood rivers above the John Redmond Dam were obtained from this study. Each cross section is identified by the name of its nearest city or town (Figure 2.4-32). Additional cross sections between the above selected cross sections were obtained by linear interpolation at 2-mile intervals. Cross sections downstream from the John Redmond Dam were obtained from USGS 7-1/2 minute topographical maps at 1-mile intervals. There were a total of 102 cross sections. A steady uniform flow rating curve was assumed at a selected site 8 miles down-stream from the John Redmond dam site (Table 2.4-19). The time increment utilized in the computer iterative analysis was 60 seconds. With the above information, the water levels at various times along the river and near the site were evaluated.

2.4.4.3 Water Level at Plant Site

The floods resulting from dam failures discussed in Section 2.4.4.1 were routed through the Neosho and Cottonwood rivers. Estimated maximum water levels and maximum discharges at various control sections and at the site due to a single dam failure or domino-type dam failures were computed and the results summarized in Table 2.4-20. The time-space variations in flood discharges at various selected locations along the Neosho and Cottonwood rivers due to dam failure are shown on Figures 2.4-33 through 2.4-41. The maximum flood at the junction of the Neosho and Cottonwood rivers due to a single dam failure at Council Grove, Marion or Cedar Point reservoirs is 189,200 cfs, 232,900 cfs, and 239,900 cfs, respectively. The peaks due to these dam failures are smaller than or approximately equal to the SPF of the John Redmond Reservoir. Consequently, these floods will not have any measurable effect on the safety of the John Redmond Dam. Domino-type dam failures at Marion and Cedar Point, or Marion, Cedar Point, and Council Grove reservoirs will produce higher peaks (328,800 cfs and 518,000 cfs, respectively) at the junction of the two rivers. These magnitudes, however, are still smaller than the magnitude of the spillway design flood of 640,000 cfs for John Redmond Dam. Therefore, it may be safely concluded that the John Redmond Dam will not be threatened by any combination of upstream dam failures.

Consequently, the Wolf Creek site, including all safety-related facilities, will not be affected by any combination of failure of dams located above John Redmond Reservoir. A minimum topographic elevation of 1,100 feet occurs along the drainage divide between the Neosho River and Wolf Creek valleys upstream of John Redmond Dam within the Southwest 1/4, Section 33, Township 20 South, Range 15 East. This topographic low is about 25 feet above the maximum pool elevation of 1,074.5 feet in John Redmond Reservoir. As the drainage divide is composed of thin residual soils developed on Pennsylvanian bedrock, breaching of this topographic barrier by flood flows into John Redmond Reservoir is precluded.

In the case of a single dam failure at John Redmond Reservoir, the maximum flood stage at the confluence of the Neosho River and the Wolf Creek valleys (about 5.0 miles downstream from John Redmond Dam) was determined to be at elevation 1,043.38 feet. The maximum flood stage for distances of up to 8 miles downstream of the John Redmond Dam for this case is shown on Figure 2.4-42 by curve 1. Even in the most critical case, that which postulates the domino-type failure of all four reservoirs (case b.3 of Section 2.4.4.1), the maximum flood stage of the Neosho River was estimated to be 1,044.55 feet at a distance of about 5.0 miles downstream from the John Redmond Dam (Figure 2.4-42, curve 2).

The topographic ridge between the Neosho River and Wolf Creek valleys below John Redmond Dam will separate the postulated flood levels in the Neosho River valley from any facilities at the site, with the exception of the cooling lake main dam. The minimum ground surface elevation along the ridge is about elevation 1,080 feet at the location of Dam V (Figure 2.4-1), which is about 35 feet above the maximum calculated flood elevation of 1,044.55 feet.

Therefore, the effect of flooding in the Neosho River due to dam failures above and including John Redmond Dam is limited to backwater effects on the cooling lake main dam in the Wolf Creek valley.

Wave heights generated by coincident wind activity on the potential maximum flooding levels noted previously in the vicinity of the lower Wolf Creek valley were considered to occur from a sustained 2-year extreme wind speed of 53 mph (ANSI Standard N170-1976). Based on this consideration, wave heights would be on the order of about 5.0 feet for estimated effective fetch lengths of up to 10 miles (Reference 63) and wind originating from the southeast. The effective fetch is the length of water surface over which the wind can generate waves on water. It can also have a slightly curved path, such as when the wind sweeps up the winding river valley between land ridges. The potential maximum instantaneous water level for the combined most extreme flood-causing events at the confluence of the Neosho River and Wolf Creek valleys is estimated to be at elevation 1,049.55 feet. The minimum ground-surface elevation at the location of the cooling lake main dam is about 1,010 feet, or about 40 feet below the potential maximum water level at the confluence of the valleys.

The maximum flood level at the cooling lake main dam for case b.3 of Section 2.4.4.1 was determined by making backwater calculations on Wolf Creek from its confluence with the Neosho River floodplain to the damsite, a distance of about 4,000 feet. In performing the calculations, it was assumed that the peak outflow discharge of the cooling lake service and auxiliary spillways (4,660 cubic feet per second as determined from routing the SPF through the cooling lake) would coincide with a maximum flood stage of 1,049.55 feet at the point of confluence. This elevation was utilized as the starting elevation for the backwater calculations.

The backwater calculations on Wolf Creek were made by applying the Standard Step Method for gradually varied flows (Reference 6). Three channel cross sections between the confluence of Wolf Creek with the Neosho River floodplain and the cooling lake main dam were obtained from USGS 7.5-minute quadrangle topographic maps. The water elevation at the initial section was 1,049.55 feet. An

assumed constant channel flow of 4,660 cubic feet per second (cfs) and a Manning's roughness coefficient of 0.07 were used in the analysis. The calculated results are presented in Table 2.4-21 and show a negligible backwater effect on the maximum flood level at the cooling lake main dam. The maximum water elevation on the downstream slope of the cooling lake main dam, due to the postulated combined maximum flood-causing events in the Neosho and Cottonwood river basins, is conservatively established at elevation 1,049.6 feet. This flood stage is well below surface grades of any Category I facilities at the site and is about 50 feet below the plant yard grade elevation 1,099.5 feet. Flood protection criteria for all Category I facilities are controlled by hydrologic engineering considerations in the Wolf Creek Watershed above the cooling lake main dam as discussed in Section 2.4.10.

2.4.5 PROBABLE MAXIMUM SURGE AND SEICHE FLOODING

2.4.5.1 Probable Maximum Winds and Associated Meteorological Parameters

Reports of severe, damaging, meteorological events occurring in Arkansas, Oklahoma, Kansas, and Missouri during the period January 1959 through December 1978 are documented in the U.S. Department of Commerce publication Storm Data, Volumes 1 through 20. Analysis of these documented reports indicates that wind speeds greater than the calculated, annual-extreme, fastest-mile wind speed frequently occur in that region. The site region lies outside the zones of active hurricane activity (Reference 52, p. 126).

Studies for this region have indicated that maximum straight winds occur in conjunction with thunderstorms and associated tornadoes, heavy rainfall, and hail. However, not all the associated phenomena will affect the same area during the same storm; the parent storm may move in any direction depending on the location of the storm relative to the area. Reports studied indicate that winds at a given point lasted from a few minutes to more than 1/2 hour. A peak recorded gust of 138 miles per hour (mph) was measured at Stillwater, Oklahoma, with sustained winds of between 92 and 115 mph for 8 minutes (Reference 65). Maximum estimated winds between 100 and 140 mph were reported in connection with a thunderstorm at Desloge, St. Francis County, Missouri, on July 14, 1972 (Reference 66). Local variations in the distribution of wind direction and speed are expected to exist.

For design purposes, a regional historical study of maximum wind speeds was made in order to arrive at an estimated probable maximum wind speed for a 25-minute duration. A 25-minute duration is the minimum time required for wave generation in the cooling lake (Section 2.4.3.6). The fastest observed 1-minute, 1-hour,

and 1-month wind speed values were found in published National Weather Service (NWS) data (Reference 65, pp. 73-74). A number of other occurrences of extreme winds with time durations accurately recorded were also used in the analysis. The observed wind speed values were plotted and a best-fit curve was drawn through the representative points. The probable maximum wind speed of 90 mph for a 25-minute duration was then estimated from the plotted data points.

2.4.5.2 Surge and Seiche Water Levels

There are no large bodies of water near the site subject to wind-generated, surge- or seiche-type flooding which could affect plant safety-related structures.

The term "wind setup" has been denoted to represent an increase above normal water level resulting from the action of wind stress on water in enclosed lakes and reservoirs (Reference 52, p. 116). Storm water levels resulting from wind setup, wave action, and runup produced from maximum probable winds are discussed in Section 2.4.3.6.

Seiches are water surface oscillations and may be of varying periods and heights. They are caused by either barometric pressure or wind forces. The relatively small size of the cooling lake precludes significant changes in water level due to seiches.

2.4.5.3 Wave Action

As there are no large bodies of water near the site subject to wind-generated surges or seiches, no discussion is needed.

2.4.5.4 Resonance

The natural period of longitudinal oscillations was computed (Reference 18 and 8) for the cooling lake and compared with the wind wave periods. For the case of a long and narrow basin, only longitudinal oscillations are of importance (Reference 18). The method developed by Defant (Reference 8) for closed basins of complex shape was used in the computations.

The computed natural period of the lake is 35 minutes, whereas the periods of wave motion in the lake corresponding to the overland winds of 40 and 90 mph are only 3.48 and 4.96 seconds, respectively. The large difference between the wave periods and the natural period of oscillation of the lake demonstrates that the lake will not sustain wave action of a period to induce resonance.

2.4.5.5 Protective Structures

As there are no large bodies of water near the site subject to wind-generated surges or seiches, no discussion is needed.

2.4.6 PROBABLE MAXIMUM TSUNAMI FLOODING

Tsunami flooding is not applicable to the site because of its remoteness from large bodies of water.

2.4.7 ICE EFFECTS

2.4.7.1 ICE FLOODING

There are no records of severe flooding caused by major river or stream ice formation within the Neosho River basin above or near the project area (Reference 10). Any ice formation in lakes or along streams is minimal and has not hindered past reservoir operation. Therefore, the potential for ice flooding in the site area is minimal and not a safety-related factor.

2.4.7.2 FRAZIL ICE

Frazil ice can form in the Wolf Creek cooling lake creating the potential to block Essential Service Water (ESW) intake trash racks. This potential can exist when the water in the lake becomes supercooled. Supercooling requires a large heat loss from the lake associated with low air temperatures (less than 22F), clear water, and usually clear nights. Since the cooling heat transfer is at the surface, strong winds are also needed to mix the supercooled water to a depth low enough to be sucked into the intake. The effects of frazil ice are mitigated by diffusing warmed water in front of the ESW trash racks as described in Section 9.2.1.2.2.2.

2.4.8 COOLING WATER CHANNELS AND RESERVOIRS

2.4.8.1 Channels

The configuration of the channels in the Wolf Creek lake is shown in Figure 2.4-1. Three channels direct the flow of circulating water through the cooling lake. The channels are sized to carry 2230 cfs (1,000,000 gpm) at a design maximum discharge velocity of 2.5 fps, assuming a lake low water level of 1075.0 feet. This discharge and the low water level correspond to the operation of two units identical to WCGS Unit No. 1. A maximum permissible velocity of 2.5 fps was chosen to preclude erosion of the material through which the channels are excavated. The channels are 215 feet wide at the bottom (approximate elevation 1070.0 feet) and have sides with 3:1 (horizontal-to-vertical) slopes. The intake channel to the circulating water screen house is 215 feet wide at the bottom and is capable of carrying circulating water for two units. The width of this channel reduces to 107.5 feet near the screen house for Unit No. 1.

The bottom of the intake channel to the essential service water pumphouse at elevation 1065.0 feet has a bottom width of 80 feet and has side slopes of 3:1 (horizontal-to-vertical). A berm 55 feet wide is provided at elevation 1070.0 feet. The berms support sheets of ice and prevent any blockage of the channel in the extreme event of the loss of water in the cooling lake to an elevation of 1070.0 feet during winter. Sedimentation in the intake channel does not affect the capability of the essential service water system. Sedimentation of the UHS is discussed further in Section 2.4.11.6. The 80-foot-wide essential service

water channel is designed to provide cooling water for an emergency plant shutdown. This channel can provide 30,000 gpm (67 cfs) of water, which is sufficient for the emergency shutdown of two units identical to WCGS Unit No. 1. The width of this channel reduces to 40 feet near the pumphouse for Unit No. 1.

2.4.8.2 Reservoir

The cooling lake is designed to supply cooling water to two units with an installed nominal capacity of 1150 megawatts each. Precipitation over the lake and its drainage basin constitutes a part of the water supply to the lake. Additional makeup water, which is released from the John Redmond Reservoir for this purpose, pumped from the Neosho River immediately downstream of the John Redmond Reservoir and discharged into the lake. The makeup to the lake varies from 0 to 120 cfs, with an annual average rate of 41 cfs. The lake serves as a cooling lake for the heated condenser effluent. Baffle dikes and channels as described in Subsection 2.4.8.1 are provided to increase the travel time of the cooling water form the discharge point to the circulating water screen house intake.

The cooling lake has a storage capacity of 111,280 acre-feet and a surface area of 5,090 acres at the normal operating level of 1,087 feet. Figure 2.4-20 shows the lake area-capacity curves as a function of elevation derived from the topographic map of the area.

The Wolf Creek drainage area above the cooling lake dam is 27.4 sq. mi. The filling of the lake began on October 27, 1980; normal operating level was reached on May 30, 1982.

In calculating the necessary capacity for the cooling lake, the historic drought of 1952-57 was used in the analysis as the worstcase design drought. It is estimated to have a 50-year recurrence interval. Minimum lake water level obtained for one-unit operation through the design drought is 1085 feet. The evaluation of drought effects on the cooling lake is discussed in Section 2.4.11.

Sedimentation rate in the Wolf Creek lake was determined using two different methods, and the higher estimate of the two was used in estimating the sediment accumulating in the lake from the Wolf Creek stream flow.

Sedimentation survey data are available for various streams and reservoirs throughout the state of Kansas (References 25, 27 and 64). A correlation analysis was made, with the available data,

between the sedimentation rates and the corresponding drainage areas. A straight line was then fitted through the plotted points by the method of least squares. The sedimentation rate for Wolf Creek lake using this method is estimated to be about 0.587 acre-foot per square mile per year. In the second method, the procedure outlined in Appendix C of the publication, "Sediment Yields from Small Drainage Areas in Kansas" (Reference 27) was used. This procedure takes into account the division of drainage area into cropland and rangeland and the corresponding sediment delivery rates and trap efficiencies. Land classification data were obtained from the "Kansas State Water Plan Studies, Statewide Land Classification" (Ref. 62). This procedure conservatively projects the sedimentation rate for Wolf Creek lake to be 0.67 acre-foot per square mile per year.

Using this conservative value, the sediment yield due to stream flow of Wolf Creek alone (including the bedload) would be 515 acre-feet in 40 years. The amount of sediment deposit resulting from a maximum inflow from John Redmond Reservoir of 120 cfs was calculated, using the observed turbidity of Neosho River water near Hartford (Reference 30), to be 565 acre-feet over the 40-year period. Therefore, the loss of lake capacity due to sedimentation over a period of 40 years amounts to approximately 1080 acre-feet. This is equivalent to only about 1 percent of the lake's storage volume at its normal operating level. The estimated sediment volume from Wolf Creek stream flow through the cooling lake is smaller than that from the water pumped from John Redmond Reservoir. This is because the estimated average Wolf Creek stream flow is only about 17 cfs, whereas a continuous maximum inflow from the Neosho River (120 cfs) was assumed in the 40-year sedimentation calculation.

The dam and dike system is designed to withstand the PMF with coincident wind waves. Section 2.4.3 describes the procedures for evaluating the PMF. The following paragraphs present the design bases for the spillways and outlet structures. A general layout of the cooling lake dam, service and auxiliary spillways, and outlet works is shown on Figure 2.4-2.

2.4.8.2.1 Cooling Lake Dam

The cooling lake was formed by constructing a main earth dam across Wolf Creek and saddle dams along the periphery of the lake. The main dam has a maximum height of about 100 feet above the creek bed and is approximately 12,260 feet in length. The top of the main dam and the saddle dams is at elevation 1100 feet to provide sufficient freeboard and to prevent overtopping of the dam by the PMF and wind wave action. Riprap is provided on the upstream slopes for erosion protection against wind waves.

The downstream slope and the toe of the main dam are protected against tailwater effects by riprap. Seepage through the dams is discussed in Section 2.5.

2.4.8.2.2 Spillways

A service spillway and an auxiliary spillway are provided on the east abutment of the main dam to pass floods up to and including the PMF (Figure 2.4-43). The service spillway is an uncontrolled concrete ogee-crested spillway that is semicircular in plan. The crest length is 100 feet and the crest elevation is 1088 feet. This concrete service spillway is approximately 14 feet high, and water discharges through it via a 30-foot concrete chute to a stilling basin. The channel downstream of the stilling basin is protected against erosion, with riprap. A pilot channel was excavated to convey the water to the main channel of Wolf Creek.

The auxiliary (emergency) spillway is located approximately 1500 feet east of the service spillway and is of the opencut type with a crest length of 500 feet and a crest elevation of 1090.50 feet. The service spillway will function alone for all floods up to the 100-year flood. For floods greater than the 100-year flood, both the service spillway and the auxiliary spillway will function. Under PMF conditions the peak total outflow is 22,845 cfs, 7318 cfs of which will be discharged by the service spillway. The outflow discharge from both the spillways reaches Wolf Creek through the pilot channel and another existing creek which is a tributary to Wolf Creek. The downstream slopes of the main dam are unaffected by the outflow from the spillways.

Design provisions are made downstream of the auxiliary and service spillways to prevent erosion and ensure the safety of the dam and the spillway structures. The chute downstream of the service spillway is designed to safely discharge the PMF outflow. The plan and sections of the service spillway are shown in Figure 2.4-21.

The toe of the dam in the vicinity of the service spillway is at Station 1 + 60 (see Figure 2.4-21) and is at elevation 1086.0 feet MSL. Upstream of Station 2 + 15, necessary freeboard for the chute sidewalls above PMF level is provided (Reference 51). From Station 2 + 15 to Station 2 + 55, the top of the wall is sloped down from elevation 1084.75 feet to 1081.80 feet.

The following discussion is provided to demonstrate that the splash of water over the wall does not endanger the toe of the dam.

In the event of any splash of water over the wall due to wave action downstream of Station 2 + 15, water will safely flow away from the toe of the dam, since the ground slopes away from the dam. Station 2 + 55 is the closest station to the toe of the dam where the maximum splash over the side-walls could potentially occur. The maximum discharge over the sidewall at this location would be 7.7 cfs per foot length if the splash over the wall exists continuously at an elevation equivalent to PMF level plus freeboard of 3.34 feet. However, the flow over the wall due to wave action would, in reality, be intermittent. It is conservatively assumed that 50% of the above maximum discharge could spill over the wall. The maximum depth of scour (erosion) due to this flow (impinging over the finished grade adjacent to the chute wall) is calculated at 3.8 feet based on the following equation (Reference 63).

$$d_S = 1.32\ H_T^{.225} q^{.54} \qquad [2.4\text{-}3]$$

Where

d_S = the maximum depth of scour below tailwater level in feet,

H_T = difference in elevation between (PMF elevation + freeboard) and finished grade elevation in feet, and

q = discharge per foot width in cfs.

Conservatively assuming that the scour hole has a slope of 3 to 1, with the maximum scour depth of 3.8 feet, the scour hole extends about 12 feet upstream of Station 2 + 55. There would still be a clear distance of 83 feet from the edge of the scour to the toe of the dam. Between Stations 2 + 55 and 2 + 15, the depth of the scour hole would be smaller. Hence, there would be no effect on the toe of the dam from the scour.

At Station 2 + 55 the scour depth is also calculated using the procedure given in Hydraulic Design Criteria for Storm Drain Outlets (Reference 59). From this procedure the depth of the scour hole is calculated to be 2.8 feet. The hole extends 11 feet upstream from Station 2 + 55. In the above calculations, it is conservatively assumed that the splash of water due to wave action over the wall acts like a jet in producing the scour. The calculation assumes a splash time of 30 hours and a 1-foot length of wall.

Following a similar analysis to the above, it is found that the scour at any location downstream of Station 2 + 55 does not affect the safety of the toe of the dam or the dam itself.

Figure 2.4-43 shows the details of erosion protection for the auxiliary spillway. The following specific erosion protection provisions are made in the design so that it can pass the PMF safely and without endangering the dam embankment.

a. The crest of the spillway and the downstream 3:1 slope are formed with a 1-foot-thick concrete apron. The apron on the 3:1 slope continues down to the solid Toronto limestone rock at an elevation of about 1071.0 feet.

b. The 10:1 slopes of both sides of the spillway along the axis of the dam also have a 1-foot-thick concrete apron.

c. On either side of the spillway, the concrete apron, with a 3:1 slope, is continued through the transition of the dam and the spillway channel up to the Toronto limestone rock at an elevation of approximately 1071.0 feet, as shown in Figure 2.4-44.

d. The sloping concrete apron on the sides of the spillway channel is continued downstream such that any erosion during PMF is checked at a distance of about 100 feet from the toe of the main dam, and thus does not endanger the dam embankment.

e. The discharge channel and the sides of the channel are backfilled with the excavated local material as shown to the final grade.

2.4.8.2.3 Spillway Design Flood

The PMF is used as the design inflow to the lake to determine the sizes of the spillways. Estimation of the PMF is described in Section 2.4.3. The results are presented in Figure 2.4-18.

The PMF inflow is routed through the service and auxiliary spillways by using the U.S. Army Hydrologic Engineering Center's computer program "Spillway Rating and Flood Routing". An antecedent standard project storm was assumed to end 72 hours before the start of the PMP. The resulting PMF outflow hydrograph is also shown in Figure 2.4-18. Peak service spillway discharge would be approximately 7318 cfs, and the maximum reservoir elevation would be 1095.0 feet, with a rise of 7.0 feet above the spillway crest. The spillway rating curve is given in Figure 2.4-22. The tailwater rating curve below the Wolf Creek dam, shown in Figure 2.4-45, was developed from backwater computations upstream from the confluence of Wolf Creek with the Neosho River.

2.4.8.2.4 Low-Level Outlet Works and Blowdown Structure

Low-level outlet works are located in the west abutment of the main dam. This outlet is provided to evacuate enough storage of the cooling lake to permit inspection and repairs of the main dam if necessary. A concrete-encased pipe is provided below the embankment of the main dam up to the center of the dam cross section. The pipe downstream of the center line is carried in a concrete tunnel provided for inspection purposes. The outlet pipe is 60 inches in diameter and is sized according to the procedures outlined by U.S. Army Corps of Engineers (Reference 60). The upstream invert elevation of the outlet pipe is set at 1030.0 feet.

A 30 inch diameter blowdown pipe branches off from the outlet pipe at the downstream end of the outlet works. This blow-down pipe discharges a flow varying from 0 to 60 cfs. Valves and controls are provided for controlling and isolating the flow through the blowdown and outlet pipes. The intake structure, the stilling basin, and the intake and outlet channels were designed according to accepted procedures (References 48, 49 and 63).

2.4.9 CHANNEL DIVERSIONS

There is no historic or topographic evidence indicating that flow in Wolf Creek can be diverted away from its present course. Local relief and the natural geomorphological condition preclude the likelihood of Wolf Creek and its tributaries discharging anywhere other than into the cooling lake. No deeply incised gorges are present in upstream Wolf Creek where landslides could entirely cut off creek flow. Upstream ice jams will not divert flow completely either, since they do not prevent overbank subsurface flow. The essential service water intake is designed to prevent ice from jamming against it and cutting off inflow. Even if the creek flow were temporarily cut off, makeup water to the plant is still available from the John Redmond Reservoir on the Neosho River.

Regional topographical conditions also preclude the probability that the upper Neosho River would be diverted away from the John Redmond Reservoir due to ice jams or subsidence. Therefore, it is unlikely that the river inflows would be cut off completely so as to affect the sources of makeup water to the cooling lake.

2.4.10 FLOODING PROTECTION REQUIREMENTS

The flood design considerations are discussed in Section 2.4.2.2. The plant buildings are not affected due to local intense precipitation at the plant site (Section 2.4.2.3). All the

safety-related buildings have their floor elevations above the level obtained by superimposing the maximum wave runup on the PMF level in the cooling lake (Section 2.4.3).

The safety-related intake structure for the essential service water system is located at the edge of the cooling lake and is subjected to wave forces as well as high water. The maximum wave runup elevation at the structure is 1100.2 feet with a wave height of 5.0 feet, and a wave period (maximum) of 3.3 seconds. This wave runup elevation due to the maximum wave is based on a vertical wall with an effective fetch that would exist without baffle dike A. However, the intake structure for the essential service water system is designed to withstand a high water elevation of 1102.5 feet.

The only openings below elevation 1102.5 feet are the pressure doors and the pump structure forebay opening. The pressure doors are of marine type and are located at plant grade on the west wall of the intake structure. These doors are normally closed and under administrative control. The pump structure forebay normally contains water.

Therefore, the safety-related facilities are not affected by the PMF in the cooling lake or by the local intense precipitation at the plant site and no flood protection requirements are necessary.

2.4.11 LOW-WATER CONSIDERATIONS

2.4.11.1 Low Flow in Rivers and Streams

Low-flow data of the regional rivers and streams were analyzed statistically for the frequency distribution. The most severe drought of 1952-1957 was shown to have a recurrence interval of 50 years (Section 2.4.11.3). Monthly flows in Wolf Creek for this once-in-50-years drought of 5-year duration were synthesized and are presented in Table 2.4-22. The 5-year low-flow to be expected in Wolf Creek is 1.6 cubic feet per second. The analysis was based on a method described in Chow (Reference 7, p. 18-10 to 18-15).

Low-flows in the Neosho River during the same drought period are given in Table 2.4-23. The 5-year duration low-flow rate was computed to be 147.5 cubic feet per second (Section 2.4.11.3).

2.4.11.2 Low Water Resulting from Surges, Seiches, or Tsunamis

Consideration of low water conditions resulting from surges, seiches, or tsunamis is not applicable to this site since there are no large bodies of water near the site, nor is the site near a coastal area.

2.4.11.3 Historical Low Water

2.4.11.3.1 Historical Drought

Since Wolf Creek is ungauged, its low-flow history is not available. However, according to the Kansas Water Resources Board (Reference 23, p. 169), the lowest mean discharge for 7 consecutive days for the creek that is expected to recur once in 2 years would be 0 cubic feet per second. Stream flow in Wolf Creek was extrapolated from gauging records obtained at Council Grove, Americus, Strawn, Burlington and Iola, on the Neosho River, and at Madison on the Verdigris River. This takes into consideration the proper adjustments for the respective drainage areas. Low flows calculated for Wolf Creek during the 1952-1957 historic drought period are given in Table 2.4-22.

Based on U.S. Army Corps of Engineers data (Reference 45), a low-flow frequency analysis was made for the Neosho River at the John Redmond dam site by using the log-Gumbel distribution procedure. Figure 2.4-46 shows the resulting low-flow frequency curves for durations of 1, 2, 3, and 5 years. The 1952-1957 drought, as seen from Figure 2.4-46, has a recurrence interval of 50 years. Average river inflow to the John Redmond Reservoir for this 5-year drought of 50-year recurrence interval is 147.5 cubic feet per second.

2.4.11.3.2 Water Level Determination

Lake drawdown analysis was performed to include the 1952-1957 historic drought under projected operation of a 1150-megawatt generating station. Hydrologic data used in the drawdown studies and shown in Tables 2.4-24, 2.4-25, and 2.4-26 include rainfall, natural evaporation, and forced evaporation due to plant heat rejected to the lake, respectively. A conservatively estimated seepage loss of 3.5 cubic feet per second was used.

The period used for the drawdown analysis was 1949-1964, which included the historical drought period of 1952-1957. At the beginning of the analysis period, that is, at the beginning of 1951, the assumed starting lake water level was 1087.0 feet, which is the normal operating level of the cooling lake. The spillway crest elevation is at 1088.0 feet. No makeup water from John Redmond Reservoir is pumped when the cooling lake pool elevation is at or above the normal operating level of 1087.0 feet. The required makeup varies from 0 to 120 cubic feet per second (with an annual average rate of 41 cubic feet per second), depending on the pool elevation in John Redmond Reservoir. Figure 2.4-47 shows fluctuations in the water surface elevation of the Wolf Creek lake for the period 1949-1964.

The computed minimum water level in the cooling lake is 1085.5 feet based on the simulated operation of one unit at 100 percent average load factor and 100 percent capacity factor. At this elevation, there would be 4900 acres of surface area and 104,197 acre-feet of storage remaining. The minimum design operating level for the circulating water screen house, circulating water pumps, and service water pumps for normal operation is 1075 feet. This level is based on the estimated low-water condition during the 1952-1957 historic drought for the operation of two 1150-megawatt units on the cooling lake. At elevation 1075 feet, approximately 3255 acres of surface area and 61,350 acre-feet of storage remain in the cooling lake.

The natural evaporation data used to evaluate cooling lake draw-down are data for Fall River Reservoir. The Fall River Reservoir dam is located approximately 40 miles south and 20 miles west of the Wolf Creek Lake. Fall River Reservoir evaporation data were chosen for the Wolf Creek evaluation because of Fall River's close proximity (<50 miles) to Wolf Creek and because the Fall River weather station was the only station in southeastern Kansas which had Weather Bureau type Class 'A' evaporation instrumentation in operation during the drought of record in Kansas (1952-1957).

The evaporation data presented in Table 2.4-26 was calculated by Sargent & Lundy's LAKET computer model in 1979.

The LAKET program is proprietary. The LAKET program abstract was provided in WCGS-ER(OLS) response to Question 240.6 (ER). The LAKET user's manual is available in Sargent & Lundy's office for NRC's inspection.

Since the original Tables 2.4-24 through 2.4-26 and Figure 2.4-47 were recorded in the WCSA new LAKET runs were executed to include the 16 year period 1949-1964. These tables and figures were revised to include the more recent output.

2.4.11.4 Future Control

The cooling lake is designed to supply adequate water to the plant under a drought condition that is at least as severe as the 1952-1957 historic drought, which has a recurrence of about 50 years. Future upstream uses of Wolf Creek water will not lower minimum flows. Furthermore, any future use of the water upstream of the site has to consider the water rights that have been obtained for the plant.

2.4.11.5 Plant Requirements

The cooling lake described in Section 2.4.8.2 provides the cooling water requirements for the WCGS Unit No. 1 and for a future unit of similar size. The lake supplies cooling water to the circulating water system, the service water system, and the essential service water system, as described in Subsections 10.4.5 and 9.2.1. The ultimate heat sink, which is the source of cooling water for the essential service water system, is created within the lake by a submerged seismic Category I dam, with a crest elevation of 1070 feet, which spans one of the fingers of the lake. A summary of the cooling water requirements for various operating modes is provided below for one unit.

Water Level in the Lake	Circulating Water Flow (gpm)	Service Water Flow (gpm)
H.W.L (1090.0 feet)	510,000	41,000
N.O.L (1087.0 feet)	500,000	40,000
L.W.L (1075.0 feet)	462,000	38,000

The minimum emergency plant shutdown flow for Unit No. 1 is 15,000 gpm, which can be supplied by the Unit No. 1 essential service water system (Section 9.2.1).

The following gives the flow, minimum water design elevation, and sump invert elevation for the essential service water system. The essential service water intake structure is shown in Figures 3.8-1, 3.8-2 and 3.8-3.

FLOW (gpm)	INTAKE STRUCTURE SUMP INVERT ELEV. (ft MSL)	MINIMUM WATER DESIGN OPERATING LEVEL (ft MSL)
15,000	1,058	1,068

The ability of pumps to supply sufficient cooling water to the essential service water system during extreme low-water conditions is ensured because the pumps are located as specified above. In the event that the extreme low-water condition requires any emergency shutdown and use of the ultimate heat sink, the minimum flow requirements are met by the ultimate heat sink (see Sections 2.4.11.6 and 9.2.5).

2.4.11.6 Heat Sink Dependability Requirements

The ultimate heat sink that provides water for the essential service water system is a submerged pond. Applicable design considerations and descriptions of the ultimate heat sink are presented in Sections 9.2.5 and 2.5.

Low-flow conditions in Wolf Creek do not affect the ability of the ultimate heat sink to perform adequately. The design water surface elevation of the sink is 1070.0 feet, which would be 5.0 feet lower than the design minimum lake elevation during one-unit plant operation (Section 2.4.11.5).

In the vicinity of the ultimate heat sink, the groundwater table rises to the level of the water surface in the cooling lake during normal operating conditions. In case the cooling lake fails, groundwater flow would be toward the sink from the higher groundwater table created by the lake. The possibility of seepage through the submerged dam and its foundation is controlled by the design provision of the dam structure. Therefore, the loss of water from the sink due to seepage would be insignificant.

From Section 9.2.5, the maximum allowable sediment within the UHS is 155 acre-feet for one unit operation. However, to provide allowance for 5 acre-feet of losses before realignment of the ESWS from the Service Water Discharge to the UHS under conditions described in Section 9.2.1.2.2.3, and to allow for the sensitivity of these numbers to weather data, the maximum allowable sediment volume will be limited to 130 acre-ft. With an amount of sedimentation less than or equal to 130 acre-ft, the UHS will have sufficient surface area and volume to safely shut down and maintain shut down of the plant.

The intake channel bottom in the UHS is at elevation 1065'0" feet and locally slopes downward to elevation 1064'0" at the essential service water pumphouse as shown in Figure 2.4-48.

Figure 2.4-49 shows the locations of the sounding stations in the UHS. Before the lake was filled up, the bottom of the UHS, and the sounding stations shown in Figure 2.4-49, were surveyed. These twenty sounding stations (concrete sediment pads) have been located on the bottom of the ultimate heat sink and essential service water intake canal. Prior to 2003 sedimentation was checked annually by visual inspection at the sediment pads by divers. Between the years 2003 to 2009 the sedimentation levels were not measured. After 2009 sedimentation levels are checked annually by hydrographic methods when the water level is greater than 1975-foot elevation (SNUPPS). Based on trending of past sediment measurements, dredging of the channel is performed on a five-year frequency and the reservoir every fifteen years.

The cooling lake water level in the vicinity of the ultimate heat sink is monitored. Emergency shutdown operations are initiated if the lake water drops to an elevation such that the lake can no longer provide adequate circulating water for normal plant operation. A summary of the PMF pool level and the elevations of the safety-related structures are given in Table 2.4-27.

2.4.12 DISPERSION, DILUTION, AND TRAVEL TIMES OF ACCIDENTAL RELEASES OF LIQUID EFFLUENTS IN SURFACE WATERS

2.4.12.1 Dilution Factors

Most of the tanks containing radioactive liquids are housed inside the plant buildings. Any accidental liquid spill from these tanks will be contained in the buildings and reach the basement level. The consequences of this spill reaching the groundwater and to the cooling lake or Wolf Creek through groundwater are discussed in Section 2.4.13.

There are only three tanks located outside the plant buildings which contain radionuclides. They are at elevation 1,100.0 feet MSL. These are the condensate storage tank, the refueling water storage tank, and the reactor makeup water storage tank. See Figure 1.2-1, Items M-2, 3 and 4. The largest of these three, which also contains the highest radioactive concentration, is the

refueling water storage tank. It has a capacity of 400,000 gallons (See Table 11.1-6). Therefore, although it is a Seismic Category I, safety-related structure, the effect on surface water of an accidental release of liquid effluent from this tank is considered, because the failure of this tank alone would result in the highest concentrations of radionuclides to be released to surface water.

In the event of failure of the refueling water storage tank, the liquid effluent would reach the site drainage system and would flow to the oil separator south of the main plant buildings and be diluted with the water in the oil separator. Because the capacity of the oil separator available for dilution is less than 10% of the total effluent volume, the effect of dilution in the oil separator would be minimal. After discharge from the oil separator, the effluent would flow through the drainage ditches and reach the cooling lake southwest of the main plant buildings (see Figure 2.4-3). The cooling lake is used for cooling and recirculating the heated plant discharges. The circulating water discharges are discussed in Section 2.4.11.5. Makeup is provided to the lake from the John Redmond Reservoir at an annual average rate of 41 cfs. Blowdown from the lake is discharged into Wolf Creek below the dam and eventually reaches the Neosho River. The blow-down during a normal year averages 3.5 cfs. Due to the recirculation of the plant discharges, makeup from John Redmond Reservoir and the relatively small blowdown, the liquid effluent which reaches the cooling lake is assumed to mix completely with the available capacity of the cooling lake.

The cooling lake downstream of the location where the liquid effluent would be released into the lake has a capacity of 83,000 acre-feet, or 27,044 million gallons at the normal operating level of 1087 feet MSL. With this conservative assumption, the cooling lake can thus provide a dilution of at least 67,610 times for this worst-case surface water spill.

The nearest downstream potable surface water user is at Leroy, Kansas, on the Neosho River, approximately 22 river miles downstream of the Wolf Creek Station. The diluted effluent from the cooling lake will be further diluted in the Neosho River before reaching the City of Leroy. The concentrations of the effluent at the site boundary are discussed in Section 2.4.12.2.

A discussion of normal radioactive releases is given in Section 11.2.

2.4.12.2 Radiological Dose Assessment

A review of the concentrations of radionuclides in the refueling water storage tank (Table 11.1-6) shows that all nuclides except three are already at concentrations below 10 CFR 20, Appendix B, Table II, Column 2 limits. The exceptions are:

	TANK CONCENTRATION μCi/ml	10 CFR 20 LIMIT μCi/ml
H-3	2.5	$1x10^{-3}$
I-131	$3.87x10^{-6}$	$3x10^{-7}$
I-133	$7.52x10^{-6}$	$1x10^{-6}$

The analysis in Section 2.4.12.1 shows that the tank concentrations would be diluted by a factor of 67,610. This is more than adequate to assure that concentrations at the cooling lake discharge and all downstream water users will be less than 10 CFR 20 limits. See Table 2.4-4 for a listing of water rights in Coffey County and Figure 2.4-8, which shows all water users and municipal users downstream of the site.

2.4.13 GROUND WATER

2.4.13.1 Description and Onsite Use

2.4.13.1.1 Aquifer Systems

This section describes the water-bearing characteristics of the soil and bedrock in the vicinity of the WCGS site. Information about regional aquifers, which includes a 50-mile radius around the site, was obtained from a literature search. Hydrogeologic characteristics of the ground-water system within 5 miles of the site are based on the results of site investigations as described in Section 2.5.4.

2.4.13.1.1.1 Regional Ground-Water Systems

Small quantities of ground water are available regionally from three sources within a 50-mile radius of the site. These sources are the alluvial deposits in the river valleys, the near-surface weathered bedrock including shallow soils, and the deep bedrock.

The major alluvial aquifers within a 50-mile radius are in the Neosho, Marais des Cygnes, Verdigris, and Osage river valleys. Nearest to the site, the Neosho River flows in a southeasterly direction through Morris, Chase, Lyon, Coffey, Anderson, Woodson,

Allen, and Neosho counties (Figure 2.4-8). It passes within 3 miles southwest of the plant site. The width of the alluvium in the valley ranges from about 1 to 10 miles.

The alluvial aquifer in the Marais des Cygnes River Valley is found in Osage, Franklin, Miami, Anderson, and Linn counties. The Marais des Cygnes River flows in an easterly and south-easterly direction and passes about 17 miles north of the site. The alluvial aquifer in the Verdigris River Valley is in Lyon, Greenwood, Woodson, Elk, and Wilson counties. Its closest point is 22 miles southwest of the site. The Osage River Valley alluvial aquifer is in Bourbon County adjoining the state of Missouri about 27 miles southeast of the site at the nearest point.

The alluvial aquifers in the site region are composed of silt, sand, and gravel. Yields from wells in the alluvial aquifers are much greater than yields from the other regional sources, and commonly range as high as 100 gallons per minute (Reference 3).

Recharge to the alluvial aquifers is derived from precipitation and from ground water in the weathered rock zone where the zone is hydraulically connected to the alluvium. Periods of high river stage may also contribute some short-term recharge. Ground-water discharge occurs where the ground-water table is above and adjacent to surface drainage, and where wells are being pumped. Within a 20-mile radius of the site, the towns of New Strawn, 3 miles west-northwest, and Hartford, 15 miles west-northwest of the plant site, obtain water from alluvial aquifers.

The weathered bedrock is composed of weathered shales, silt-stones, sandstones, and limestones, and the soils derived from them. The process of chemical and physical weathering alters the near-surface bedrock and produces additional porosity in the bedrock materials. The weathered bedrock, which is as deep as 40 feet in places, is sufficiently permeable to yield water to wells. Yields from wells in the weathered bedrock range up to 10 gallons per minute (Reference 3). This zone is developed mainly for domestic and livestock purposes. Recharge to the weathered bedrock is from local precipitation, and discharge occurs into alluvial deposits, streams, and wells.

In the site region, the bedrock units below the weathered zone are composed of sandstones, siltstones, shales, and limestones with typically low water yields (Reference 37). Unweathered bedrock units range in age from Permian to Pennsylvanian and dip gently westward from 10 to 30 feet per mile. Recharge from precipitation occurs primarily at formational outcrops. These bedrock units supply water for domestic and livestock purposes and yield from 1 to 10 gallons per minute to wells (Reference 3).

2.4.13.1.1.2 Local Ground-Water Systems

The local ground-water systems have characteristics similar to the regional systems. Water levels in local wells indicate that the shallow ground-water table closely parallels the topographic surface within at least a 5-mile radial area of the plant site (Figure 2.4-50). Wells in this area tap either or both the alluvium and weathered bedrock. Where these units are contiguous they are hydraulically connected.

Vertical recharge is derived from precipitation. During periods of drought, the water levels drop significantly, especially in the weathered bedrock (Reference 4).

There are no published reports on the aquifer hydraulic characteristics in Coffey County. Listed below is a summary of hydrogeologic characteristics of local water-bearing units (Table 2.4-28 and Figure 2.4-51) based on the results of site as described in Section 2.5.4 and accompanying tables:

a. The Spring Branch Limestone Member of the Lecompton Formation is a light gray, thin-bedded, fossiliferous limestone interbedded with thinly laminated shale. The Spring Branch Member is absent at the plant site due to erosion but crops out to the north and west of the plant site with a thickness ranging up to 10 feet. It yields less than 1 gallon per minute to local wells;

b. The Stull Shale Member of the Kanwaka Shale Formation is a dark gray, laminated, fossiliferous shale interbedded with light gray, calcareous sandstone and shaley siltstone. It crops out north and west of the site. Its thickness in Boring B-20 is 51 feet. The Stull Shale Member is absent at the plant site, having been removed by erosion. It yields less than 1 gallon per minute to local wells;

c. The Clay Creek Limestone Member of the Kanwaka Shale Formation is a fine-grained, fossiliferous, gray limestone locally interbedded with sandy shale. Its thickness at the site ranges from 2 to 8 feet. Although it is exposed at the surface east of the site and is present both at the surface and in the subsurface in the western portion of the site area, it has been removed by erosion at the plant site. It yields less than 1 gallon per minute to wells;

d. The Jackson Park Shale Member of the Kanwaka Shale Formation is a laminated, calcareous, gray shale

with a basal, fine-grained, silty sandstone which locally exceeds 10 feet in thickness. The total thickness at the site ranges from 23 to 30 feet. At the plant site, only the lower portion of the Jackson Park Shale Member is present as the overlying portion has been removed by erosion. It yields less than 3 gallons per minute to wells;

e. The Heumader Shale Member of the Oread Formation is a laminated, fossiliferous, dark gray, clayey shale with fine-grained, thin-bedded calcareous zones, and occasional gray limestone lenses. Near the site this unit ranges from 0 to 25 feet in thickness. It is moderately to highly weathered to depths of as much as 20 feet. Yields to wells of less than 3 gallons per minute are obtained from this unit.

None of the deep bedrock units near the site are capable of yielding large quantities of potable water to wells. Listed below are the hydrogeologic characteristics of the deep bedrock units that yield small quantities of water at the site (Table 2.4-28) and Figure 2.4-51), based on the results of site investigations (Section 2.5.4):

a. The Plattsmouth Limestone Member of the Oread Formation is a fine-grained, medium-bedded, fossiliferous, slightly fractured limestone with thin shale and silty clay layers. It has occasional vertical fractures near the surface. At the plant site, the top of the Plattsmouth Limestone is about 34 feet below the plant grade elevation of 1,099.5 feet. Its thickness at the site ranges from 11 to 14 feet. The Plattsmouth Limestone Member yields less than 1 gallon per minute to wells;

b. The Toronto Limestone Member of the Oread Formation is a fine-grained, thin- to thick-bedded limestone with fossil fragment beds. Pinpoint vugs are present at some horizons within the unit. At the plant site, the top of the Toronto Limestone is about 64 feet below the plant grade elevation of 1,099.5 feet. Its thickness at the site ranges from 14 to 19 feet. It generally yields less than 2 gallons per minute to wells;

c. The Ireland Member of the Lawrence Formation is a fine-grained, calcareous sandstone with interbedded siltstone and laminated with clayey shale layers. It has some fractured zones and coal seams. At the plant site, the top of the Ireland Sandstone is about 111 feet below the

plant grade elevation of 1,099.5 feet. Its thickness at the site ranges from 40 to 117 feet, and it yields up to 0.5 gallons per minute to wells;

d. The Tonganoxie Sandstone Member of the Stranger Formation is a fine-grained, slightly calcareous, micaceous sandstone. Interbedded with shale and siltstone, it has some vertical fractures. At the plant site, the top of the Tonganoxie Sandstone is about 290 feet below the plant grade elevation of 1,099.5 feet. Its thickness in this area ranges from 42 to 142 feet, and it rarely yields over 3 gallons per minute to wells.

During the boring and aquifer testing program (described in Section 2.5.4), none of the deep bedrock formations yielded more than 2 gallons per minute in a 3-inch test hole; only slightly higher yields could be expected with larger diameter wells. The flow rate was measured by air lifting the water out of the hole. The rate of water-level recovery was timed and measured to determine the permeability. Water-level readings in the piezometers show that leakyartesian conditions exist in the deeper bedrock strata below the weathered bedrock. The Toronto Limestone Member and younger strata are recharged principally by local precipitation. Much of the precipitation first recharges the overlying weathered bedrock aquifers which in turn provides some leakage to the deeper units including the Toronto Limestone Member. Pressure tests indicate that the permeability of the deeper bedrock shale units below the Toronto Limestone Member ranges from 10^{-7} to 10^{-8} centimeters per second (Section 2.5.4).

Ground-water and rock samples from the weathered Jackson Park Shale and Heumader Shale members, and ground water from the Plattsmouth Limestone Member in the Category I area were tested for water-soluble sulfate. It was determined that sulfate concentrations exhibit considerable horizontal and vertical variation within the vicinity of the plant site. The sulfate concentrations in soil and rock samples ranged from 3.1 to 535.0 milligrams per kilogram. Ground-water samples contained sulfate concentrations which ranged from 78.5 to 346.0 milligrams per liter (mg/1). At Well D-26, which was monitored by a water-level recorder during 1973 and 1974 and is located less than one mile northeast from the center of the plant site, sulfate concentrations range from 66 to 71 mg/1. At Well C-2, located approximately 1.75 miles northwest of the plant site, sulfate concentrations have varied between 764 and 1,050 mg/1. For well location and inventory data refer to Figure 2.4-52 and Table 2.4-29.

The criterion used for well sealing was in accordance with Sargent & Lundy's Specifications A-3854, (Section 304.1). This specification is reproduced as Table 2.4-29a.

The status of well sealing is presented in Tables 2.4-29b and 2.4-29c.

2.4.13.1.2 Onsite Use

There is no anticipated use of ground water at or near the site during plant operation.

2.4.13.2 Sources

Although most of the public water supplies in the vicinity of the site are derived from surface-water sources, ground water accounts for a small amount of both municipal and private water needs. Information was obtained from public agency contact and a local water well inventory. A discussion of regional and local ground-water flow regimes is also included in this section.

2.4.13.2.1 Regional Public Ground-Water Use

This discussion of regional public ground-water use applies to a 20-mile radius of the site (Figure 2.4-53). Table 2.4-30 summarizes the information available regarding the municipal supplies in this region.

2.4.13.2.1.1 Present Use

The amount of ground water used for public supplies within a 20-mile radius of the plant site is small. The city of Waverly, Kansas, about 10 miles north-northeast of the site, has five wells (228 to 300 feet deep) (References 19 and 15) which obtain water from the Tonganoxie Sandstone (Figure 2.4-53). An average of 39,000 gallons per day (about 5 gallons per minute per well) is pumped from this system (Reference 15). Bailer tests performed by the driller produced 10-25 gallons per minute, but a sustained yield of 5 gallons per minute is typical. A sanitary seal is installed in each well to prevent pollution from the surface from entering the well through the weathered rock zone.

The municipalities of Williamsburg, 20 miles northeast, and Melvern, 18 miles north of the site, also obtain water supplies from deep wells in the Tonganoxie Sandstone Member (Table 2.4-30). Borehole tests in the Tonganoxie Sandstone near the site produced yields of less than 3 gallons per minute (Section 2.4.13.1.1.2).

The municipalities of New Strawn, located 3 miles west of the site, and Hartford in Lyons County, located 15 miles west-northwest of the site, obtain ground water from wells less than 40 feet deep in the Neosho River alluvium (Reference 21). At Hartford, the static water level is about 32 feet below ground surface; it is about 12 feet below ground surface in the New Strawn well (Reference 20).

The only known ground-water supply being used for industrial purposes within a 20-mile radius of the site is from one well owned by the Atchison Topeka and Santa Fe Railway located about 15 miles northwest of the site (Well No. 39, Table 2.4-4 and Figure 2.4-8). The user has a water right for 10 gallons per minute.

2.4.13.2.1.2 Future Use

The use of ground water for public supplies in Coffey County is not expected to increase significantly as a result of population changes (Section 2.1.3). Total projected use (as estimated in 1979) is presented in Table 2.4-31 and shows a decrease in ground-water pumpage between 1965 and 1980 followed by an increase to slightly above 1965 levels in 2020 (Reference 22). The current (February, 1984) projected use of water in Coffey County is shown in Table 2.4-31a. The total use of water for domestic and manufacturing purposes increased by 159 acre-feet between 1965 and 1980, largely due to the increased domestic use of water by both the City of New Strawn, which obtains ground water from the alluvium along the Neosho River and the City of Burlington and the water districts around the site which used treated surface water, during the short term growth between 1970 and 1980. Although the projections shown in Table 2.4-31a for the year 2000 and after are preliminary and are subject to change, the 1984 projections of Table 2.4-31a for the year 2000 are consistent with the 1979 projections of Table 2.4-31, and show a gradual increase in the use of water for domestic and manufacturing purposes through the year 2035.

2.4.13.2.2 Local Ground-Water Use

A well inventory was made of 198 wells within 5 miles of the plant site. A summary of the well inventory is listed in Table 2.4-29.

2.4.13.2.2.1 Present Use

The local wells are used for domestic and livestock purposes. The 198 wells are reported to produce a total of about 73,400 gallons per day or an average of 382 gallons per day per well. Table 2.4-29 lists the pertinent data collected on each well, and Figure 2.4-52 shows the locations of the property owners of the wells.

The wells supply small quantities of water (1/2 to 10 gallons per minute) from the weathered bedrock and larger quantities from the alluvium. The shallow dug wells have diameters of 3 to 6 feet; the drilled wells have diameters of 6 to 8 inches. Most wells in the area intercept ground water in the weathered bedrock zone where the permeability has been increased by weathering.

There are three water districts within a 5-mile radius of the site. The City of New Strawn is the smallest district and serves the residents of the New Strawn area. This district obtains ground water from the alluvium along the Neosho River below the John Redmond Reservoir near New Strawn. Rural Water Districts No. 2 and 3 serve numerous residents around the site, encompass a larger geographical area than the City of New Strawn, and both obtain treated surface water from the City of Burlington.

2.4.13.2.2.2 Future Use

Information obtained during the well inventory indicates a trend away from domestic ground-water usage and towards the use of treated surface water. Continued local use of ground water for domestic and livestock use is anticipated as shown in the long-term projections (1979 projections) of Table 2.4-31 (References 29 and 11).

District No. 2 plans a gradual increase in participants as the general trend from ground water to treated surface water continues.

2.4.13.2.3 Ground-Water Flow Regimes

This section describes the regional and local potentiometric surfaces and ground-water gradients. Regional conditions within 20 miles of the site are based on a literature search, and a site investigation, detailed in Section 2.5.4, was performed to describe local conditions. The weighted average permeability is given for each water-bearing soil and bedrock unit, and ground-water recharge is discussed. The effects of local pumping on ground-water levels at the plant site are also discussed.

2.4.13.2.3.1 Regional Conditions

Within 20 miles of the site, the shallow ground-water table basically conforms to the topography of the region which has a gradient to the east and south in eastern Kansas. About 15 miles north of the site, shallow ground water in the weathered bedrock zone drains into the Marais des Cygnes River which flows eastward through Osage and Franklin counties, and into Miami County where the river assumes a southeastward course into Missouri (Figure 2.4-53).

To the west and south of the site, the shallow ground water drains into the Neosho River which flows southeastward at a gradienet of about 4 feet per mile through Morris, Lyon, Coffey, Woodson, and Allen counties, where it continues southward into Oklahoma (Figure 2.4-53).

2.4.13.2.3.2 Local Conditions

Surface drainage of the site area is generally to the south by way of Wolf and Long creeks. The gradient of Wolf Creek is about 10 feet per mile, and the gradient of Long Creek is about 7 feet per mile.

2.4.13.2.3.2.1 Potentiometric Surfaces

The locations of the B-boring piezometers are shown on Figure 2.4-54. The P-, HS-, and ESW-series piezometers are shown on Figure 2.4-55. Graphs of water-level variations in the piezometers for the various rock units are shown on Figure 2.4-56. The piezometer water-level graphs generally show little change of water levels after the effects of drilling and permeability testing have dissipated, and it may be concluded that the ground-water level in the bedrock units is relatively stable.

Water levels in the inventoried wells (Table 2.4-29) show that the shallow ground-water table closely parallels the topography within at least a 5-mile radius of the plant site. The gradient of the water table, as determined from the water-table contour map, Figure 2.4-50, ranges from 20 to 160 feet per mile, depending on the topography. Direction of ground-water flow is perpendicular to the ground-water elevation contour lines (Figure 2.4-50).

The potentiometric surface maps for the Plattsmouth Limestone, the Toronto Limestone, and the Ireland Sandstone members (Figures 2.4-57, 2.4-58, and 2.4-59, respectively) are based on piezometer readings for the individual rock units (Tables 2.4-32 and 2.4-33). The gradient of each of the potentiometric surfaces measured from these figures generally dip west and south away from the plant site at approximately 20 feet per mile. The average potentiometric surface gradient of these three units is about one half the average gradient of the ground-water table as measured in the weathered Jackson Park Shale and Heumader Shale members.

The ground-water gradient in the shallow, unweathered bedrock generally reflects surface topography more than regional structural trends. Figure 2.4-57 illustrates the potentiometric surface of ground water in the Plattsmouth Limestone Member. This surface is related to the local topography which indicates that there is some hydraulic connection between the Plattsmouth

Limestone Member and the weathered bedrock zone. Recharge to the Plattsmouth occurs in the upland areas mainly through cross-bed leakage while discharge occurs in the lower areas.

An analysis of the piezometer readings shows that water in the deeper, unweathered bedrock units is under semiconfined conditions. The shale units between the deeper limestone and sandstone units (such as the Ireland and Tonganoxie sandstones) retard vertical water movement.

Potentiometric contours for ground water in the Toronto Limestone Member, determined from piezometer readings, are shown on Figure 2.4-58. The potentiometric surface also reflects the topographic surface, but the relationship is more subdued than for the Plattsmouth potentiometric surface.

The potentiometric surface of the Ireland Sandstone is more dependent upon the westerly regional dip than are the potentiometric surfaces for the shallower units. The configuration of the potentiometric contours (Figure 2.4-59) bears little resemblance to the potentiometric contours of either the Plattsmouth or Toronto Limestone members.

Figures 2.4-57, 2.4-58, and 2.4-59 show the potentiometric surface contours prior to filling the cooling lake. After the cooling lake was filled, the ground-water elevations adjacent to the cooling lake in the Plattsmouth, Toronto, and Ireland members gradually rose to the normal operating level of the cooling lake, elevation 1,087 feet. Ground water discharged into Wolf Creek and, after the cooling lake was filled, ground-water gradients in those units along the lake perimeter were reversed. Ground water at elevations above 1,087 in other units were not affected. Because of the low permeability of the inundated bedrock units, the ground-water gradients are steep between the cooling lake level and the undisturbed ground-water levels in the hill slope opposite the lake to the east and west. The steepened gradients affect ground-water conditions only immediately adjacent to the cooling lake.

2.4.13.2.3.2.2 Weighted Average Permeabilities

The permeability in the weathered Jackson Park Shale Member ranges from about 5×10^{-7} to 5×10^{-5} centimeter per second (cm/sec) with a weighted average of about 4 x 10-5 cm/sec or 0.8 gallons per day per foot^2 (gpd/ft^2) (Table 2.4-34). At depths greater than 20 feet, the permeability ranges from 9×10^{-7} to 1×10^{-5} cm/sec6(0.02 to 0.2 gpd/ft^2) and the weighted average is 4×10^{-6} cm/sec (0.08 gpd/ft^2).

As listed on Table 2.4-34, the weighted average permeability for the Plattsmouth Limestone Member (at 0 to 20 foot depths) is 2 x 10^{-5} cm/sec (0.4 gpd/ft^2). Where the Plattsmouth is found at depths greater than 20 feet the weighted average permeability decreases to 2 x 10^{-6} cm/sec (0.04 gpd/ft^2). The two ranges (0-20 feet and greater than 20 feet) for the Toronto Limestone Member have weighted averages of 2 x 10^{-5} cm/sec (0.4 gpd/ft^2) and 1 x 10^{-6} cm/sec (0.02 gpd/ft^2), respectively. The average permeability for the Ireland Sandstone Member is 4 x 10^{-6} cm/sec (0.08 gpd/ft^2). Throughout the site area the Ireland Sandstone Member is found at depths greater than 20 feet.

The weighted average permeabilities range from 6 x 10^{-7} cm/sec (0.01 gpd/ft^2) to 2 x 10^{-6} cm/sec (0.04 gpd/ft^2) for the following unweathered shales found below the Plattsmouth Limestone Member: Heebner Shale, Snyderville Shale, Unnamed Lawrence Shale, and Robbins Shale members. They serve as confining beds between more permeable limestone and sandstone beds.

Within the site area and surrounding region there are impoundments of surface water for watering stock. A field survey of ponds within Sections 5, 6, 7, and 8 (T 21 S, R 16 E), indicates that in the area of the wolf Creek watershed. All ponds in this area are associated with natural drainage courses on side slopes of hills, and are not the result of seepage from lithologic contacts. Occasional seepage that collects near contacts is due to differential surface weathering at these contacts is due to differential surface weathering. Slightly higher permeabilities are developed by weathering at these contacts but probably extend only several feet into the interior of the hills.

2.4.13.2.3.2.3 Ground-water Recharge

An automatic water-level recorder was placed in an unused, dug well (Well D-26) about 1/3-mile northeast of the site (Figure 2.4-52). The well was sealed at the surface to prevent any runoff from entering around the top. The data obtained shows a rapid response between rainfall and the shallow water table (Figure 2.4-60). Based on a map showing the geology of the area (Figure 2.5-22), the dug well extends into the sandstone unit of the Jackson Park Shale Member. The rapid rate of recharge is probably due to infiltration of water through outcrops of the sandstone unit rather than outcrops of the shale and limestone members. The rate of vertical recharge from the surface is expected to be less than the vertical water movement at a greater depth in the sandstone unit of the Jackson Park Shale Member. This is probably related to flow in shallow vertical desiccation cracks and fissures. Following a moderate intense rainfall or during an extended period

of rainfall, it is anticipated that the clays in the weathered bedrock will swell, plugging most of the desiccation cracks. Well response to rainfall would be slower if the water percolated through the surface materials.

Recharge to the weathered bedrock is from precipitation. Recharge tothe unweathered Plattsmouth and Toronto Limestone members is principally from vertical downward leakage from overlying units; the Plattsmouth may also receive recharge from precipitation where it outcrops in highland areas on the east ridge which borders the cooling lake. Recharge to the Ireland and Tonganoxie sandstones is from precipitation in their area of outcrop east of the site and from vertical seepage at any place where these formations are in hydraulic connection with the weathered bedrock zone.

2.4.13.2.3.2.4 Effects of Local Pumpage

The nearest major pumpage from the bedrock (Tonganoxie Sandstone Member) is at Waverly which is located about 10 miles from the plant site. Because of the distance, and the fact that the pumpage at Waverly averages only about 25 gallons per minute total from 5 wells, the area of influence would not extend to the plant site. There are no significant cones of depression around the shallow dug wells in the weathered bedrock zone in the site area. These wells are used only intermittently for domestic and livestock purposes.

2.4.13.3 Accident Effects

2.4.13.3.1 Introduction

Radioactive liquids from the plant are postulated to enter the ground water as a result of the accidental rupture of specific tanks containing liquid radwaste. The effects of this accidental contamination have been examined at the nearest ground-water discharge locations: lakes, streams, or local wells.

The three tanks postulated to rupture will contain the highest curie inventory of the radioisotopes of relatively long half-lives and of concern to human health (Table 11.1-6): Sr-90, Cs-137, Co-60, and H-3. These tanks are:

a. The spent resin storage tank (Primary);

b. The boron recycle holdup tank (A or B); and

c. The refueling water storage tank.

The first two tanks are located in the radwaste building, while the refueling water storage tank is located outside, between the radwaste building and the turbine-reactor complex. Highest curie contents for Sr-90, Cs-137, and Co-60 are expected in the spent resin storage tank (Primary). The highest concentration of H-3 is expected in the boron recycle holdup tank (A or B), while the greatest curie content of H-3 is expected in the refueling water storage tank. In this accident analysis, we have postulated the rupture of each of these three tanks, as separate isolated events. Rupture of the refueling water storage tank is unlikely because it is a Category I structure. Details of the tanks and their curie content for important radionuclides are given in Table 2.4-35.

Once a tank ruptures, the liquid contents are conservatively assumed to merge immediately with the ground water. Ground water may move initially into the radwaste building and into the spent resin storage tank (primary) and the boron recycle holdup tank (A or B) through the cracks postulated to develop during the accident. Such ground-water movement would occur until the water level in the radwaste building attains the ground-water level existing outside the building. Significant ground-water movement away from the building will occur only after this hydraulic head equilibrium is achieved. To be conservative, the water table at the plant is assumed to be at plant grade, elevation 1,099.5 feet, which is about 5 feet above historical ground-water elevations (Table 2.4-33). The bases of the spent resin storage tank and the boron recycle holdup tank are approximately at elevation 1,071 feet, which is within the Heumader Shale Member. Thus, liquid contents of these tanks would flow down-gradient in the ground water within that unit. The base of the refueling water storage tank is approximately at elevation 1,095 feet. Thus, the liquid radwaste from that tank would seep directly into the adjacent overburden soil and weathered bedrock, as well as possibly into the upper portion of the underlying Heumader Shale Member, and flow down-gradient in these units.

The nearest surface-water body that can be affected by accidental releases at the plant is the cooling lake. The normal operating water level of the lake is at elevation 1,087 feet. The nearest down-gradient location to the shoreline is toward the southeast, about 640 feet from the radwaste building and 770 feet from the refueling water storage tank. Water in the cooling lake enters Wolf Creek from blowdown discharge through the outlet works or by flowing over the service spillway of the main cooling lake dam, located approximately 3.1 miles south of the plant site. At the normal operating level, the cooling lake will contains approximately 111,280 acre-feet of water. The spillway crest has

been established one foot above the normal operating level, or at elevation 1,088 feet. Water-level determinations for the cooling lake are presented in USAR Sections 2.4.3.5 and 2.4.11.3.2.

This analysis shows that the average time of contaminant travel to the cooling lake is at least equal to half the expected life of the plant (Table 2.4-37). For this reason, an analysis has also been made for the case of an accidental release toward the end of the life of the plant. Although there are no plans to drain the cooling lake after decommissioning of WCGS, the conservative assumption is made that by the time the contaminants reach the shoreline after such an accident, the cooling lake may have been drained. Thus, consideration was given to contaminant transport down-gradient to the closest discharge point on the tributary to Wolf Creek, approximately 2,450 feet southwest of the radwaste building.

Wells C-20 and C-50 (Table 2.4-29 and Figure 2.4-52) are the nearest wells in the down-gradient direction that were not purchased by the Licensees or inundated by the cooling lake. They are the nearest potable water supplies. These wells are located approximately 10,500 and 13,700 feet, respectively, from the radwaste building. The shallow ground water that flows by these wells in the over-burden soils and the underlying Heumader Shale is physically separated from the plant site by the valleys of Wolf Creek and its tributaries, and by the cooling lake. Ground water coming from the direction of these two wells tends to flow toward the plant and discharge into the intervening streams. For this reason, analysis of ground-water transport from the radwaste tanks to the wells was not performed.

In the analysis which follows, it is shown that, with the exception of tritium concentrations, ground water contaminated at the plant site by accidental radioactive releases will have radionuclide concentrations below the maximum permissible concentrations of 10 CFR 20, Appendix B, Table II, for unrestricted areas by the time the contaminated ground water reaches the nearest surface water (the cooling lake or the Wolf Creek tributary). However, it is noted that tritium is a very weak beta emitter (decay energy for total disintegration = 0.0186 MeV) and also, the tritium-related offsite doses from this postulated accident will be a very small fraction of the 10 CFR Part 100 dose limits. The following analysis also shows that the tritium concentration in the cooling lake and the Wolf Creek tributary will be well below the 10 CFR 20 limits for unrestricted areas. The effects of hydrodynamic dispersion, fluid convection, cation exchange, and radionuclide decay were included in the analysis.

2.4.13.3.2 Description of Analytical Model

The model used in this analysis conservatively assumes an instantaneous release of effluent to the ground-water system. Effluent from the refueling water storage tank, because it is a seismic Category I structure, may be released at a slower rate, but the model conservatively assumes an instantaneous release from the tanks. In the case of a slug of solution containing radionuclides which is introduced instantaneously into the ground-water system in an infinitesimally small volume, the following equation is applicable (Reference 2):

$$\frac{c}{m} = \frac{\frac{1}{n}}{(4\pi D't)^{3/2}} \exp -\left(\frac{(x - u'_x t)^2}{4D't} + \frac{(y - u'_y t)^2}{4D't} + \frac{(z - u'_z t)^2}{4D't} + \lambda t\right) \quad [2.4\text{-}4]$$

where:

c = quantity of radionuclide cation per milliliter of interstitial solution, at any time, t, and at any point x, y, z;

m = total quantity of radionuclide introduced with the slug (microcuries);

n = total porosity of the aquifer (dimensionless);

t = time since introduction of the slug (days);

x = distance from point of injection in direction of ground-water flow (centimeters);

y = distance laterally, perpendicular to ground-water flow (centimeters);

z = distance vertically, from center of slug (centimeters);

λ = decay coefficient = $0.693/T_{1/2}$ where $T_{1/2}$ is the radionuclide half-life, in days;

D' = reduced dispersion coefficient

= DR_f (Reference 33),

where:

D = the average dispersion coefficient

$= (D_x\ D_y\ D_z)^{1/3}$, and

D_x, D_y, D_z = the dispersion coefficients valid for the x, y, and z directions, respectively.

u_x', u_y', u_z' = the average velocities of the radionuclide in the x, y, and z directions, respectively (centimeters per day);

For example, $u_x' = u_x\ R_f$

where:

u_x = average velocity of water in the pores (cm/day)

R_f = the reduction factor due to cation exchange (Reference 32):

$$R_f = \frac{1}{1 + \frac{\rho_b}{n} \frac{Q}{C_{ca}} E}$$

where:

ρ_b = bulk density of the aquifer (grams per milliliter);

Q = concentration of calcium adsorbed on the exchange complex of the aquifer material (milliequivalents per gram) (closely approximated by the cation exchange capacity, for cases where the radionuclide concentration is low relative to the cation concentration of the native ground water);

C_{Ca} = total concentration of dissolved native cations in the ground water at equilibrium (milliequivalents per milliliter), assumed conservatively to consist entirely of calcium;

E = equilibrium exchange constant for exchange process for the radionuclide displacing calcium on the exchange complex;

By integrating Equation 2.4-4 over the dimensions x_o , y_o , and z_o of a slug of finite prismatic volume, we obtain Equation 2.4-5, the analytical model used in this analysis:

$$c = \frac{m}{8nx_o y_o z_o} \left(\mathrm{erf}\left(\frac{x + \frac{x_o}{2} - u_x' t}{\sqrt{4D_x' t}} \right) - \mathrm{erf}\left(\frac{x - \frac{x_o}{2} - u_x' t}{\sqrt{4D_x' t}} \right) \right)$$

$$\cdot \left(\mathrm{erf}\left(\frac{Y + \frac{Y_o}{2}}{\sqrt{4D_y' t}} \right) - \mathrm{erf}\left(\frac{Y - \frac{y_o}{2}}{\sqrt{4D_y' t}} \right) \right)$$

$$\cdot \left(\mathrm{erf}\left(\frac{Z + \frac{z_o}{2}}{\sqrt{4D_z' t}} \right) - \mathrm{erf}\left(\frac{Z - \frac{z_o}{2}}{\sqrt{4D_z' t}} \right) \right)$$

$$\cdot \exp\ (-\lambda t) \qquad [2.4\text{-}5]$$

where:

x_o, y_o, z_o = the dimensions of the slug in the soil at time 0, along the respective axes, and $D_x'=D_x R_f$, $D_y'=D_y R_f$, and $D_z'=D_z R_f$. The Equation 2.4-5 parameters are as defined for Equation 2.4-4 above. Equation 2.4-5 was derived under the assumption that $u_y = u_z = 0$.

The analyses performed used a computer program certified by Dames & Moore (SLUG3D), which solves Equation 2.4-5, with several different output options.

2.4.13.3.3 Selection of Model Parameters

A summary of the discharge points, flow paths, and parameter values selected for the model simulations is provided in Table 2.4-36.

Average Hydraulic Gradient (i) - To be conservative, the water-table level at the plant was assumed to be a maximum, at plant grade (elevation 1,099.5 feet). The ground-water elevation assumed at the cooling lake discharge point is the normal operating lake level (1,087 feet), and that at the Wolf Creek tributary to the southwest is 1,048 feet. Thus, for example, the average gradient (i) from the radwaste building to the cooling lake was computed to be:

$$i = \frac{1,099.5 - 1,087}{640} = 0.0195 \qquad [2.4\text{-}6]$$

where 640 feet (approximately 19,500 cm) is the shortest distance from the radwaste building to the shoreline of the cooling lake. The average hydraulic gradients from the tanks to the Wolf Creek tributary and the cooling lake are listed in Table 2.4-36.

Horizontal Permeability (K_h) - Of the shallow geologic units at the site, the Plattsmouth Limestone Member has the highest measured permeability (2 x 10^{-4} cm/sec). This is higher than the values for the overlying Heumader Shale Member as shown in Table 2.4-34. There is a possibility that accidentally introduced liquid radwaste could migrate below the Heumader Shale into the Plattsmouth Limestone and flow laterally at least in part in the latter unit. For this reason, and to be conservative, the value of 2 x 10^{-4} cm/sec (17.3 cm/day) was used for the average coefficient of horizontal permeability.

Porosity - Total porosity was estimated on the basis of bulk density measurements on nine samples of Heumader Shale obtained at the site. The average density was found to be 2.29 g/cm^3. Then, total porosity (n) was computed from Equation 2.4-7.

$$n = 1 - (\rho_b / \rho_s) \qquad [2.4\text{-}7]$$

where:

ρ_b = the bulk density, and

ρ_s = the specific gravity of the solids, assumed to be 2.7 g/cm^3.

The result was a computed total porosity of 0.15.

Effective porosity (n_e) was estimated to be 80 percent of total porosity (Reference 41). Thus, n_e was assumed to be 0.12. This is the value used to compute u_x in Equation 2.4-5, in which:

$$u_x = \frac{K_h^i}{n_e} \qquad [2.4\text{-}8]$$

<u>Dispersion Coefficients</u> (D) - The dispersion coefficient in the direction of flow (D_x) was estimated using the approximate equation given by Reference 13:

$$D_x = \left(0.67 + 0.5 \left(\frac{u_x\, d_{50}}{D_m}\right)^{1.2} D_m\right) \qquad [2.4\text{-}9]$$

where:

d_{50} = the median grain size; and

D_m = the molecular diffusion coefficient in water, 0.864 cm^2/day.

Particle size analyses on test pit samples showed that the d_{50} of the Heumader Shale and the overlying soil and weathered rock was about 0.0005 cm.

For all the flow paths examined, D_x was computed to be equal to 0.58 cm^2/day. The dispersion coefficient (D_m) is slightly less than the molecular diffusion coefficient in water (D_x) because the median grain size (d_{50}) is very small. As d_{50} increases, D_x also increases.

Based on Figure 7 of Reference 34, the ratio of D_x /D_{y2} was estimated to be 1.0 in each case. Thus, D_y = 0.58 cm/day.

The value for D_z was set arbitrarily low, 1.0 x 10^{-6} cm^2/day cm^2/day, to ensure that no dispersion would occur vertically beyond the upper or lower boundary of the water-table aquifer.

<u>Cation Concentration</u> (C_{Ca}) - Water-quality data for the period 1976-1978 were available for five wells located within 3 miles of the center of the site. To be conservative, the highest cation concentration values were selected, because the value of R_f increases as C_{Ca} increases.

CATION	MAXIMUM VALUE IN 3-YEAR PERIOD (mg/l)	(meq/ml)
Ca	320	0.016
Mg	68	0.0057
K	7.2	0.00018
Na	280	0.012
Total		0.03388

It is a conservative simplification to assume that calcium is the only native cation in the soil exchange complex with which injected strontium, cesium, and cobalt cations would have to compete. The concentration term (C_{ca}) in the reduction factor (R_f) refers to the equilibrium concentration of calcium in interstitial fluids. Thus, C_{Ca} was set equal to 0.034 meq/ml.

Cation Exchange Capacity (Q) - The approximate composition of the clay minerals of the Heumader Shale and other shale members at the site is 48.3 percent illite, 33.3 percent chlorite, and 18.3 percent kaolinite (Table 2.5-44).

As the clay minerals make up about 70 percent of the mineral composition of the shales (Figure 2.5-90), the approximate bulk composition of the shales by clay mineral is 34 percent illite; 23 percent chlorite, and 13 percent kaolinite.

Reference 16 states that the range of cation-exchange capacities for the three clay minerals are:

a. Illite, 10 to 40 milliequivalents per 100 grams;

b. Chlorite, 10 to 40 milliequivalents per 100 grams; and

c. Kaolinite, 3 to 15 milliequivalents per 100 grams.

To be conservative, the lowest exchange capacity for each mineral is assumed. Using the bulk percentage of each mineral results in cation-exchange capacities for illite, chlorite, and kaolinite of 0.034, 0.023, and 0.004 milliequivalents per gram, respectively. The total cation-exchange capacity of the site shales is 0.061 milliequivalents per gram.

Equilibrium Exchange Constants (E) - The equilibrium exchange constant for strontium (E_{Sr-Ca}) was estimated on the basis of experimental data for illite and kaolinite provided by Heald (Ref. 17), under the assumption that strontium exchange on chlorite will be close to that for kaolinite. The weighted average value for E_{Sr-Ca} was 1.01.

To estimate the exchange constants for cobalt and cesium, data on distribution coefficients (k_d) for cobalt and cesium, as well as strontium, were analyzed and compared. The data derived from experimental investigations reported by References 39, 43, and 74. The k_d values were obtained for each clay mineral (kaolinite or illite) from data obtained under similar experimental conditions. Then, weighted k_d values for each

isotope were obtained on the basis of the proportion of the clay minerals in the shale; exchange reactions on chlorite were assumed to be the same as on kaolinite. The resulting estimated k_d values for Heumader Shale are:

$$k_d(Sr) = 2,235$$

$$k_d(Cs) = 14,087$$

$$k_d(Co) = 4,684$$

Considering that the materials and conditions of the experiments from which these values were derived were essentially the same, it is reasonable to estimate the exchange constants for Cs and Co using E_{Sr-Ca} as the standard, on the assumption that E is linearly proportional to k_d. Therefore:

$$E_{Cs-Ca} \sim \frac{14,087}{2,235} (1.01) = 6.30 \qquad [2.4-10]$$

and

$$E_{Co-Ca} \sim \frac{4,684}{2,235} (1.01) = 2.10 \qquad [2.4-11]$$

Dimensions of Slug (V_o) - The volume (V_o) occupied by the slug in the soil at time t = 0 will be approximately:

$$V_o = \frac{\text{Volume of Liquid Contents}}{n} \qquad [2.4-12]$$

For example, for the boron recycle holdup tank, the volume of liquid contents equals 1.696 x 10^8 ml. Thus:

$$V_o = \frac{1.696 \times 10^8}{0.15} = 1.131 \times 10^9 \text{ ml} \qquad [2.4-13]$$

For a cuboid slug, $x_o = y_o = z_o$; hence:

$$x_o = y_o = z_o = (1.131 \times 10^9)^{1/3} = 1,042 \text{ cm} \qquad [2.4-14]$$

The dimensions of the slug for the other tanks are computed similarly.

Because of the large size of the refueling water storage tank, however, it was not reasonable to select a cuboid slug, as that would have resulted in a z_o (vertical dimension of the slug in the soil) of 2,160 cm (71 feet), greater than the saturated thick-

ness of the water-table aquifer at the plant. Therefore, z o was taken as 1,219 cm (40 feet) the approximate saturated thickness of the water-table aquifer. This resulted in an x_o (=y_o) of 2,878 cm (94 feet).

2.4.13.3.4 Results of Analysis

The results of the postulated rupture of each of the three tanks described in USAR Section 2.4.13.3.1 are presented in Table 2.4-35. Peak concentrations at the discharge points and the time to attain these concentrations are provided for some or all of the following important radionuclides, depending upon the composition of the radwastes in each tank: H-3, Mn-54, Co-58, Co-60, Sr-89, Sr-90, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140. Cation exchange (E greater than 0) was included in the simulations only for strontium, cesium, and cobalt.

As shown in Table 2.4-35, only in the case of tritium did the computed concentrations at ground-water discharge points exceed the maximum permissible concentrations set forth in Appendix B of 10 CFR 20. A peak tritium concentration of 1.21 mCi/ml and 0.57 mCi/ml was computed for ground water discharging to the cooling lake as a result of the rupture of the boron recycle holdup tank (A or B) and the refueling water storage tank, respectively. The 10 CFR 20 limits for tritium are 0.010 and 0.001 μCi/ml for restricted and unrestricted areas, respectively. The computed peak tritium concentrations for ground water discharging to the Wolf Creek tributary were 0.077 and 0.030 μCi/ml from the boron recycle holdup tank and the refueling water storage tank, respectively, which exceed the 10 CFR 20 limit for unrestricted areas.

However, the tritium concentration in the cooling lake and the Wolf Creek tributary will be well below the limits for unrestricted areas (see discussion below). Since the nearest water users are downstream of both the cooling lake and the potential discharge point on the tributary to Wolf Creek, the tritium concentrations would be within the 10 CFR 20 limits at the nearest water supply. Details of dilution within the surface-water regime of the cooling lake are discussed in USAR Section 2.4.12. Details of dilution within the Wolf Creek tributary due to ground-water discharge are discussed below.

Calculations show that the rate of addition of tritium to the cooling lake by means of ground-water discharge exceeds its radioactive decay rate. Hence, the maximum contribution to the concentration of tritium in the lake would occur when the entire tritium plume had discharged to the lake, assuming there was no significant discharge of lake

water downstream of Wolf Creek in the interim. The time for the entire plume to enter the lake is calculated to be 10,665 days. At the end of this period, the total number of curies (M) of tritium can be calculated by:

$$M = M_o e^{\lambda t} \quad [2.4\text{-}15]$$

where M_o is the initial number of curies of tritium. For this analysis, the refueling water storage tank provides the worst case, as it has a higher M_o value than does the boron recycle holdup tank.

$$M = (3.79 \times 10^9) \exp - \frac{0.693}{4{,}478} (10{,}665) \quad [2.4\text{-}16]$$

$$= 7.275 \times 10^8 \ \mu Ci$$

At the normal operating level, the lake will hold 111, 280 acre-feet of water, or 1.3726 x 1014 ml. Assuming complete mixing, the average contribution to the tritium concentration in the lake at peak ground-water discharge concentration levels would be

$$\frac{7.275 \times 10^8}{1.3726 \times 10^{14}} = 5.30 \times 10^{-6} \ \mu Ci/ml \quad [2.4\text{-}17]$$

which is about 200 times smaller than the 10 CFR 20 limit for unrestricted areas. This is less than the equilibrium tritium concentration in the cooling lake due to normal releases and is well below the limits of 10 CFR 20.

Significant dilution would also occur in the tributary to Wolf Creek, thus reducing the peak tritium concentration there to a figure well below the limit for unrestricted areas. A model run (Program SLUG3D) showed that at the time of the peak point concentration, resulting from the rupture of the refueling water storage tank, the average tritium concentration of ground water entering the stream would be approximately 1.62×10^{-2} μCi/ml over a reach of about 175 feet, the computed width of the plume. By straight-line measurement, the tributary is approximately 5,500 feet long, from a northerly point (north of which the stream is ephemeral) southward to the tributary's confluence with Wolf Creek. Dilution would occur as a result of the ground-water discharge into the stream arising from the 5,500-175, or 5,325 feet of uncontaminated reach on the east side, plus 5,500 feet of uncontaminated reach on the west side. However, allowance was made for the fact that the average ground-water discharge coming from the west side could be approximately five times less than that from the east side, because of the much smaller catchment size on the west side. The ground-water discharge rate per lineal foot of stream was assumed to be constant; thus, the dilution

factor was based solely on the ratio of the length of stream receiving uncontaminated ground water to the length of stream affected by the plume. The resulting computed dilution factor was 37.3. Therefore, the expected peak concentration of tritium at the confluence of the tributary with Wolf Creek is 4.3×10^{-4} μCi/ml, compared to the 10 CFR 20 limit of 1.0×10^{-3} μCi/ml for unrestricted areas.

2.4.13.4 Monitoring or Safeguard Requirements

Construction of the plant required dewatering of the excavations which extend below the water table (USAR Section 2.5.4.6). It is demonstrated in USAR Section 2.4.13.5.1 that dewatering of plant site excavations during construction did not affect offsite ground-water users.

It is demonstrated in USAR Section 2.4.13.3 that the travel time (including the effects of ion-exchange capacity) and dilution effects for an accidental release of radioactive effluent to move from the plant along potential ground-water flow paths to existing or potential future users is sufficiently long to preclude contamination of ground- and surface-water supplies. Radioactive effluent reaching these supplies would have insignificant concentrations of radionuclides. Therefore, ground-water monitoring and safeguards are not required to protect ground-water users, and no monitoring programs or special safeguards are planned.

Piezometers and wells located in the area inundated by the cooling lake were sealed prior to filling of the lake except as described below. The piezometers in the cooling lake area which were sealed are listed in Table 2.4-38 and their locations are shown on Figures 2.4-54, 2.4-55, and 2.4-61. Private operating and abandoned wells in the cooling lake area which were sealed are listed in Tables 2.4-29b and 2.4-29c, and the well locations are shown on Figure 2.4-52.

Well D38B was not plugged due to flooding by the water storage pond at the wash plant during construction of the lake, and Wells D-58B, X-D39-1 and X-D18 which were in waste areas and could not be located. This includes all piezometers and wells within the drainage boundaries of the cooling lake below elevation 1097.5 feet (USGS) (cooling lake level under the condition of probable maximum flood and superimposed wind-wave effect) with the exception of the piezometers at Borings B-17, P-14, and LK-10. The piezometers at Borings B-17 and LK-10 have been maintained to monitor local ground-water levels during the operational phase of the plant; although these borings are above the normal pool elevation of the cooling lake, the piezometer installations are

adequately protected to prevent contamination and damage from the cooling lake during flood and wave runup. Piezometer P-14 was damaged during construction and could not be located. Piezometer P-14 is currently located under a parking lot consisting of granular subbase with a 4" asphalt surface course which should protect the groundwater from contamination.

All test borings made at the site, except for those in which piezometers were installed, have previously been backfilled and sealed with cement.

The following procedures were used for sealing wells:

a. All drilled wells are sealed with a grout mix.

b. Dug wells greater than 10 feet deep are sealed with a concrete mix.

c. Dug wells or cisterns less than 10 feet deep are plugged by excavating the well or cistern and filling in the resulting hole with compacted cohesive material. During excavation, if it is found that the well or cistern is into bedrock, the hole is sealed with a concrete mix.

2.4.13.5 Design Bases for Subsurface Hydrostatic Loadings

2.4.13.5.1 Plant Site

Water levels measured in piezometers installed in the residual soil, Jackson Park Shale Member, and Heumader Shale Member were generally about 5 feet below the present ground surface; however, some seasonal variations are noted (Figure 2.4-56 and Tables 2.4- 32 and 2.4-33). Data obtained from plant site piezometers measuring the composite water levels of all rock units from the Jackson Park Shale Member to the Plattsmouth Limestone Member (Table 2.4-33) show that the potentiometric water levels are near the ground surface following periods of high precipitation and snow-melt. The shallow water table in the residual soil and weathered bedrock, depending on the amount and frequency of precipitation, is partly perched on the underlying bedrock. After periods of intense precipitation, the water table in the residual soil and weathered bedrock rises at a faster rate than in the unweathered rock units. This is due to greater vertical permeability in the residual soil and weathered bedrock. Because ground-water levels occasionally rise to near the ground surface, the design water level for ground water-induced hydrostatic loading is conservatively established at plant site grade elevation, 1,099.5 feet.

The normal water table at the plant site is 5 feet below grade and all the safety-related structures are designed for full hydrostatic loading to El. 1099.5 ft. MSL which is the plant grade. No permanent underdrains or ground water dewatering systems are installed or planned at the site.

2.4.13.5.2 Uplift Pressures

The water contained in the weathered Heumader Shale Member is under water-table conditions, while the water contained in the Plattsmouth Limestone Member is under semi-confined to water-table conditions. However, uplift pressures in the Heumader Shale Member due to excess hydrostatic pressure and lack of drainage in the Plattsmouth Limestone Member will not be significant. The head in the Plattsmouth Limestone Member will equilibrate as excavation progresses. The piezometer water-level response to surface infiltration indicates that these units have sufficient vertical permeability to allow relief of excess pressure. The hydrostatic pressure in the Toronto Limestone Member is not high enough to affect excavation stability.

The drop in head from the Heumader Shale Member to the Plattsmouth Limestone Member (Figure 2.4-57) indicates a downward gradient from the ground surface to the Plattsmouth. Water levels in piezometers installed in the Toronto Limestone Member are lower than those observed in the Plattsmouth Limestone Member (Figures 2.4-57 and 2.4-58).

Both natural and recompacted cohesive soils in the site area tend to produce shrinkage or desiccation cracks upon drying. Thus, vertical downward movement of water from precipitation can be expected, even in areas where engineered cohesive fill has been properly placed. In addition, controlled rock blasting of excavations is expected to increase vertical hydraulic connection in the adjacent bedrock and allow an increased hydraulic connection between the bedrock and recompacted soils.

2.4.13.5.3 Dewatering of Excavations

Excavations extend to variable depths to attain foundation grades (USAR Section 2.5.4, Figure 2.5-45) with maximum depths of about 41 feet or to elevation 1,058.5 feet.

Dewatering of excavations within the Category I area has been accomplished by pumping from sumps in the excavation. With permeabilities averaging 4 x 10-5 cm/sec (0.8 gpd/ft^2) in the Jackson Park Shale Member, 6 x 10^{-6} cm/sec (0.1 gpd/ ft^2) in the Heumader Shale Member, and 2 x 10^{-6} cm/sec (0.04 gpd/ft^2) in the Plattsmouth Limestone Member, normal dewatering by pumping from sumps has been used to maintain dry excavations.

Where benches are established (USAR Section 2.5.4), surface-water runoff and ground-water seepage has been intercepted by ditches and directed to sumps. Water levels in weathered and unweathered shale and limestone units equilibrate during excavation. The low permeabilities of these units (Table 2.4-34) have precluded an appreciable amount of seepage into the excavations. Water from precipitation and ground-water seepage has been removed from excavations prior to placing concrete. The method of dewatering by pumping from sumps has been chosen because (1) the volume of ground-water seepage is small, (2) uplift pressures will not be significant, and (3) it is necessary to remove water from precipitation.

At the plant site, the Jackson Park Shale Member was dewatered during excavation. During construction dewatering, the potentiometric level within the Heumader Shale Member is locally lowered to the bottom of that unit at about elevation 1,064 feet, a depth of 35.5 feet below plant grade. The potentiometric level of the Plattsmouth Limestone Member is lowered from about 1,068 to 1,057 feet, or about 11 feet.

The lateral extent of dewatering during construction was evaluated by use of an equation cited by Reference 9 as follows:

$$s = s_o \quad 1 - \frac{2}{\sqrt{p}} \int_0^{\frac{x}{\sqrt{Tt/S}}} e^{-u^2} du$$

where:

$u^2 = x^2 S/(4Tt)$

s_O = water-level decline in the excavation, in feet;

s = net decline in ground-water levels, in feet;

x = distance from the excavation to a hypothetical observation well, in feet;

t = time lapsed, in days;

S = storage coefficient of strata, dimensionless;

T = transmissivity of the strata (permeability times saturated thickness in feet - assumed to be constant away from the excavation), gallons per day per foot (gpd/ft).

Assuming an average thickness of 26 feet, a storage coefficient (S) of 0.05, a permeability (k) of 6 x 10^{-6} cm/sec (0.1 gpd/ft^2), a transmissivity (T) of 3.3 gpd/ft and using the Ferris equation above the following water-level changes are calculated to occur in the Heumader Shale Member after 2 years of dewatering:

Distance From Excavation (feet)	Decline in Water Level (feet)
50	23.5
100	13.5
200	2.9
500	< 0.03

The above tabulation indicates that beyond a distance of about 500 feet from the excavation, construction dewatering has a negligible effect on the water table.

A similar analysis was performed for the Plattsmouth Limestone Member. Because of low permeability and semi-confined conditions, the storage coefficient (S) of the Plattsmouth Limestone Member is conservatively taken as 0.0001. The permeability (k) is taken as 2 x 10^{-6} cm/sec (0.04 gpd/ft^2) (Table 2.4-34). Thus, assuming a 12-foot thickness of this unit, the transmissivity is 0.51 gpd/ft. Water-level changes in the Plattsmouth Limestone Member after 2 years of dewatering are calculated with the Ferris equation and the above input data as:

Distance From Excavation (feet)	Decline in Water Level (feet)
50	10.6
100	10.1
200	9.2
500	6.6
1,000	3.5
2,000	0.44
3,000	< 0.01

The above tabulation indicates that beyond a distance of about 2,000 feet from the excavation, construction dewatering will have a negligible effect on the water levels in the Plattsmouth Limestone Member. Ground-water level readings in the Plattsmouth from piezometer P-14 about 800 feet from the excavations show that the dewatering calculations are accurate (Table 2.4-33). Present and future ground-water users were not affected by dewatering

excavations at the plant site. The nearest wells outside the site boundary are more than 6,000 feet east of the excavations. Completion of construction has allowed the local water table to recover to its original level.

2.4.13.5.4 Essential Service Water System (ESWS) Pumphouse

Borings ESW-28 and ESW-29 were drilled at the location of the essential service water system (ESWS) pumphouse (Figures 2.5-36iii and 2.5-36jjj). Logs of borings ESW-28 and ESW-29 are presented in USAR Section 2.5, and a cross section through those borings is shown on Figure 2.5-50.

Ground-water conditions in the ESWS pumphouse area were monitored by piezometers installed in Borings ESW-10, ESW-23, HS-29, and HS- 10. The piezometer in ESW-10 measures the potentiometric surface in the Plattsmouth Limestone Member. The ground-water level was at about elevation 1,075 under artesian conditions. The piezometer installed in Boring ESW-23 was isolated in the Plattsmouth Limestone Member, but the water level had not stabilized before it was destroyed in 1975 (Table 2.4-33). Two piezometers have been installed in Boring HS-29. The lower piezometer measures the potentiometric level of the Toronto Limestone Member, while the upper piezometer measures the composite potentiometric level of the overburden through the Plattsmouth Limestone Member. The upper piezometer in Boring HS-29 indicates a stabilized water-level elevation at about 1,050 feet (Figure 2.4-56). About 1,000 feet to the east of the ESWS pumphouse location, at Boring HS-10, a piezometer is isolated in the Plattsmouth Limestone Member. Its hydrograph (Figure 2.4-56) suggests that the Plattsmouth Limestone Member at and near the ESWS pumphouse is under semi-confined conditions with the potentiometric level near the top of the Plattsmouth Limestone Member.

The excavation for the ESWS pumphouse extends to about elevation 1,053 feet which is near the base of the Plattsmouth Limestone Member. However, the low permeability of the Plattsmouth Limestone Member and the overlying Heumader Shale Member [2 x 10^{-6} and 8 x 10^{-7} cm/sec (0.04 and 0.02 gpd/ft^2), respectively] indicates that only minor amounts of ground-water seepage entered the excavation. Dewatering during construction was accomplished by pumping from sumps. As demonstrated in USAR Section 2.4.13.5.3, the area of influence of dewatering was small.

The design water level for the ESWS pumphouse is conservatively established at the ground-surface grade or the Probable Maximum Flood level in the lake (elevation 1,095.0) whichever is greater.

2.4.13.5.5 Category I Pipelines

Data obtained from piezometers (Tables 2.4-32 and 2.4-33 and Figure 2.4-56) measuring the composite water levels of all units from the overburden to the Plattsmouth Limestone Member show that the potentiometric water levels are near the ground surface (generally within 5 feet) following periods of high precipitation. Piezometers tapping only the Plattsmouth Limestone Member indicate a water level near the top of the unit. Therefore, the design water level along the ESWS pipelines has been established conservatively at the ground surface or at the maximum cooling lake elevation of 1,095.0 feet, whichever is greatest at any point along the pipeline routes.

The cross sections of the ESWS pipeline alignments (Figures 2.5-47 and 2.5-51) indicate that the pipeline excavations only partially penetrate the Plattsmouth Limestone Member. The low permeability of the near-surface rock units [8 x 10^{-7} to 4 x 10^{-5} cm/sec (0.02 to 0.8 gpd/ft^2)] indicated that the amount of seepage into the ESWS pipeline excavations during construction was very low. When the excavations were first opened, ground-water inflows originate from the weathered sandstone unit of the Jackson Park Shale Member. These inflows locally dewatered the Jackson Park Shale Member as the excavation proceeded. Ground water in the Heumader Shale and Plattsmouth Limestone members which seeped into excavations were removed by a system of ditches and sump pumps. As demonstrated in USAR Section 2.4.13.5.3, the area of influence of dewatering during construction was small. Temporary dikes were used for installation of the replacement ESW piping where it crossed the lake to the northeast of the plant. The area of the lake crossing was dewatered during installation.

2.4.13.5.6 ESWS Discharge Point

Boring B-130 was drilled nearest to the ESWS discharge point.

Two piezometers were installed in Boring HS-8, about 1000 feet west of Boring B-130, which monitor ground-water conditions near the location of the ESWS Discharge Point. The lower piezometer measures the potentiometric level of the Toronto Limestone Member while the upper piezometer measures the composite potentiometric level of the overburden and Plattsmouth Limestone Member. The hydrograph (Figure 2.4-56) for the upper piezometer indicates that the water levels near the discharge point are near the existing ground surface. Marshy conditions at the ground surface near the discharge point suggest a water-table condition. The ground-water level in the Toronto Limestone Member is at about elevation 1,057 under artesian conditions.

The final adjacent ground surface elevation is at the base of the ultimate heat sink (UHS) pond, elevation 1,065 feet. The founda-

tion grade is at about elevation 1,059 feet within the Heebner Shale Member (Figure 2.5-51). The low permeability of the Plattsmouth Limestone and Heebner Shale members [averaging about 2 x 10^{-5} and 4 x 10^{-6} cm/sec (0.4 and 0.08 gpd/ft^2), respectively; see Table 2.4-34 indicates that the rate of ground-water seepage into the excavation during construction was slow and could be removed by pumping from sumps. As demonstrated in Section 2.4.13.5.3, the area of influence of dewatering during construction was small.

The design water level for the ESWS discharge point is conservatively established at the maximum cooling lake elevation of 1,095.0 feet.

2.4.14 REFERENCES

1. ASCE Journal of the Hydraulics Division, 1973, Sediment control methods: D. Reservoirs: By the Task Committee for preparation of Manual on Sedimentation of the Committee on Sedimentation of the Hydraulics Division, April 1973.

2. Baetsle, L.H., and Souffriau, J., 1967, Installation of chemical barriers in aquifers and their significance in accidental contamination, in Disposal of radioactive wastes into the ground: Proceedings of a Symposium, 29 May - 2 June, 1967, International Atomic Energy Agency, Vienna.

3. Bayne, C.K., and Ward, J.R., 1967, General availability of ground-water in Kansas: Kansas Geol. Survey, map.

4. Broeker, M. E., and Fishel, V. C., 1961, Groundwater levels in observation wells in Kansas, 1960: Kansas Geol. Survey, Bull., no. 153.

5. Burns, C. V., 1967, Kansas streamflow characteristics, part 7, Annual streamflow summary tables: Kansas Water Resources Board, Topeka, Kansas, Tech. rept. no. 7 (June).

6. Chow, V. T., 1959, Open-channel hydraulics: McGraw-Hill BookCompany, Inc., New York, p. 115.

7. Chow, ed., 1964, Handbook of applied hydrology: McGraw-Hill Book Company, Inc., New York, Sections 14-6, 21-37, 25-5.

8. Defant, A., 1960, Physical oceanography: Pergamon Press, Inc., v. II.

9. Ferris, J. G., and others, 1962, Theory & aquifer tests: U.S. Geol. Survey, water-supply paper 1536-E, 174 pp.

10. Flasch, D., 1973, Chief, Hydraulic Branch, U. S. Army Corps of Engineers, Tulsa, Oklahoma district, written communication.

11. Flickinger, Gary, 1979, Kansas Water Resources Board, Topeka, Kansas, telephone communication (June 6).

12. Flickinger, 1984, Kansas Water Office, Topeka, Kansas, written communication (February 20).

13. Fried, J.J., and Combarnous, M.A., 1971, Dispersion in porous media, in Advances in hydroscience: Ven Te Chow, ed., Academic Press, vol. 7, pp. 169-282.

14. Garrison, J.M., Granju, J.P., and Price, J.T., 1969, Unsteady flow simulation in rivers and reservoirs: Journal of the Hydraulics Division, Am. Soc. of Civil Engineers (September).

15. Gettinger, Lucille, 1979, Records, Kansas State Board of Agriculture, Division of Water Resources, Topeka, Kansas, written communication (August 24).

16. Grim, R. E., 1953, Clay mineralogy: McGraw-Hill Book Company Inc., New York.

17. Heald, W. R., 1960, Characterization of exchange reations of strontium or calcium on four clays: Soil Science Society of America Proceedings, vol. 24., pp. 103-106.

18. Ippen, A. T., ed., 1966, Estuary and coastline hydrodynamics: McGraw-Hill Book Company, Inc., New York.

19. Kansas Geological Survey, 1973, Well logs on open-file: Kansas Geol. Survey.

20. Kansas State Board of Agriculture, 1979, Open-file material: Division of Water Resources, Topeka, Kansas (March).

21. Kansas State Department of Agriculture, 1973, Open-file material: Kansas Water Resources Board.

22. Kansas Water Office, 1984, Open-file material.

23. Kansas Water Resources Board, 1960, Kansas streamflow characteristics, Part 2, Low-flow frequency: Tech. rept. no. 2.

24. ________, 1961a, State water plan studies: Part A, sec. 7 (June).

25. ________, 1961b, A program of fluvial sediment investigations in Kansas: Bull. 6 (July).

26. ________, 1967a, Special water districts in Kansas: Project no. '701', Rept. no. 16, p. 43 (September).

27. ________, 1971b, Sediment yields from small drainage areas in Kansas: Bull. 16.

29. ________, 1967c, Irrigation in Kansas: Project no. '701', Rept. no. 16, p. 43 (September).

29. ________, 1973a, Open-file material.

30. ________, 1973b, Turbidity data for Neosho River at Hartford water intake: (October 16).

31. ________, 1978, Kansas state water plan, water supply and storage program: 5th annual report, Topeka, Kansas.

32. Kaufman, W.J., 1973, Notes on radionuclide pollution of ground waters: Water Resources Engineering Series, Univ. of California, Berkeley.

33. Lai, S., and Jurinak, J.J., 1972, The transport of cations in soil columns at different pore velocities: Soil Science Society of America Proceedings, vol. 36, pp. 730-733.

34. Lenda, A., and Zuber, A., 1970, Tracer dispersion in ground-water experiments: Isotope Hydrology 1970, International Atomic Energy Agency, Vienna, pp. 619-641.

35. Linsley, R.K., and Franzini, J.B., 1972, Water Resources Engineering, second edition, McGraw-Hill Book Company, Inc., New York.

36. Linsley, R.K., Kohler, M.A., and Paulhus, J.L., 1958, Hydrology for engineers: McGraw-Hill Book Company, Inc., New York, pp. 204-207, 297-301.

37. Merriam, D.F., 1963, The geologic history of Kansas: Kansas Geol. Survey, Bull. 162.

38. Newton, D.W., and Cripe, M.W., 1973, Flood studies for safety of TVA nuclear plants, hydrologic and embankment

breaching analysis - presented at the National Meeting on Water Resources Engineering in Washington, D.C.: Tennessee Valley Authority, Knoxville, Tennessee.

39. Parker, F. L., Struxness, E.G., Tamura, T., Bruscia, G., Morton, R.J., Eastwood, E.R., and Sorathesn, A., 1960, Clinch River studies: Health Physics Division, Annual Progress Report for the Period Ending July 31, 1960, Oak Ridge National Laboratory, ORNL-2994, pp. 45-57.

40. Price, J.T., and Garrison, J.M., 1973, Flood waves from hydrologic and seismic dam failures - presented at the National Meeting on Water Resources Engineering, Washington, D.C.: Tennessee Valley Authority, Knoxville, Tennessee.

41. Routson, R.C., and Serne, R.J., 1972, Experimental support studies for the percol and transport models: Battelle Pacific Northwest Laboratories, Richland, Washington, BNWL-1719.

42. Stoker, J.J., 1957, Water waves: Interscience Publishers, New York, pp. 333-513.

43. Tamura, T., 1972, Sorption phenomena significant in radioactivewaste disposal, in Underground waste management and environmental implications: Proceedings of the Symposium held December 6-9, 1971, Memoir 18, APPG.

44. U.S. Army Corps of Engineers, 1952, standard project flood determinations: U.S. Army Corps of Engineers, EM 1110-2-1411 (Revised 1965).

45. _________, 1958, Hydrology, Strawn reservoir: U.S. Army Corps of Engineers, Tulsa, Oklahoma District, Design memorandum no. 2 (February).

46. _________, 1961, Hydrology, Marion dam and reservoir: U.S. Army Corps of Engineers, Tulsa, Oklahoma District, Design memorandum no. 1 (February).

47. _________, 1962, Summary report of CWI projects CW-164 and CW-165: Beach Erosion Board, OCE, Tech. memorandum no. 132 (November).

48. _________, 1963, Hydraulic design of reservoir outlet structures: EM-1110-2-1602 (August).

49. _________, 1964, Structural design of spillways and outlet works: EM-1110-2-2400 (November).

50. _________, 1965a, Flood plain information, Neosho and Cottonwood rivers, Kansas: U.S. Army Corps of Engineers, Tulsa, Oklahoma District (February).

51. _________, 1965b, Engineer Manual, Engineering and design, Hydraulic design of spillways: U.S. Army Corps of Engineers, EM-1110-2-1603, Headquarters, Department of the Army, Office of the Chief Engineers (March).

52. __________, 1966a, Shore protection, planning and design: U.S. Army Corps of Engineers, Tech. rept. no. 4, 3rd ed. (June).

53. __________, 1966b, Spillway rating and flood routing: U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer program 22-52-L210 (October).

54. __________, 1966c, Technical Letter no. 1110-2-8, Computation of free-board allowances for waves in reservoirs: U.S. Army Corps of Engineers (August).

55. __________, 1966d, EC 1110-2-27, Policies and procedures pertaining to determination of spillway capacities and freeboard allowances for dams: U.S. Army Corps of Engineers (August).

56. __________, 1968, Water surface profiles: U. S. Army Corps of Engineers, Hydrologic Engineering Center, Computer program 22-J2-L232 (December).

57. __________, 1969, Reservoir regulation manual for Council Grove, Marion, and John Redmond reservoirs, Upper Grand (Neosho) River, Kansas: U.S. Army Corps of Engineers, Tulsa, Oklahoma District (June).

58. __________, 1971, Cedar Point Lake: U.S. Army Corps of Engieers, Tulsa, Oklahoma District, Design memorandum no. 1 (April).

59. ___________, 1973, Hydraulic design criteria on storm drain out-lets: (Sheets 772-4 to 722-7).

60. ___________, 1975, Engineering Regulation ER-1110-2-50 (May).

61. Thompson, Robert, Kansas State Department of Health and Environment, Topeka, Kansas, telephone communication (February 16).

62. U.S. Department of the Interior, Bureau of Reclamation, 1971, Kansas state water plan studies, Subreconnaissance land classification report for Kansas: in cooperation with the Kansas Water Resources Board.

63. U.S. Department of Interior, Bureau of Reclamation 1973, Design of small dams: Bureau of Reclamation, second edition.

64. U.S. Department of Agriculture in cooperation with Committee on Sedimentation, Water Resource Council, 1969, Summary of reservoir sediment deposition surveys made in the U.S. through 1965: U.S. Dept. of Agriculture, Rept. no. 1143 May).

65. U.S. Department of Commerce, 1963, Storm data: U.S. Dept. of Commerce, v. 3, no. 7 (July); v. 5, no. 3 (March); v. 6, no. 8 (August).

66. _________, 1972, Storm data: U.S. Dept. of Commerce, v. 14, no. 7 (July).

67. U.S. Geological Survey, 1952, Kansas-Missouri floods of July, 1951: U.S. Geol. Survey, water-supply paper 1139.

68. _________, 1964, Magnitude and frequency of floods in the United States, 1961-65, Part 7, Lower Mississippi River basin, rkansas River basin: U.S. Geol. Survey, water-supply paper 1681, v. 2.

69. _________, 1969, Water resources data for Kansas, part 1, surface water records: U.S. Geol. Survey.

70. _________, 1978, Water resources data for Kansas, Water year 1977: Report KS-77-1.

71. U. S. Weather Bureau, 1865-1965, Kansas, national and annual summaries of climatological data: U.S. Government Printing Office, Washington, D.C.

72. _________, 1961, Rainfall frequency atlas of the United States: U. S. Government Printing Office, Washington, D.C., Tech. rept. no. 40.

73. _________, 1956, Seasonal variation of the probable maximum precipitation east of the 105th meridian for areas from 10 to 1,000 square miles and durations of 6, 12, 24 and 48 hours: U.S. Government Printing Office, Washington, D.C., Hydrometeorological rept. no. 33 (April).

74. Webster, 1975

75. U.S. Nuclear Regulatory Commission, NUREG/CR-7046, Design-Basis Flood Estimation for Site Characterization at Nuclear Power Plants in the United States of America, November 2011.

76. National Oceanic and Atmospheric Administration, NOAA Hydrometeorological Report No. 52, Application of Probable Maximum Precipitation Estimates - United States East of the 105th Meridian, August 1982.

77. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Hydraulic Modeling System [HEC-HMS], Computer Software, Version 3.5, http://www.hec.usace.army.mil/software/hec-hms/.

78. U.S. Army Corps of Engineers, Hydrologic Engineering Center, River Analysis System [HEC-RAS], Computer Software, Version 4.1, http://www.hec.usace.army.mil/software/hec-ras/.

TABLE 2.4-1

EXISTING GAGING STATIONS
IN THE UPPER NEOSHO RIVER BASIN

Gaging Number	Approximate Location	Drainage Area Above the Station (square miles)	Records Available Since	Flow Rates or Elevation Records		
				Average	Maximum	Minimum
07179400	Council Grove Lake near Council Grove	246	Oct. 1964	Unknown	1,284.64 ft	1,265.79 ft
07179500	Neosho River at Council Grove	250	Oct. 1938	125 cfs	121,000 cfs	0 cfs
07179730	Neosho River near Americus	622	Jun. 1963	319 cfs	10,900 cfs	0 cfs
07179794	Marion Lake near Marion	200	Feb. 1968	Unknown	1,356.66 ft	1,347.60 ft
07179795	Cottonwood River below Marion Lake	200	Jul. 1968	87.5 cfs	3,390 cfs	0 cfs
07180400	Cottonwood River near Florence	754	Jun. 1961	340 cfs	56,000 cfs	5.5 cfs
07180500	Cedar Creek near Cedar Point	110	Oct. 1938	54.8 cfs	52,400 cfs	0 cfs
07182250	Cottonwood River near Plymouth	1,740	Mar. 1963	906 cfs	57,500 cfs	8.7 cfs

TABLE 2.4-1 (continued)

Gaging Number	Approximate Location	Drainage Area Above the Station (square miles)	Records Available Since	Flow Rates or Elevation Records Average	Maximum	Minimum
07182450	John Redmond Reservoir near Burlington	3,015	Aug. 1963	Unknown	1,066.81 ft	1,033.80 ft
07182510	Neosho River at Burlington	3,042	Jun. 1961	1,605 cfs	26,200 cfs	1.1 cfs

Source:

U.S. Geological Survey, 1978, Water resources data for Kansas, water year 1977: Report KS-77-1, U.S. Geological Survey.

 Rev. 0

TABLE 2.4-2

GEOMORPHOLOGICAL CHARACTERISTICS
OF THE WOLF CREEK WATERSHED

Characteristic	Near the Plant Site Area (Under Natural Conditions)	At Main Cooling Lake Damsite (Under Natural Conditions)
Drainage area, in square miles	19.7	27.4
Stream order (reflects degree of bifurcation within watershed), dimensionless	3	4
Length of main stream from divide to point of consideration, in miles	12.7	19.1
Total stream length in drainage area above outlet, in miles	48.5	71.9
Drainage density (average length of streams per unit area within watershed), in miles per square mile	2.5	2.6
Mean overland flow length, in miles	0.2	0.2
Watershed length (straight line length from outlet to outermost point), in miles	7.9	10.6
Shape factor (ratio of length of watershed to its width), dimensionless	3.15	4.1
Difference in elevation between stream headwater region and outlet, in feet	128.5	163
Mean stream gradient, in feet per mile	10.1	8.5

TABLE 2.4-3

GENERALIZED SECTION OF UPPER GEOLOGIC FORMATIONS IN THE REGION SURROUNDING THE SITE

System	Series	Group Formation	Thickness (feet)	Physical Characteristics	Water Supply and Water Quality Characteristics
Quaternary	Pleistocene		0-25	Gravel, sand, silt and clay as alluvium and terrace deposits; very thin local deposits of eolian silt.	Yields small to moderate supplies of water that is hard and may contain objectionable amounts of iron but otherwise of good quality.
Tertiary	Pliocene	Ogallala	0-3	Gravel and sand, chiefly chert, in a reddish clay matrix, leached and oxidized.	Generally above water table.
Pennsylvanian	Virginian	Shawnee	0-325	Limestone and shale: shales locally contain channel sandstone.	Supplies adequate for domestic and stock use generally available at depths of 30 to 150 feet. Both sodium and calcium bicarbonate waters are obtained.
Pennsylvanian	Virginian	Douglas	0-300	Shale and sandstone. Sandstone locally comprises one-third to one-half of the deposits. Limestone and coal comprise less than five percent of the group.	Shale beds yield little water, sandstones locally yield dependable domestic and stock supplies.
Pennsylvanian	Missourian	Lansing	0-160	Limestone formations and an intervening shale formation; forms two escarpments.	Small supplies for stock and domestic use can generally be developed from limestones, black fissile shales or thin sandstones.

Source:

Table reproduced, in part, from Kansas Water Resources Board, 1961, State water plan studies, part A, section 7, Neosho unit: Kansas Water Resources Board (June) p. 59.

TABLE 2.4-4

WATER RIGHTS IN COFFEY COUNTY

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
1	SW/NW and SW/SW 4-23-16 and SE/SE 5-23-16	M. Parmely	Neosho River	1,300	79	Irrigation
2	SW/NW and SW/SW 4-23-16 and SE/SE 5-23-16	M. Parmely	Neosho River	2,160	79	Irrigation
3	NW/SE 5-19-14	City of Lebo and vicinity	Tributary Cole Creek	63	102	Municipal
4	SW/21-22-14 NW/28-22-14	City of Gridley	Varvel Creek	75	57	Municipal
5	NE/NW 3-23-16	City of LeRoy and vicinity	Neosho River	200	80	Municipal
6	N/NE 27-21-15	Huff's Gardens	Rock Creek	450	9	Irrigation
7	NW/SW/SE 10-21-15	Village of Strawn	Well	60	22	Municipal

(a) See Figure 2.4-8 for locations.

(b) Locations are specified by section division, section, township, and range.

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
8	NW/NW/SE 35-21-15	Nelson Motors, Inc.	Neosho River	1,500	350 125	Recreation Irrigation
9	E/NW/NW 10-21-15	KG&E	John Redmond damsite	24,685[c]	25,000	Industrial
10	SE/SE/NE 7-20-17	Rural Water District No. 4	4 wells	60	49	Municipal
11	NE/SW/SW 2-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Troublesome Creek	Natural flow	30 (storage)	Recreation
12	S/N 18-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Troublesome Creek	Natural flow	525 (storage)	Recreation
13	NW/SE/SW 14-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000[d]	152	Recreation

(c) Withdrawal of natural flows in Neosho River only at such times as minimum of at least 250 cfs remains immediately downstream from the intake.

(d) Water users number 13-15, 17-21, 23 and 24 are limited to a combined total not to exceed 10,000 gpm.

TABLE 2.4-4 (continued)

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
14	NW/SE/SW 13-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000 [d]	50	Recreation
15	SE/NE/SW 19-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000 [d]	330	Recreation
16	SE 25-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Tributary Eagle Creek	Natural flow	6 (storage)	Recreation
17	NW/NE/NW 36-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Eagle Creek	10,000 [d]	73	Recreation
18	NW/NW/NW 31-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Eagle Creek	10,000[d]	18	Recreation

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
19	NW/SW/SE 30-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Eagle Creek	10,000[d]	40	Recreation
20	SW/SE/SE 20-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000[d]	68	Recreation
21	SW/SW/SE 20-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000[d]	212	Recreation
22	SW/SW/NW 21-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	Natural flow	72 (storage)	Recreation
23	SE/NW/NW 28-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000[d]	200	Recreation

TABLE 2.4-4 (continued)

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
24	NW/SE/NE 33-20-14	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	10,000[d]	82	Recreation
26	SW/NW/NW 14-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	36	Irrigation
27	SE/NE/SW 11-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	70	Irrigation
28	NW/SW/SE 11-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	99	Irrigation
29	W/NW/NE 14-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	198	Irrigation

(e) Water users numbers 26-34 are limited to a combined total not to exceed 8,000 gpm.

TABLE 2.4-4 (continued)

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
30	SW 14-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	55	Irrigation
31	NW/NE/NW 23-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	74	Irrigation
32	NE/SE/NE 23-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	45	Irrigation
33	SW/SE/SW 13-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	58	Irrigation
34	NE/SW/SW 13-20-13	U.S. Department of Interior - Bureau of Sport Fisheries and Wildlife	Neosho River	8,000[e]	71	Irrigation

TABLE 2.4-4 (continued)

Water User No.[(a)]	Location of Diversion Point[(b)]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
35	E/NW/NW 10-21-15	KG&E	Neosho River	76,300[(c)]	57,300	Industrial
36	NE/NW/NW 12-19-14	Martin Marietta Aggregates	Tributary to Frog Creek	800	50	Industrial
38	NE/NW 3-23-16	City of LeRoy and vicinity	Neosho River	160	55	Municipal
40	24-19-16	City of Waverly	4 wells	100	25	Municipal
41	NW 26-21-15	City of Burlington	Neosho River	800	245	Municipal
42	SW/NW/SW 14-20-13	City of Hartford	Neosho River	100	62	Municipal
43	SW/NW/SW 7-20-17	Rural Water District No. 4, Anderson City	Well	15	23	Municipal
44	NW 26-21-15	City of Burlington Coffey Co. RWD 2 & 3	Neosho River	1,000	767	Municipal
45	W/SW/SE 26-21-15	F. Robrahn	Neosho River	650	61	Irrigation
46	SW/NW/NW 21-22-16	D. Crotts	Long Creek	1,000	33	Irrigation

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
47	NW/NE/SE 9-21-15	Kansas Fish and Game Commission	Neosho River	12,000	150	Recreation
48	SE/NE/SW 10-21-15	New Strawn	Well	100	84	Municipal
49	SW/NE/NE 15-21-15	J. Decker	Neosho River	1,050	156	Irrigation
50	NE/SW/NW 26-21-15	W. Strawn	Neosho River	400	40	Irrigation
51	SE/SW/NE and NW/SW/SE 4-21-16	Martin Marietta Corp.	Long Creek	800	307	Industrial
52	NE/NE/NE 12-20-16	Rural Water District No. 4 Anderson Co.	Well	25	25	Municipal
53	NW/NW/NE and NE/NE/NW 11-19-16	Rural Water District No. 4 Osage Co.	2 Wells	75	107	Municipal
54	3 points in NW 3-19-15 4 points in NE 2 points in SW, and 2 points in SE 4-19-15 5 points in SW 34-18-15 (Osage Co.)	Niles Farms Inc.	Frog Creek	3,900	461	Irrigation

Water User No.[a]	Location of Diversion Point[b]	Owner	Source	Authorized Maximum Diversion Rate (gpm)	Authorized Maximum Quantity (acre-feet)	Principal Water Usage
55	4 points in NE, and 3 points in NW 7-19-15	Niles Farms Inc.	Unnamed Tributary to Frog Creek	1,700	149	Irrigation
56	N/NW/SE 3-20-17	W. Miller	Unnamed Tributary to Elm Creek	800 (direct) Natural Flow (storage)	74 78	Irrigation
57	NW/NW/SE 5-19-14	City of Lebo	Unnamed Tributary to Cole Creek	120	165	Municipal
58	SE/NE/NE 12-20-16	Rural Water District No. 4 Anderson Co.	Well	10	15	Municipal
59	E/SE/NE 29-22-16	K. Crotts	Neosho River	1,125	39	Irrigation
60	SW/NW 14-20-13	City of Hartford	2 Wells	100	28	Municipal
61	SW/SW/NE 30-21-16	KG&E	Wolf Creek	Natural Flows	40,000 (storage)	Industrial

Source:
State Board of Agriculture, 1979, Open-file material: Division of Water Resources, Topeka, Kansas (March).

TABLE 2.4-5

MUNICIPALITIES AND RURAL WATER DISTRICTS IN KANSAS
UTILIZING THE NEOSHO RIVER DOWNSTREAM OF THE SITE

City or Rural Water District	1976-1977 Population Served	1976-1977 Annual Water Use (acre-feet)	2000 Population Served	2000 Annual Water Use (acre-feet)	Source of Water
Coffey County					
LeRoy	653	47.6	992	93.1	Neosho River
Anderson County					
RWD #5	1,205	135.0	*	*	City of Iola, Allen Co.
Kincaid	350	28.0	*	*	RWD #5
RWD #5 to Allen Co.	240	18.1	240	22.0	City of Iola, Allen Co.
RWD #5 to Coffey Co.	55	6.2	58	7.7	City of Iola, Allen Co.
RWD #5 to Franklin Co.	90	10.6	*	*	City of Iola, Allen Co.
Woodson County					
RWD #1	360	21.9	462	34.8	Neosho River
RWD #1 to Allen Co.	200	15.1	200	18.3	Neosho River
Allen County					
Humboldt	2,444	472.7	2,610	511.8	Neosho River
Iola	6,968	1,197.9	7,500	1,309.8	Neosho River
Bassett	32	8.0	28	7.0	City of Iola
Gas City	522	73.7	580	89.4	City of Iola
LaHarpe	621	87.7	670	104.9	City of Iola
RWD #1	26	3.7	22	3.2	City of Iola
RWD #2	42	7.0	38	6.3	City of Iola
RWD #3	60	5.3	64	5.7	City of Iola
RWD #4	28	5.9	24	5.3	City of Iola
RWD #5	20	8.8	18	8.0	City of Iola
RWD #6	54	6.9	50	6.4	City of Iola
RWD #7	152	17.8	145	16.9	City of Iola
RWD #8	180	27.7	352	32.4	City of Iola
RWD #9	34	4.3	38	4.8	City of Humboldt
RWD #10	84	11.7	164	36.2	City of Humboldt

* Present population and water use greater than year 2000; use present values for delivery.

City or Rural Water District	1976-1977 Population Served	1976-1977 Annual Water Use (acre-feet)	2000 Population Served	2000 Annual Water Use (acre-feet)	Source of Water
Neosho County					
Chanute	10,400	1,309.1	12,526	2,011.0	Neosho River
Erie	1,425	172.0	1,787	469.6	Neosho River
St. Paul	713	92.1	921	110.5	Neosho River
RWD #3	107	12.3	115	12.5	City of Erie
RWD #4	340	30.5	360	32.5	City of Erie
RWD #7	620	67.5	700	76.8	City of Chanute
RWD #8	196	26.6	231	108.7	City of St. Paul
RWD #9	182	26.1	274	43.0	City of Chanute
RWD #7 to Allen Co.	19	2.0	25	2.7	City of Chanute
Chanute to Petrolia (Allen Co.)	83	18.8	100	22.7	City of Chanute
Labette County					
Chetopa	1,663	168.9	1,997	233.3	Neosho River
Oswego	2,167	456.2	2,250	437.7	Neosho River
Parsons	13,344	2,151.4	16,654	2,345.1	Neosho River Standby and Imp. Res.
RWD #1	220	11.0	400	20.0	City of Oswego
RWD #2	105	5.2	200	10.7	City of Parsons
RWD #4	141	15.4	170	21.5	City of Oswego
RWD #7	186	13.1	230	18.4	Neosho RWD #4
RWD #8	700	73.7	900	94.7	Labette RWD #2

Source:
Flickenger, G., 1979, Associate Engineer, Written communication, Water Resources Board, Topeka, Kansas (March 9).

TABLE 2.4-6

PEAK ANNUAL STAGES AND DISCHARGES
FOR NEOSHO RIVER AT BURLINGTON ,KANSAS
(USGS GAGE NO. 07182510)[a]

WATER YEAR	GAGE HEIGHT (feet)	DISCHARGE (cfs)
1961[b]	31.53	26,200
1962	31.36	24,800
1963	15.56	5,770
1964	14.80	5,200
1965	27.49	16,000
1966	19.31	8,950
1967	22.70	11,700
1968	22.33	11,400
1969	23.18	12,000
1970	20.95	10,500
1971	22.78	11,700
1972	22.27	12,400
1973	25.40	15,300
1974	24.29	14,300
1975	22.81	12,900
1976	18.65	9,620
1977	23.03	13,400
1978	14.48	6,780

Sources: U.S. Geological Survey, 1966-1977, Water resources data for Kansas, Part 1, Surface water records: USGS.

Thompson, M., 1979, USGS, Lawrence, Kansas, District Office, telephone communication.

(a) The gage is a digital water-stage recorder. Datum of gage is 983.56 feet above Mean Sea Level, datum of 1929. Prior to Oct. 1, 1962, graphic water-stage recorder at same site and datum (U.S. Department of the Interior, 1971).

(b) Gage became operational in June.

TABLE 2.4-7 Sheet 1 of 3

PEAK ANNUAL STAGES AND DISCHARGES
FOR THE NEOSHO RIVER AT STRAWN, KANSAS
(U.S.G.S. GAGE NO. 071824)[a]

Water Year	Gage Height (feet)	Discharge (cfs)
1885 [b]	26.0	75,000
1902 [b]	24.5	43,000
1903	24.5	43,000
1904	26.5	90,000
1905	20.0	18,000
1906	20.5	19,000
1907	18.0	15,000
1908	24.5	43,000
1909	26.0	75,000
1910	21.0	20,000
1911	18.0	15,000
1912	16.5	13,000
1913	17.0	14,000
1914	13.0	10,000
1915	21.5	21,000
1916	21.5	21,000

(a) The gage was nonrecording June 8 to Sept. 26, 1948; re- cording thereafter. Datum of gage is 1,018.78 above M.S.L., datum of 1929, Kansas City Supplementary adjust- ment of 1943; levels by Corps of Engineers (U.S. Geological Survey, 1964; 1969).

Period of Record (U.S. Army Corps of Engineers, 1971, p. 9).

Month & Year	Agency	Remarks
6/02 - 10/41	Strawn State Bank	Stages only (high water readings only)
6/48 - 9/50	Corps of Engineers	Stages & discharges
10/50 - 6/63	United States Geological Survey	Stages & discharges

(b) Stages shown for the water years 1885, 1902-1947 are based on gage-height relations with stages for stations at Neosho Rapids 17.7 miles upstream and at Burlington 18 miles down- stream, and are approximate only. Annual peaks for these water years 1885, 1902-1947 are based on subsequent stage-discharge relation and are also approximate (U.S. Geological Survey, 1964).

TABLE 2.4-7 (continued) Sheet 2 of 3

Water Year	Gage Height (feet)	Discharge (cfs)
1917	19.5	17,000
1918	14.0	11,000
1919	23.5	33,000
1920	11.5	9,000
1921	10.0	7,000
1922	22.5	25,000
1923	24.5	43,000
1924	16.5	13,000
1925	18.5	16,000
1926	24.0	38,000
1927	25.0	51,000
1928	22.0	23,000
1929	25.5	62,000
1930	19.5	17,000
1931	6.5	5,000
1932	25.5	62,000
1933	16.5	13,000
1934	4.5	4,000
1935	23.5	33,000
1936	19.0	16,000
1937	16.0	13,000
1938	23.0	29,000
1939	8.5	6,000
1940	5.5	4,000
1941	24.0	38,000
1942	25.5	62,000
1943	21.5	21,000
1944	26.0	75,000
1945	26.0	75,000
1946	23.0	29,000
1947	22.5	25,000
1948	27.48	99,200
1949	17.85	15,000
1950	20.24	17,700
1951	30.54	400,000
1952	17.45	14,300
1953	5.80	4,340
1954	5.64	4,020
1955	5.25	3,960
1956	8.22	5,340
1957	22.45	24,900
1958	18.40	13,900
1959	--	18,200
1960	--	17,100
1961	24.80	47,800
1962	21.90	22,400

TABLE 2.4-7 (continued)

Water Year	Gage Height (feet)	Discharge (cfs)
1963 [c]	8.33	6,960

[c] Gage discontinued end of June.

Sources:

Burns, C. V., 1967, Kansas stream flow characteristics, Part 7, Annual stream flow summary tables: Kansas Water Resources Board, Topeka, Kansas, Technical Report No. 7 (June).

U.S. Army Corps of Engineers, 1971, Cedar Point Lake: U.S. Army Corps of Engineers, Design Memorandum No. 1 (April).

U.S. Geological Survey, 1964, Magnitude and frequency of floods in the United States, 1961-65, part 7, lower Mississippi River basin, Arkansas River Basin: U.S. Geological Survey, Water-Supply Paper 1921, vol. 2.

_________, 1969, Water resources data for Kansas, Part 1, Surface water records: U.S. Geological Survey.

TABLE 2.4-8

ESTIMATED ANNUAL FLOOD PEAK DISCHARGES FOR THE NEOSHO RIVER NEAR BURLINGTON AT RIVER MILE 343.7*

Water Year	Discharge (cfs)
1922	30,000
1923	29,300
1926	71,400
1927	28,100
1928	46,700
1929	65,800
1932	18,900
1935	20,000
1936	16,800
1938	37,700
1941	29,900
1942	65,400
1943	30,500
1944	90,000
1945	91,000
1946	16,000
1947	21,000
1948	102,000
1950	18,600
1951	408,000

*No estimates available after 1951.

TABLE 2.4-9

RAINFALL INTENSITY AT THE PLANT SITE

FOR 100-YEAR STORM

STORM DURATION	RAINFALL INTENSITY INCHES/HOUR 100-YEAR STORM
5 minutes	13.6
10 minutes	10.5
15 minutes	8.8
30 minutes	6.2
1 hour	3.9
2 hours	2.3
3 hours	1.7
6 hours	1.0

TABLE 2.4-10

LOCAL INTENSE PRECIPITATION (LIP)

AT PLANT SITE

DURATION IN HOURS	MAXIMUM DEPTH OF PRECIPITATION (inches)
0.5	14.44
1.0	19.0
2.0	20.96
3.0	22.92
4.0	24.87
5.0	26.83
6.0	28.79

TABLE 2.4-11

PROBABLE MAXIMUM PRECIPITATION

MONTHLY AND ALL-SEASON HIGH-DEPTH DURATION DATA*

MONTH	DURATION 6 HOURS	12 HOURS	24 HOURS	48 HOURS
January	8.70 .	11.42	14.30	18.10
February	10.56	13.25	15.94	19.90
March	14.96	17.00	20.10	22.50
April	21.00	24.40	26.25	28.40
May	24.00	26.60	28.70	30.70
June	25.50	28.30	30.30	32.80
July	25.50	28.50	30.30	32.80
August	25.30	28.10	30.30	32.70
September	23.70	26.80	29.70	32.30
October	18.30	22.00	25.00	29.60
November	11.85	16.12	18.60	22.70
December	8.73	11.60	14.30	18.34
All-Season	25.50	28.50	30.30	32.80

*Depth of rainfall in inches over Wolf Creek drainage basin.

TABLE 2.4.12 (Sheet 1 of 3)

PROBABLE MAXIMUM PRECIPITATION

STORM DISTRIBUTION

DURATION (hr)	CUMULATIVE PRECIPITATION (in.)	INCREMENTAL PRECIPITATION (in.)	CRITICAL ARRANGEMENT OF PRECIPITATION (in.)
0-1	9.70	9.70	0.02
1-2	13.50	3.80	0.02
2-3	17.10	3.60	0.03
3-4	20.20	3.10	0.08
4-5	23.00	2.80	0.03
5-6	25.50	2.50	0.02
6-7	26.64	1.1	0.03
7-8	27.09	0.45	0.03
8-9	27.51	0.42	0.04
9-10	27.87	0.36	0.11
10-11	28.20	0.33	0.04
11-12	28.50	0.30	0.03
12-13	28.96	0.46	0.04
13-14	29.14	0.18	0.05
14-15	29.31	0.17	0.06
15-16	29.45	0.14	0.16
16-17	29.58	0.13	0.06
17-18	29.70	0.12	0.05
18-19	29.93	0.23	0.12
19-20	30.02	0.09	0.14
20-21	30.10	0.08	0.18
21-22	30.17	0.07	0.46

TABLE 2.4-12 (Sheet 2 of 3)

DURATION (hr)	CUMULATIVE PRECIPITATION (in.)	INCREMENTAL PRECIPITATION (in.)	CRITICAL ARRANGEMENT OF PRECIPITATION (in.)
22-23	30.24	0.07	0.17
23-24	30.30	0.06	0.13
24-25	30.91	0.61	0.30
25-26	31.15	0.24	0.36
26-27	31.37	0.22	0.45
27-28	31.56	0.19	1.14
28-29	31.74	0.18	0.42
29-30	31.90	0.16	0.33
30-31	32.06	0.16	2.50
31-32	32.12	0.06	3.10
32-33	32.18	0.06	3.80
33-34	32.23	0.05	9.70
34-35	32.28	0.05	3.60
35-36	32.32	0.04	2.80
36-37	32.43	0.11	0.16
37-38	32.47	0.04	0.19
38-39	32.51	0.04	0.24
39-40	32.54	0.03	0.61
40-41	32.57	0.03	0.22
41-42	32.60	0.03	0.18
42-43	32.68	0.08	0.06
43-44	32.71	0.03	0.07
44-45	32.74	0.03	0.09

TABLE 2.4-12 (Sheet 3 of 3)

DURATION (hr)	CUMULATIVE PRECIPITATION (in.)	INCREMENTAL PRECIPITATION (in.)	CRITICAL ARRANGEMENT OF PRECIPITATION (in.)
45-46	32.76	0.02	0.23
46-47	32.78	0.02	0.08
47-48	32.80	0.02	0.07

TABLE 2.4-13

COMPARISON OF UNIT HYDROGRAPH PARAMETERS FOR WOLF CREEK, JOHN REDMOND, AND CEDAR POINT PROJECTS

PARAMETER	WOLF CREEK	NEOSHO RIVER AT COUNCIL GROVE	COTTONWOOD RIVER AT COTTONWOOD FALLS	CEDAR POINT RESERVOIR ON CEDAR CREEK	
				Gauge	Dam
D.A. (mi^2)	27.4000	250.00000	1402.00000	110.00000	119.00000
L (mi)	18.2000	23.80000	96.00000	15.00000	17.90000
L_{ca} (mi)	10.2000	8.40000	52.00000	6.40000	9.10000
Waterway slope	0.0016	0.00251	0.00051	.00325	0.00264
C_t	1.8400	1.84000	1.87000	1.20000	1.34000
C_p	0.8400	0.82800	0.84000	1.21000	1.48000

TABLE 2.4-14 (Sheet 1 of 2)

UNIT HYDROGRAPH PARAMETERS FOR

PRE- AND POST-PROJECT CONDITIONS*

BASIC DESIGNATION OF D. A.	D. A. (mi^2)	T_r (hr)	T_{pr} (hr)	C_t	C_p	L (mi)	L_{ca} (mi)	q_{pr} (cfs/mi^2)	Q_{pr} (cfs)	W_{50} (hr)	W_{75} (hr)
POST-PROJECT CONDITION											
1	8.0	1	4.00	1.84	0.84	5.61	2.51	134.5	1075	3.9	2.2
2	11.2	1	2.00	1.84	0.84	1.90	0.53	268.5	3020	1.90	1.10
Lake area	8.2	-	-	-	-	-	-	-	-	-	-
PRE-PROJECT CONDITION											
Dam site	27.4	1	9.0	1.84	0.84	18.2	10.2	59.7	1640	9.2	5.3

*The unit hydrograph computations are based on V. T. Chow, Handbook of Applied Hydrology, 1964.

TABLE 2.4-14 (Sheet 2 of 2)

Definitions of the Symbols

D.A - Drainage Area

T_r - Duration of effective rainfall adopted in the study

T_{pr} - Lag time from midpoint of duration T_r to peak of unit hydrograph.

C_p, C_t - Coefficients depending upon units and drainage basin characteristics.

L - River or stream mileage from the given station to the upstream limits of the drainage area.

L_{ca} River mileage from the station to center of gravity of the drainage area.

q_{pr} Peak discharge per unit drainage area of unit hydrograph for duration T_r

Q_{pr} q_{pr} times the D.A.

W_{50} Width of unit hydrograph at discharge equal to 50% of the peak discharge.

W_{75} Width of unit hydrograph at discharge equal to 75% of the peak discharge.

TABLE 2.4-15

INPUT TO SPF AND PMF HYDROGRAPH COMPUTATIONS*

HOURLY PRECIPITATION (INCHES) FOR SPF DETERMINATION

Rainfall Excess:

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.11	.14	.19	.53	.17	.12	1.26	1.46
1.86	4.86	1.76	1.36	.04	.05	.08	.27	.07	.05	.00	.00	.01	.08	.00	.00

Rainfall:

.01	.01	.02	.04	.01	.01	.01	.02	.02	.05	.02	.02	.02	.02	.03	.08
.03	.03	.06	.07	.09	.23	.08	.07	.15	.18	.23	.57	.21	.16	1.30	1.50
1.90	4.90	1.80	1.40	.08	.09	.12	.31	.11	.09	.03	.03	.05	.12	.04	.03

HOURLY PRECIPITATION (INCHES) FOR PMF DETERMINATION

Rainfall Excess:

.00	.00	.00	.04	.00	.00	.00	.00	.00	.07	.00	.00	.00	.01	.02	.12
.02	.01	.08	.10	.14	.42	.13	.09	.26	.32	.41	1.10	.38	.29	2.46	3.06
3.76	9.66	3.56	2.76	.12	.15	.20	.57	.18	.14	.02	.03	.05	.19	.04	.03

Rainfall:

.02	.02	.03	.08	.03	.02	.03	.03	.04	.11	.04	.03	.04	.05	.06	.16
.06	.05	.12	.14	.18	.46	.17	.13	.30	.36	.45	1.14	.42	.33	2.50	3.10
3.80	9.70	3.60	2.80	.16	.19	.24	.61	.22	.18	.06	.07	.09	.23	.08	.07

*Lake Area = 8.2 mi^2.

TABLE 2.4-16

SUMMARY OF INFORMATION ON WAVE RUNUP ESTIMATES[1]

	DAM SITE OVERLAND WIND VELOCITY (mph)		PLANT SITE OVERLAND WIND VELOCITY (mph)		ESWS PUMPHOUSE OVERLAND WIND VELOCITY (mph)		ESWS ACCESS VAULT AV6 WIND VELOCITY (mph)	
	40	90	40	90	40	90	40	90
Freeboard reference level (FRL)								
Pool elevation at spillway crest in feet		1088		1088		1088		1088
Probable maximum flood elevation in feet	1095		1095		1095		1095	
Fetch distance in miles								
Effective fetch	2.4	2.4	2.03	2.03	2.11	1.34	3.24	1.08
Wind tide fetch	6.1	6.1	3	3	3.4	3.4	1.62	0.54
Embarkment characteristics								
Slope of wave-action	3:1	3:1	30:1	30:1	30:1	30:1	6:1	14:1
Slope protection at waveaction elevation	Riprapped		None		None		Riprapped	
Wind tide height								
Average water depth in feet	51	43	36	28	34	26	34	27
Wind tide height or setup in feet	0.14	1.2	0.14	0.91	0.16	1.1	0.1	0.3
Wave characteristics								
Wave length (L_S) in feet	62	126	55.9	113	56.4	88.2	39	37.2
Significant wave height (H_S) in feet	3.25	7.9	2.93	7.2	3	5.7	2.6	2.3
Maximum 1% wave height (H_m) in feet	5.43	13.2	4.9	12	5	9.52	2.9	4.6
Wave runup on embankment Section								
Height H_s runup above FRL in feet ^{s}	3.84	8.7	0.44	1.01	0.45	0.77	1.4	1.3
[2]Maximum elevation H_s runup in feet	1099.00	1097.90	1095.55	1089.90	1095.60	1089.90	1096.40	1089.30
Height H_m runup above FRL in feet	5.27	11.1	0.69	1.56	0.65	1.15	1.7	1.5
[2]Maximum elevation H_m runup in feet	1100.40	1100.30	1095.80	1090.50	1095.80	1090.25	1096.70	1089.50

1 The maximum wave runup based on vertical wall at the intake structure of the pumphouse is given in Section 2.4.10.

2. The maximum wave runup elevation is the sum of the FRL + Wind Tide Ht. + Wave Runup. The resultant elevation may vary a few hundredths of a foot from the values shown in this row.

TABLE 2.4-17

DAM AND RESERVOIR CHARACTERISTICS[(a)]

Characteristics	Cedar Point[(b)]	Marion	Council Grove	John Redmond
Location:				
County	Chase	Marion	Morris	Coffey/Lyon
Streamcourse	Cedar Creek	Cottonwood River	Neosho River	Neosho River
River mile (from mouth)	4.2	126.7	449.9	343.7
Drainage Area:				
Contributing (sq mi)	119	200	246	2,450
Total[(c)] (sq mi)	119	200	246	3,015
General Construction Data:				
Year Authorized	1950	1950	1950	1950
Date regulated storage began	-	26 Feb 1968	9 Oct 1964	1 Sep 1964
Dam length (miles)	1.81 (approx)	1.59	1.23	4.13
Height of dam above stream bed (ft)	124 (approx)	67 (approx)	96	86.5
Elevation and Storage Data:[(d)]				
Maximum pool elevation (ft)	1341.6	1362.8	1320.0	1074.5
Total storage (ac-ft)	171,200[(e)]	142,800[(f)]	104,000[(f)]	593,800[(f)]
Top of flood control pool elevation (ft)	1335.9	1358.5	1289.0	1068.0
Allocated flood storage (ac-ft)	56,700[(e)]	59,900[(f)]	62,100[(f)]	531,300[(f)]
Top of conservation pool elevation (ft)	1324.6	1350.5	1274.0	1039.0
Allocated conservation storage (ac-ft)	114,500[(e)]	82,900[(f)]	41,900[(f)]	62,500[(f)]

(a) Existing dams are compacted earthfill and were designed by the U.S. Army Corps of Engineers. This agency also supervised the construction of same. The proposed Cedar Point Dam will be of the same type and will also be designed by the Corps of Engineers.
(b) Preconstruction planning should be completed in fiscal year 1981.
(c) Includes noncontributing and reservoir controlled areas.
(d) Elevations refer to mean sea level datum.
(e) Storage remaining after 100 years sedimentation.
(f) Storage remaining after 50 years sedimentation.

TABLE 2.4-17 (continued)

Characteristics	Cedar Point[b]	Marion	Council Grove	John Redmond
Structures:				
Spillway:				
Type	Uncontrolled	Gate-controlled	Uncontrolled	Gate-controlled concrete chute
Discharge width and/or control	300 ft.	3 gates at 40 x 40-foot	500 ft.	14 gates at 40 x 35-foot
Outlet pipes (includes those for normal regulated flows and low flows):				
Type	Conduit for regulated flow	Low-flow pipe	Conduit for regulated flow	2 gated low-flow pipes
Size	10.0- by 10.75-foot	24-inch	17-foot diameter	30-inch
Hydrologic Data:				
Spillway design flood (inflow into full pool):				
Peak flow (cfs)	Unknown	173,000	265,000	640,000
Volume (ac-ft)	Unknown	235,500	298,800	2,508,000
Runoff (inches)	Unknown	22.07	22.78	15.60
Duration (days)	Unknown	4	4	10
Flood storage outflow:				
Channel capacity below damsite reservoir (cfs)	Unknown	6,000	14,000	16,000
2 percent flood release (cfs)[g]	Unknown	Unknown[h]	2,100	12,500
4 percent flood release (cfs)[g]	Unknown	Unknown[h]	1,000	7,200
Low flow firm yield:				
2 percent drought (cfs)	Unknown	Unknown (h)	14	76
5 percent drought (cfs)	Unknown	Unknown[h]	20	105

(g) Reflects regulated reservoir release rate from storage for flood of given probability.
(h) No definite data available.

TABLE 2.4-17 (continued)

Characteristics	Cedar Point (b)	Marion	Council Grove	John Redmond
Uses:	Flood control, water supply, water quality, recreation, streamflow regulation, and fish and wildlife	Flood control, water quality, water supply, recreation and fish and wildlife	Flood control, water supply, water quality, streamflow regulation, recreation, and fish and wildlife	Flood control, water quality, recreation, water supply, streamflow regulation, and fish and wildlife

Sources:

Kansas Water Resources Board, 1967, Special water districts in Kansas: Kansas Water Resources Board, Project No. '701', Report No. lb(a) (September).

________, 1978, Kansas State water plan, water supply and storage program, fifth annual report: Kansas Water Resources Board.

U.S. Army Corps of Engineers, Tulsa, Oklahoma district, 1958, Hydrology, Strawn reservoir: U.S. Army Corps of Engineers, Design Memorandum No. 2 (February).

________, 1959, Hydrology, Council Grove dam and reservoir: U.S. Army Corps of Engineers, Design Memorandum No. 2 (January).

________, 1961, Hydrology, Marion dam and reservoir: U.S. Army Corps of Engineers, Design Memorandum No. 1 (February).

________, 1965, Flood plain information, Neosho and Cottonwood rivers, Kansas: U.S. Army Corps of Engineers (February).

________, 1971, Cedar Point Lake: U.S. Army Corps of Engineers, Design Memorandum No. 1 (April).

________, 1977, Pertinent data sheets for Tulsa District projects: U.S. Army Corps of Engineers (June 1).

U.S. Geological Survey, 1971, Water resources data for Kansas, Part 1, Surface water records: U.S. Geological Survey.

TABLE 2.4-18

INITIAL CONDITIONS AND
PEAK DISCHARGES OF COMPLETE DAM FAILURES

Item	John Redmond	Council Grove	Marion	Cedar Point
Distance to plant site, in river miles, (approximate)[(a)]	2.8	109.0	168.0	144.2
Top of flood control pool elevation in feet	1068.0	1289.0	1358.5	1335.9
Reservoir storage at top of flood control pool in acre-feet	593,800[(b)]	104,000[(b)]	142,800[(b)]	171,200[(c)]
Initial water depth below dam, in feet	10.0	10.0	10.0	10.0
Initial water depth above dam, in feet	48.0	49.0	38.5	81.0
Dam length, in miles (approximate)	4.13	1.23	1.59	1.81
Peak outflow rate, cfs	5,669,000	2,202,000	2,179,000	3,945,000
Time increment used in computation, dt, min.	10	5	5	5

(a) This distance is that measured from the John Redmond damsite along the Neosho River to a cross section cut perpendicular to the Neosho River through the plant site.

(b) Storage remaining after 50 years sedimentation.

(c) Storage remaining after 100 years sedimentation.

TABLE 2.4-19

RATING CURVE AT 8 MILES DOWNSTREAM OF JOHN REDMOND DAM

Stage (ft)	Area (1000 ft^2)	(Hydraulic Radius)$^{2/3}$	Mean Velocity* (fps)	Flow Rate (1000 cfs)
1,020.0	228	7,400	4.78	1,600
1,030.0	630	9,700	6.26	3,900
1,040.0	964	11,700	7.58	7,300
1,050.0	1,276	13,600	8.79	11,200
1,060.0	1,598	15,300	9.93	15,900
1,070.0	1,950	17,000	11.00	21,500
1,080.0	2,324	18,600	12.03	28,000
1,090.0	2,684	20,100	13.01	35,000
1,100.0	3,126	21,600	13.97	43,700

* Mean Velocity = $\frac{1.486}{n} R^{2/3} S^{1/2}$

where n = channel roughness, Manning's "n", 0.05
R = Hydraulic radius
S = Channel slope, 2.5 ft/mile.

TABLE 2.4-20

MAXIMUM WATER LEVEL AND DISCHARGE DETERMINATIONS

Case I <u>John Redmond Dam Failure</u>

Location [a]	John Redmond Damsite	2 Mile [b]	3 Mile	4 Mile	Junction w/ Wolf Creek	6 Mile	8 Mile
Maximum Discharge (cfs)	5,906,700	4,830,000	4,311,800	4,057,000	3,949,200	3,641,200	3,550,400
Maximum Stage (feet)	1068.00	1054.16	1052.16	1045.48	1043.38	1038.22	1028.32

Case II <u>Council Grove Dam Failure</u>

Location [a]	Council Grove Damsite	Dunlap	Americus	Emporia	Junction [c]	John Redmond Dam [d]
Maximum Discharge (cfs)	2,331,500	714,100	353,600	257,800	189,200	
Maximum Stage (feet)	1289.00	1194.02	1148.28	1123.13	1113.32	<1074.5

(a) Locations are identified by the town or city nearest to the cross section (Figure 2.4-27).
(b) Distance downstream from damsite.
(c) Confluence of Neosho and Cottonwood rivers.
(d) The John Redmond spillway capacity of 640,000 cfs is sufficient to pass the flood without exceeding the Redmond Reservoir maximum flood elevation 1074.5.

Case III Marion Dam Failure

Location[a]	Marion Damsite	Florence	Cedar Point	Elmdale	Strong City	Junction[c]	John Redmond Dam[d]
Maximum Discharge (cfs)	2,351,900	665,100	521,200	333,400	297,400	232,900	
Maximum Stage (feet)	1358.50	1296.88	1267.41	1208.83	1185.83	1115.02	<1074.5

Case IV Cedar Point Dam Failure

Location[a]	Cedar Point Damsite	Cedar Point	Elmdale	Strong City	Junction[c]	John Redmond Dam[d]
Maximum Discharge (cfs)	4,048,700	2,961,700	407,600	316,900	239,900	
Maximum Stage (feet)	1336.00	1286.41	1210.04	1186.24	1115.29	<1074.5

Case V Marion and Cedar Point Dam Failures

Location[a]	Marion Damsite	Cedar Point Damsite	Cedar Point	Elmdale	Strong City	Junction[c]	John Redmond Dam[d]
Maximum Discharge (cfs)	2,351,900	4,048,700	3,482,900	680,100	524,700	328,800	
Maximum Stage (feet)	1358.50	1336.00	1292.03	1214.65	1190.37	1119.69	<1074.5

TABLE 2.4-20 (continued)

Case VI Marion, Cedar Point, and Council Grove Dam Failures

Location[a]	Marion Damsite	Cedar Point Damsite	Council Grove Damsite	Junction[c]	John Redmond Dam
Maximum Discharge (cfs)	2,315,900	4,048,700	2,331,500	518,000	
Maximum Stage (feet)	1358.50	1336.00	1289.00	1128.25	<1074.5

Case VII John Redmond, Council Grove, Cedar Point and Marion Dam Failures

Location[a]	John Redmond Damsite	2 Mile[b]	3 Mile[b]	4 Mile[b]	6 Mile[b]	8 Mile[b]
Maximum Discharge (cfs)	6,187,000	4,890,000	4,274,100	4,067,000	3,680,500	3,608,300
Maximum Stage (feet)	1068.00	1053.62	1052.73	1045.47	1038.38	1028.57

Case VIII John Redmond, Council Grove, Cedar Point and Marion Dam Failures with Standard Project Floods

Location[a]	John Redmond Damsite	2 Mile[b]	3 Mile[b]	4 Mile[b]	Junction w/ Wolf Creek	6 Mile[b]	8 Mile[b]
Maximum Discharge (cfs)	6,309,800	5,061,200	4,460,100	4,256,100	4,156,300	3,866,900	3,789,700
Maximum Stage (feet)	1068.00	1054.34	1053.55	1046.21	1044.55	1039.16	1029.35

TABLE 2.4-21

BACKWATER COMPUTATION ON WOLF CREEK FOR COMBINED FLOOD-CAUSING EVENTS ON THE NEOSHO RIVER

Section	Z (ft)	A (ft^2)	R (ft)	$R^{2/3}$	n	K	V (fps)	$\frac{V^2}{2g}$ (ft)	H_1 (ft)	S_f	$\bar{S}_f$	X (ft)	h_f (ft)	H_2 (ft)
A	1049.55	98,000	29.8	9.61	0.07	2.00×10^7	0.048	3.5×10^{-5}	1049.55	5.4×10^{-8}	...	4000	...	1049.6
B	1049.55	74,600	22.3	7.92	0.07	1.26×10^7	0.062	6.1×10^{-5}	1049.55	1.4×10^{-7}	9.7×10^{-8}	2300	0	1049.6
C	1049.55	100,300	25.8	8.73	0.07	1.86×10^7	0.046	3.4×10^{-5}	1049.55	6.3×10^{-8}	1.0×10^{-7}	900	0	1049.6

NOTES:
1. Reference: Chow, Ven Te, "Open Channel Hydraulics", McGraw-Hill Book Company, 1959, pp. 274-280.
2. Z = Initial water surface elevation for section.
3. $K = 1.49\ AR^{2/3} / n$.
4. $H_1 = Z + \frac{V^2}{2g}$
5. $S_f = \left(\frac{Q}{K}\right)^2$
6. Q = 4,660 cfs
7. X = Distance in feet from the cooling lake main dam.
8. h_f = Friction loss in the reach (eddy losses included).
9. H_2 = Total head, $H_1 + h_f$, to nearest tenth of foot.

RESULT: The water level in Wolf Creek at the cooling lake main dam is at elevation 1049.6 feet.

TABLE 2.4-22 (Sheet 1 of 2)

SYNTHESIZED RUNOFF FOR WOLF CREEK IN ACRE-FEET*

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1947										38.60	30.80	225.00
1948	104.20	136.50	1375.00	276.00	710.00	925.00	7220.00	319.00	650.00	70.80	85.80	69.00
1949	1994.00	2700.00	870.00	980.00	1760.00	739.00	800.00	167.00	111.00	378.00	80.00	72.00
1950	161.00	78.20	88.30	182.00	572.00	1165.00	3370.00	3880.00	680.00	186.50	90.00	84.50
1951	71.20	120.10	250.00	910.00	4510.00	4360.00	19000.00	1160.00	5070.00	684.00	620.00	272.00
1952	273.00	203.00	1650.00	2085.00	796.00	145.50	71.50	182.00	27.60	12.90	26.70	39.40
1953	37.60	31.60	94.80	96.80	177.60	71.80	51.00	7.40	3.30	1.60	3.30	8.20
1954	7.90	9.10	12.00	42.70	148.70	435.00	4.40	25.00	0.60	33.40	1.80	1.20
1955	8.90	60.10	56.70	288.00	465.00	226.00	283.00	20.90	111.00	138.50	7.70	2.40
1956	2.70	9.30	6.60	47.80	126.50	37.00	9.80	210.00	0.07	3.00	0.90	0.15
1957	0.15	0.30	57.80	1035.00	3580.00	1740.00	344.00	24.40	188.10	412.00	515.00	168.00
1958	231.00	502.5	2830.00	916.00	576.00	1228.00	3710.00	380.00	955.00	459.00	453.00	148.00
1959	193.00	337.00	295.00	690.00	1950.00	350.00	3080.00	280.00	142.50	3110.00	282.00	383.00
1960	640.00	1020.00	3162.00	1440.00	756.00	668.00	180.00	718.00	242.00	1282.00	628.00	649.50
1961	203.00	821.00	1985.00	2218.00	6450.00	1175.00	968.00	212.00	2030.00	1450.00	2340.00	478.50
1962	1440.00	1500.00	1213.00	435.00	671.00	2200.00	434.00	184.00	3445.00	726.00	270.00	220.00
1963	274.00	163.00	694.00	187.70	152.00	356.00	241.00	26.00	15.80	48.70	31.30	29.80
1964	29.40	26.80	38.60	870.00	460.00	990.00	54.30	140.00	63.80	9.80	418.00	194.00
1965	122.50	127.00	670.00	528.00	127.00	3320.00	2061.00	75.50	2655.00	474.00	101.00	447.00
1966	277.00	228.00	174.00	1005.00	223.00	282.00	65.30	93.70	35.80	25.80	24.90	17.60
1967	11.80	10.70	19.10	241.00	48.70	2180.00	3040.00	228.00	799.00	2830.00	518.00	331.00
1968	306.00	159.00	163.00	928.00	869.00	1186.00	489.00	678.00	67.80	1245.00	800.00	649.00
1969	487.00	803.00	965.00	1930.00	3650.00	2270.00	4840.00	382.00	494.00	870.00	414.00	541.00

TABLE 2.4-22 (Sheet 2 of 2)

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1970	244.00	125.00	124.00	2340.00	798.00	2670.00	171.50	261.00	585.00	650.00	126.00	236.00
1971	386.00	376.00	800.00	124.00	1410.00	3420.00	2770.00	965.00	39.50	52.00	632.00	627.00
1972	251.00	169.00	87.00	344.00	2139.00	135.00	1515.00	452.00	127.00	58.00	265.00	652.00
1973	2441.00	2599.00	5828.00	4111.00	2198.00	1463.00	433.00	144.00	2546.00	7012.00	2203.00	2232.00
1974	1730.00	700.00	1317.00	1419.00	1304.00	2046.00	101.00	262.00	1028.00	356.00	1869.00	692.00
1975	827.00	1349.00	1335.00	1481.00	544.00	3189.00	1348.00	75.00	96.00	46.00	40.00	160.00
1976	62.00	28.00	34.00	488.00	1267.00	708.00	443.00	55.00	44.00	59.00	36.00	33.00
1977	37.00	37.00	36.00	44.00	1051.00	3754.00	3529.00	428.00	857.00			

*Drainage area equals 27.4 square miles.

TABLE 2.4-23 (Sheet 1 of 2)

ESTIMATED MONTHLY AND ANNUAL FLOWS IN ACRE-FEET

AT JOHN REDMOND DAMSITE*

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
1922	1,450	3,900	238,200	446,500	106,200	29,820	112,200	27,830	3,300	1,800	47,800	7,850	1,027,000
1923	5,370	3,510	12,850	8,580	114,100	473,300	141,700	10,540	13,920	48,770	21,470	22,680	876,800
1924	12,980	21,660	77,810	59,360	78,760	29,460	44,190	48,080	22,110	17,000	11,930	6,190	429,500
1925	27,990	16,580	11,960	82,700	22,370	78,770	8,230	1,310	13,180	7,830	41,690	7,300	319,900
1926	9,360	6,890	7,350	85,500	32,060	15,480	2,190	8,580	463,500	326,000	37,170	27,880	1,022,000
1927	28,980	22,530	129,800	565,600	222,500	267,200	34,800	284,400	127,500	112,900	15,140	13,410	1,825,000
1928	15,630	49,710	51,730	105,300	72,890	383,100	108,000	52,190	15,390	19,080	496,700	140,300	1,510,000
1929	143,100	60,550	60,680	180,900	265,900	131,300	240,200	46,400	11,880	10,720	11,210	7,850	1,171,000
1930	4,920	27,500	11,420	26,490	163,500	49,410	6,760	5,610	21,110	4,970	18,130	113,600	453,400
1931	5,550	6,040	21,720	32,630	43,220	32,080	5,840	1,470	5,050	1,450	266,000	54,740	475,800
1932	36,450	28,550	27,270	33,260	30,200	123,900	218,100	14,240	7,730	3,940	3,310	4,400	531,300
1933	3,820	3,040	5,900	64,020	92,970	4,590	7,650	12,570	21,820	4,380	1,340	4,230	226,300
1934	2,020	1,520	3,980	20,530	74,130	14,920	1,280	252	4,490	3,340	38,160	7,080	171,700
1935	14,510	7,250	4,020	5,420	413,200	294,900	18,350	19,430	35,060	97,260	193,900	25,650	1,129,000
1936	23,920	8,970	6,710	3,300	42,430	5,190	698	56	4,950	20,800	2,310	8,620	127,900
1937	38,820	103,100	62,520	41,840	99,250	86,830	14,040	8,500	37,680	1,370	1,340	1,590	496,900
1938	1,460	4,700	28,310	47,460	706,100	300,600	30,750	37,080	16,730	3,660	9,990	4,840	1,192,000
1939	4,370	3,390	8,910	18,740	24,290	27,210	4,660	25,820	1,570	666	282	662	120,600
1940	1,160	2,600	5,340	48,540	46,820	14,210	1,270	5,310	27,010	1,480	27,230	20,650	201,600
1941	184,700	38,470	27,650	80,020	79,520	476,700	50,360	160,100	350,600	915,300	200,900	79,960	2,644,000
1942	39,100	53,710	59,600	210,800	93,440	303,500	52,260	83,760	220,800	114,600	30,340	156,000	1,418,000
1943	76,240	65,540	30,460	23,580	328,700	305,600	49,830	9,930	5,130	22,580	5,480	12,630	935,700
1944	17,820	17,780	307,500	964,300	283,800	101,200	49,890	94,740	33,110	97,150	46,390	435,600	2,449,000
1945	39,880	49,770	221,700	704,200	215,200	183,500	124,700	122,400	169,500	167,000	19,220	14,890	2,032,000
1946	134,000	41,150	81,930	87,750	44,330	127,900	19,160	7,830	43,230	11,950	20,670	36,890	656,800
1947	16,260	7,890	242,300	475,000	107,000	227,800	19,650	7,810	10,680	4,370	3,530	25,600	1,148,000
1948	11,800	28,970	147,500	29,020	79,540	116,700	643,900	37,070	70,790	8,200	9,340	7,910	1,191,000
1949	212,900	292,900	75,640	112,400	217,300	80,530	87,400	18,150	11,550	42,950	9,360	8,680	1,170,000
1950	16,940	8,510	9,690	21,210	64,820	128,300	347,900	403,200	71,410	27,900	12,280	11,340	1,124,000
1951	9,480	18,840	36,650	70,410	468,300	406,300	2,029,000	139,500	445,500	84,930	59,980	31,620	3,801,000
1952	31,540	20,760	184,500	238,300	103,100	37,080	10,140	13,040	4,180	2,450	4,400	5,580	655,100
1953	4,890	4,090	9,120	7,820	29,890	8,390	5,620	1,480	503	317	587	1,420	74,130
1954	1,320	1,450	2,130	1,730	10,490	38,660	805	2,130	43	790	88	75	59,710
1955	352	3,460	1,470	11,550	16,810	16,480	24,020	4,230	21,730	20,960	461	401	121,900
1956	610	1,170	625	10,330	21,230	945	151	5,850	0	0	0	0	40,900
1957	0	0	802	66,460	346,700	176,900	43,690	4,220	20,930	34,350	44,790	15,500	754,300
1958	18,140	31,450	255,900	104,800	85,680	110,600	277,400	48,740	81,000	35,010	34,630	14,360	1,098,000
1959	16,830	27,620	26,320	69,000	280,400	49,820	235,600	26,690	23,330	178,400	26,750	27,010	987,800
1960	65,820	103,700	304,200	120,500	73,470	74,180	18,100	80,480	59,480	167,300	77,020	71,520	1,216,000
1961	23,860	85,590	240,700	236,950	615,400	102,400	138,200	28,360	186,800	146,900	258,800	56,060	2,120,020
1962	145,300	185,400	125,900	46,470	97,340	266,600	62,180	24,630	365,700	93,330	35,670	29,040	1,478,000

*Regulated by Council Grove Lake since August 1963, and Marion Lake since October 1967.

TABLE 2.4-23 (Sheet 2 of 2)

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
1963	37,290	21,550	71,150	22,380	21,230	42,950	41,770	4,230	3,490	9,360	3,710	3,350	284,460
1964	4,460	4,270	3,880	86,820	46,970	98,220	6,380	6,350	8,590	2,220	93,770	32,300	394,230
1965	21,030	19,750	105,700	80,350	22,770	762,800	91,520	14,710	271,600	10,360	8,990	21,960	1,432,000
1966	25,270	32,470	26,940	71,140	31,050	49,960	7,810	17,320	5,290	940	2,360	3,150	273,700
1967	4,310	2,870	4,330	35,250	10,660	515,970	92,470	31,700	95,310	285,530	55,000	40,670	1,174,070
1968	33,820	20,620	19,470	102,970	98,960	103,640	144,790	32,270	9,560	108,490	104,450	68,390	847,430
1969	56,160	77,420	144,910	326,370	277,200	396,340	262,090	31,190	58,880	122,000	49,590	72,000	1,874,450
1970	34,400	20,780	23,970	290,470	76,800	298,770	24,030	10,410	54,300	87,540	18,300	19,040	958,810
1971	57,760	86,050	78,060	22,260	132,260	495,610	306,400	57,140	14,790	10,100	95,750	67,510	1,423,690
1972	31,690	21,120	15,070	42,920	264,430	20,510	95,640	21,740	24,100	6,890	20,720	48,990	613,820
1973	202,830	265,490	786,570	320,400	230,320	78,140	37,920	19,860	424,440	571,850	137,590	210,630	3,286,040
1974	159,330	64,000	146,840	148,240	171,830	172,820	17,330	28,380	66,350	41,180	142,220	49,130	1,207,650
1975	74,800	152,320	123,100	147,890	64,910	427,950	70,350	25,720	23,690	10,860	10,560	19,140	1,161,290
1976	9,330	7,160	8,780	97,570	148,880	86,100	41,070	5,630	3,860	5,330	4,800	4,190	422,700
1977	4,090	4,070	4,110	7,650	192,330	370,870	191,510	71,090	104,190	42,100	121,480	28,370	1,141,860
1978	12,830	77,190	203,850	132,250	73,500	46,580	31,240	5,510	5,250	2,790			

Source: U.S. Army Corps of Engineers, Tulsa, Oklahoma District, 1969, Reservoir regulation manual for Council Grove, Marion, and John Redmond Reservoir, Upper Grand (Neosho) River, Kansas, U.S. Army Corps of Engineers (June) and Private Communication with the Corps of Engineers, Tulsa, Oklahoma District.

TABLE 2.4-24

RAINFALL IN CFS AT CHANUTE, KANSAS, 1949-1964*

MONTH	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
January	39.76	3.80	8.50	5.73	1.09	1.62	8.57	6.71	4.91	5.59	0.21	8.84	0.00	10.15	5.73	4.14
February	17.05	8.11	20.59	7.83	8.67	8.19	18.57	5.29	16.74	6.42	0.00	12.84	0.00	5.50	0.92	5.31
March	19.02	6.63	9.95	28.94	22.11	5.92	11.68	4.01	13.81	34.18	9.32	8.42	16.51	17.49	17.96	8.36
April	15.85	15.85	31.30	22.29	17.92	50.63	11.83	12.26	22.42	22.63	13.28	27.29	37.97	2.71	1.28	37.77
May	30.51	34.14	33.77	10.91	24.20	29.71	40.87	53.83	56.95	28.54	29.14	28.95	62.42	20.42	10.98	31.88
June	32.73	34.94	81.29	3.78	27.28	8.13	27.45	15.35	56.40	50.76	15.63	14.55	12.58	45.33	24.27	39.33
July	53.67	72.22	74.46	26.31	21.67	2.07	5.90	31.01	14.30	66.01	42.50	26.73	11.05	21.40	17.99	7.11
August	10.49	45.06	56.72	26.42	4.66	14.04	2.04	18.25	4.55	13.14	22.02	34.25	17.68	14.82	5.86	39.20
September	44.11	15.34	59.78	3.10	20.89	21.68	59.94	1.32	26.99	49.16	14.34	3.49	80.40	63.96	9.70	14.55
October	17.54	1.19	17.76	0.00	20.20	32.67	9.91	15.18	26.97	0.07	47.76	43.60	18.04	4.84	4.35	3.45
November	1.07	0.36	16.96	18.10	13.68	0.07	0.14	15.53	17.34	9.85	0.64	0.00	0.00	11.65	9.49	0.00
December	15.27	0.28	3.89	4.34	7.32	11.72	1.69	5.80	11.81	4.90	4.14	0.00	6.01	2.76	1.66	0.00

*Source: Chanute, Kansas meteorological data.

TABLE 2.4-25

MONTHLY AVERAGE NATURAL EVAPORATION IN cfs, 1949 - 1964*

MONTH	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
January	9.23	12.32	11.82	6.65	7.25	12.48	9.34	10.59	13.68	9.21	9.71	9.31	12.95	11.59	15.29	11.69
February	4.20	9.60	6.49	8.48	14.14	13.44	8.00	7.43	5.02	11.03	7.43	11.41	6.30	7.76	10.06	13.17
March	8.81	20.23	15.82	12.42	17.11	22.76	18.46	24.16	15.89	7.46	18.61	7.29	14.08	11.85	11.55	22.03
April	21.05	29.86	17.09	15.25	31.90	20.70	21.67	34.03	10.72	19.01	25.89	25.71	23.81	22.74	34.38	27.85
May	25.44	25.19	27.48	35.78	21.65	27.09	30.31	33.88	24.93	21.27	26.05	31.22	32.39	56.62	35.09	42.61
June	33.95	38.79	28.70	54.86	70.66	45.66	32.88	44.48	33.66	48.03	38.89	37.88	34.81	35.43	44.60	35.77
July	45.18	31.16	27.57	58.42	48.20	74.15	49.42	59.99	49.85	35.98	38.65	40.46	46.92	50.67	60.62	59.36
August	44.22	34.54	46.45	54.38	64.10	65.63	56.52	75.48	60.25	49.14	54.19	48.83	44.44	61.32	55.12	57.92
September	40.24	27.84	40.85	44.65	66.36	60.40	51.20	71.86	36.12	44.45	51.80	55.20	42.89	36.57	46.73	45.99
October	27.06	33.75	31.88	43.24	37.97	35.27	39.54	38.20	30.48	35.08	30.17	35.78	32.52	29.26	46.55	35.60
November	26.20	29.21	16.32	23.15	23.36	21.05	26.87	27.84	16.78	27.26	23.34	26.59	19.77	19.49	27.55	25.31
December	16.29	9.84	13.46	10.72	17.08	14.49	9.98	9.36	13.03	10.30	8.92	15.21	12.22	13.59	18.69	11.24

*Source: Calculated from meteorological data by LAKET program.

TABLE 2.4-26

MONTHLY AVERAGE FORCED EVAPORATION DUE TO PLANT HEAT REJECTION IN cfs, 1949 - 1964*

MONTH	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
January	8.09	13.77	14.85	12.68	13.01	11.88	13.55	12.71	12.57	14.02	12.09	12.96	13.25	8.82	11.28	10.53
February	10.41	14.04	9.19	16.06	16.57	16.03	13.39	12.67	12.81	12.21	12.41	14.38	11.99	15.25	8.46	16.55
March	17.60	16.68	18.35	17.06	18.09	16.95	17.82	18.76	17.46	15.36	18.25	11.60	17.71	15.64	18.17	16.97
April	19.89	20.42	19.62	18.95	20.03	19.56	21.19	20.09	17.80	20.61	20.09	22.02	19.32	20.01	22.82	19.98
May	24.02	21.68	22.97	25.72	23.03	23.41	23.56	23.30	23.62	23.01	23.90	22.03	22.61	24.80	22.57	23.88
June	26.00	25.65	25.33	25.73	25.82	24.93	23.87	24.65	25.23	25.93	25.04	25.19	24.47	23.02	24.91	24.12
July	25.87	23.47	24.08	25.31	24.76	25.86	26.27	24.95	25.95	24.57	24.36	24.56	25.16	25.55	25.46	24.90
August	25.14	25.00	26.50	25.05	25.20	24.69	25.92	24.79	24.95	25.44	25.54	25.33	24.16	24.91	24.41	24.54
September	23.12	23.79	23.95	23.53	23.33	24.46	23.83	22.73	23.01	23.96	23.97	23.71	24.07	22.89	23.85	23.62
October	21.73	21.75	20.75	21.67	21.09	21.41	21.64	21.27	20.73	20.13	19.57	21.26	20.11	21.64	21.75	19.46
November	17.32	16.68	15.18	17.05	17.61	17.47	16.71	17.54	17.04	17.95	16.24	17.06	16.81	15.73	17.53	19.46
December	14.81	13.17	14.13	14.01	14.98	14.89	12.44	13.22	14.79	12.69	14.21	14.18	13.82	15.34	12.30	12.39

*1 unit (1150 MWe) at 100% average load factor.

TABLE 2.4-27

SUMMARY OF ELEVATIONS OF

PMF AND SAFETY-RELATED STRUCTURES

PMF Pool	1095.0
Top of the dam	1100.0
Plant grade	1099.5
Plant floor	1100.0
Top of the baffle dike in front of UHS	1094.0
Top of the submerged UHS dam	1070.0
Crest of spillway	1088.0

TABLE 2.4-28

HYDROGEOLOGIC CHARACTERISTICS
OF BEDROCK WITHIN A 5-MILE RADIUS OF SITE

	Rock Units	Physical Properties[a]	Approximate Thickness[b] (feet)	Water Yield Characteristics	Permeability[c] (cm/sec)	Typical Yield[d] (gpm)	Typical Well Depth (feet)
QUATERNARY	Alluvium	Silt, clay, sand, and gravel in river channels.	0-30	Small to moderate yields from sand aquifers in valley bottom		50	10-30
UPPER PENNSYLVANIAN	Doniphan Shale	Thinly laminated shale; interbedded fine-grained medium bedded sandstone.	35+	Negligible	1.0×10^{-4} (e)		
	Spring Branch Limestone	Thin-bedded limestone with interbedded laminated shale.	8+	Negligible	1.0×10^{-4} (e)	<1	
	Stull Shale	Thinly laminated shale; interbedded fine-grained sandstone & laminated siltstone.	50+	Very small yields from sand lenses	2.0×10^{-5} (e)	<1	
	Clay Creek Limestone	Thin- to medium-bedded, fine-grained limestone.	4-7	Negligible	6.1×10^{-6} (e)	<1	
	Jackson Park Shale	Thinly laminated shale with interbedded limestone & sandstone.	17-30	Very small yields	4.4×10^{-5}	<3	
	Limestone Member of Jackson Park Shale	Thin-bedded, fine-grained limestone with sand & shale zones.	0-9	Very small yields	1.9×10^{-5}		
	Heumader Shale	Thinly laminated shale; limestone lenses at base.	18-34	Negligible	3.0×10^{-6}	<3	
	Plattsmouth Limestone	Thin- to thick-bedded, fine-grained limestone; interbedded thinly laminated shale.	11-13	Small yields	2.3×10^{-6}	<1	10-40

[a] Physical properties from information presented in Section 2.5.

[b] Range of thickness encountered in Borings B-1 through B-21.

[c] Average permeabilities from pressure tests in Borings B-1 through B-21.

[d] Typical yield estimated from known well usage in dug and drilled wells.

[e] Measured from pressure tests in borings in cooling lake area.

TABLE 2.4-28 (continued)

UPPER PENNSYLVANIAN

Rock Units	Physical Properties[(a)]	Approximate Thickness (feet)[(b)]	Water Yield Characteristics	Permeability (cm/sec)[(c)]	Typical Yield (gpm)[(d)]	Typical Well Depth (feet)
Heebner Shale	Thinly laminated, fissile, carbonaceous shale.	2.5-4	Negligible	$1.0x10^{-6}$		
Leavenworth Limestone	Medium-bedded, fine-grained limestone.	1.0	Negligible	$3.7x10^{-7}$		
Snyderville Shale	Laminated to thin-bedded shale.	5-14	Negligible	$1.1x10^{-6}$		
Toronto Limestone	Thin- to thick-bedded, fine-grained limestone; rare shale partings & lenses.	14-19	Small yields	$1.2x10^{-6}$	<2	10-75
Unnamed Lawrence	Thinly laminated shale; inter-bedded, laminated to thin-bedded sandstone.	18-30	Possibly small yields from sandstone	$1.8x10^{-6}$		
Amazonia Limestone	Thin- to medium-bedded, fine-grained, shaley limestone; interbedded, thinly laminated shale.	2-18	Negligible	$1.0x10^{-7}$		
Ireland Sandstone	Thinly laminated shale; cross-bedded, laminated to medium bedded, fine-grained sand-stone.	40-108	Possibly very small yields from sand-stone layers	$3.3x10^{-6}$	0.5	
Robbins Shale	Thinly laminated shale; thin to medium bedded, shaley limestone.	14-90	Negligible	$2.6x10^{-7}$		
Haskell Limestone	Thin- to thick-bedded; fine-grained limestone.	1-3	Negligible	$2.1x10^{-7}$		
Vinland Shale	Thinly laminated to thin-bedded shale; interbedded, discontinuous, thin- to medium-bedded, very fine to medium-grained sandstone.	1-65	Negligible	$3.0x10^{-6}$		
Westphalia Limestone	Thin- to medium-bedded shaley limestone.	0-13	Possibly very small yields	$4.8x10^{-7}$		

	Rock Units	Physical Properties[a]	Approximate Thickness (feet)[b]	Water Yield Characteristics	Permeability (cm/sec)[c]	Typical Yield (gpm)[d]	Typical Well Depth (feet)
UPPER PENNSYLVANIAN	Tonganoxie Sandstone	Thinly laminated to thin-bedded, clayey shale; interbedded with cross-bedded, laminated to medium-bedded sandstone and siltstone.	42-142	Small yields	$2.8x10^{-6}$	3	200-300
	Weston Shale	Thinly laminated shale.	31-109	Negligible	$9.2x10^{-8}$		
	South Bend Limestone	Thick- to thin-bedded; fine-grained limestone; sandy at base.	4-6	Negligible	$3.8x10^{-8}$		

TABLE 2.4-29

WELL INVENTORY WITHIN 5 MILES OF THE SITE

Location[a]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[d]	Remarks
A1	18	1144	Above Ground Surface (AGS)	1144	Dug	250	Bennett	RWD[c]
A2	30	1164	8	1156	Dug	0	Salava	RWD
A4	NA[b]	NA	NA	NA	NA	0	Phillips	Well to be sealed
A14	30	1076	2	1074	Dug	360	Clapp	None
A17	35	1100	3	1007	Dug	70	Abbey	Well to be sealed
A18	30	1100	8	1092	Dug	530	Anderson	Well to be sealed
A19	2	1096	NA	NA	Dug	NA	Anderson	None
A20	18	1112	6	1106	Dug	50	Anderson	RWD
A22	14	1140	AGS	1140	Dug	0	Anderson	None
A23	NA	1090	NA	NA	NA	230	Williams	RWD
A23	NA	1093	NA	NA	NA	NA	Williams	Well to be sealed
A23	10	1089	NA	NA	NA	NA	Garrepp/ Corden	Well to be sealed
A24	NA	1099	NA	NA	NA	NA	Anderson	Well to be sealed

[a] Locations shown on Figure 2.4-52.

[b] NA indicates data Not Available.

[c] Indicates property serviced by Rural Water District No. 3.

[d] Owner or tenant at time of 1973 survey. KG&E presently owns or controls all wells within the site boundary.

Source: Based on field investigation, Dames & Moore, 1973 and 1979.

Location[a]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[d]	Remarks
B2	30	1123	5	1118	Dug	500	Wayne	RWD
B4	40	1091	8	1083	Dug	310	French	RWD
B8	20	1091	5	1086	Dug	75	Hess	RWD
B11	35	1080	15	1065	Dug	220	Hess	None
B12	16	NA	NA	NA	Dug	NA	NA	RWD
B12	42	1132	15	1117	Dug	410	Mallon	None
B13	33	NA	NA	NA	Dug	100	Crouch	RWD
B14	18	1081	AGS	1081	Dug	NA	NA	RWD
B14	22	1083	35	1070	Dug	NA	NA	None
B14	22	1080	5	1075	Dug	830	Huffman	None
B15	25	1062	9	1053	Dug	100	Crouch	RWD
B16	27	1087	2	1085	Dug	840	Allen	RWD
B19	13	NA	2.5	NA	Dug	NA	NA	RWD
B19	31	1113	2.5	1110	Dug	200	Skillman	None
C1	25	1097	3	1094	Dug	350	Houser	Well to be sealed
C2	NA	1101	15	1086	NA	630	Levering	RWD
C4	NA	NA	NA	NA	NA	340	Woods	RWD
C5	43	1085	11	1074	Dug	NA	NA	Well to be sealed
C5	12	1088	7	1081	Dug	500	Woods	Well to be sealed
C7	15	1075	2	1073	Dug	0	Skillman	Well to be sealed
C8	30	NA	Dry	NA	Drilled	0	Anderson	RWD

WOLF CREEK

Location[(a)]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[(d)]	Remarks
C9	20	1065	AGS	1065	Dug	0	Griffin	RWD
C10	20	1058	7.5	1050	Dug	410	Rhoads	RWD
C11	40	1030	10	1020	Dug	410	Nelson	None
C17	NA	1084	10	1074	Drilled	0	Hunter	Well has been sealed
C18	75	1080	4	1076	Dug	700	Robinett	Well to be sealed
C20	22	1090	18	1072	Dug	550	Applicant	RWD
C21	22	1040	5	1035	Dug	210	Robinett	None
C23	10	1030	10	1020	Dug	230	Reinker	RWD
C24	36	1022	10	1012	Dug	660	Decker	None
C25	12	1020	10	1010	Dug	5400	Likes	None
C26	31	NA	NA	NA	Drilled	210	Allen	None
C27	30	1040	15	1025	Dug	200	Cranford	None
C28	30	1040	10	1030	Dug	320	Zscheile	None
C29	30	1020	10	1010	Dug	290	Decker	None
C30	31	1041	9	1032	Dug	390	Hess	None
C31	24	1044	13	1031	Drilled	210	Birkbeck	None
C32	31	1039	4	1035	Drilled	2630	Birkbeck	None
C33	30	1040	9	1031	Dug	110	Rife	None
C34	15	1031	5	1026	Dug	410	Thompson	None
C35	NA	1031	NA	1026	NA	100	Traymick	None
C36	33	1034	10	1024	Drilled	210	Mays	None
C37	28	1031	5	1026	Drilled	210	White	None

Location[(a)]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[(d)]	Remarks
C38	NA	NA	NA	NA	NA	100	Hair	CITY[(e)]
C39	27	1020	6	1014	Dug	240	Shepherd	CITY
C41	NA	NA	NA	NA	NA	210	Deitrich	CITY
C42	25	NA	NA	NA	Dug	3400	Keith	None
C43	NA	1040	10	1030	Dug	400	Rieschick	None
C44	40	1040	10	1030	Drilled	400	Tice	None
C45	20	NA	NA	NA	Dug	390	Freeman	None
C49	23	1020	4	1016	Dug	310	Barrett	None
C50	20	1031	4	1027	Dug	75	Myers	None
C51	20	1017	3	1014	Dug	100	Hess	None
C54	NA	NA	NA	NA	NA	100	Glemore	None
C55	30	1033	8	1025	Drilled	580	Bryan	CITY
C56	30	1030	10	1020	Drilled	630	Paxson	CITY
C57	NA	NA	NA	NA	NA	0	Birk	RWD
C58	NA	NA	NA	NA	Drilled	200	Thompson	CITY
C59	30	1032	15	1017	Drilled	210	Cochran	CITY
C60	30	1033	8	1025	Drilled	410	Bolton	CITY
C61	40	1032	5	1027	Dug	430	Harson	None
C61	30	1032	8	1024	Drilled	NA	Harson	None
C64	21	1032	7	1025	Drilled	110	Vasey	None
C65	25	1030	15	1015	Dug	290	Caldwell	CITY
C70	30	1020	31	1017	Dug	1110	Hayes	RWD

[e]Indicates property serviced by City of Burlington water supply.

Location[a]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[d]	Remarks
C71	22	1010	5	1005	Drilled	440	Williams	None
C72	10	1013	1	1012	Dug	1370	Smart	None
C73	9	1075	NA	NA	Dug	NA	Winn	None
C73	28	1074	NA	NA	Dug	NA	Winn	None
C74	27	1087	NA	NA	NA	NA	Williams	None
C74	23	1087	NA	NA	NA	NA	NA	None
C75	10	1066	NA	NA	NA	NA	Woods	None
C76	1	1083	NA	NA	NA	NA	NA	None
C77	9	1056	NA	NA	Dug	NA	Anderson	None
C77	16	1056	NA	NA	NA	NA	Anderson	None
C77	NA	1060	NA	NA	NA	NA	Anderson	None
D1	100	1110	5	1105	Dug	380	Nielson	RWD
D1	14	NA	NA	NA	NA	NA	NA	NA
D2	30	1115	5	1100	Dug	220	Bon	RWD
D2	NA	NA	NA	NA	NA	NA	NA	NA
D3	30	1070	6	1064	Dug	150	Miller	None
D3	NA	NA	NA	NA	NA	NA	NA	NA
D4	20	1075	4	1070	Dug	10	Wuerfele	None
D5	40	1060	11	1049	Dug	440	Iseman	None
D5	25	NA	11	NA	NA	NA	NA	None
D6	20	1060	12	1048	Dug	310	Wuerfele	None
D7	16	1115	4	1111	Dug	250	Tracy	None
D8	16	1111	6	1105	Dug	470	Tragar	RWD

Location(a)	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant(d)	Remarks
D9	NA	1114	14	1100	NA	650	Hermon	None
D10	23	1105	4	1101	Dug	560	Cordell	RWD
D11	16	1043	2	1091	Dug	230	Johnson	Well to be sealed
D11	25	1088	4	1084	Dug	NA	Johnson	Well to be sealed
D12	12	1049	3	1046	Dug	160	Kellerman	Well to be sealed
D12	20	1048	7	1042	Dug	NA	Kellerman	Well to be sealed
D13	NA	1103	7	1096	Dug	650	Taylor	None
D14	26	1102	8	1094	Dug	630	Baldwin	RWD
D15	22	1070	10	1060	Dug	1820	Gifford	None
D16	20	1090	5	NA	Dug	1060	Kennard	None
D16	35	1090	5	1085	Dug	NA	Kennard	None
D17	18	1050	1	1049	Dug	1160	Salava	None
D17	10	1050	1	1049	Dug	NA	Salava	None
D19	50	NA	NA	NA	Dug	710	Yound	None
D20	180	1068	10	1058	Drilled	6400	Herr	None
D21	30	1090	5	1085	Dug	900	Bouse	None
D21	30	1095	3	1092	Dug	NA	Bouse	None
D21	30	1070	3	1067	Dug	NA	Bouse	None
D22	30	1100	AGS	1100	Dug	1410	Anderson	RWD
D23	22	1045	AGS	1045	Dug	430	Dalby	None
D24	24	1058	8	1050	Dug	630	Allen	None

WOLF CREEK

Location(a)	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant(d)	Remarks
D24	18	1050	2	1050	Dug	NA	Allen	None
D25	30	1100	4	1096	Dug	1860	Hess	Well to be sealed
D25	10	1095	AGS	1095	Dug	NA	Hess	Well to be sealed
D26	25	1104	5	1099	Dug	230	Bemis	None
D27	30	1114	7	1107	Dug	150	McReynolds	None
D28	19	1110	4	1106	Dug	150	Hess	RWD
D29	40	1071	1	1070	Dug	0	Hildebrand	Well to be sealed
D32	40	1063	NA	NA	Dug	300	Hamman	Well has been sealed
D33	42	1062	6	1057	Drilled	220	Snider	Well has been sealed
D33	30	1060	10	1050	Dug	NA	Snider	Well has been sealed
D34	30	1040	15	1025	Dug	325	Salava	Well has been sealed
D34	30	NA	NA	NA	Dug	NA	Salava	Well has been sealed
D35	NA	NA	NA	NA	NA	100	Wynn	Well to be sealed
D36	28	1030	AGS	1030	Dug	640	Riffenbark	Well has been sealed
D36	28	1030	AGS	1030	Dug	NA	Riffenbark	Well has been sealed
D37	25	1035	AGS	1035	Dug	470	Danford	Well to be sealed
D38	26	1063	3	1060	Dug	470	Iseman	Well to be sealed

TABLE 2.4-29 (continued)

Location[a]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[d]	Remarks
D39	38	1062	6	1056	Dug	540	Hess	Well to be sealed
D39	24	1057	3	1054	Dug	NA	Hess	None
D41	30	1083	5	1078	Dug	560	Martens	None
D42	30	1085	5	1080	Dug	190	Wuerfele	None
D43	22	1038	AGS	1038	Dug	1243	Crooks	None
D43	25	1034	AGS	1034	Dug	NA	Crooks	None
D44	22	1041	AGS	1041	Dug	80	Applicant	None
D45	30	NA	NA	NA	Dug	300	Ballew	None
D46	30	1042	AGS	1042	Dug	310	Lichlyter	None
D47	35	1040	4	1086	Dug	430	Rayl	RWD
D47	25	1040	5	1035	Dug	NA	Rayl	None
D48	26	1062	9	1053	Dug	620	Alexander	None
D49	20	1050	8	1042	Dug	900	Finical	RWD
D50	16	1063	3	1060	Dug	440	Combs	None
D51	25	1040	3	1037	Dug	340	Giesy	None
D52	18	1022	AGS	1022	Dug	390	Spencer	None
D53	20	1036	AGS	1036	Dug	290	Hess	None
D54	15	1040	10	1030	Dug	170	Wynn	None
D55	28	1078	14	1064	Dug	170	Taylor	None
D56	16	1088	3	1085	Dug	280	Hutson	Well to be sealed
D57	14	1054	AGS	1054	Dug	250	Vincent	Well to be sealed

Location[a]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[d]	Remarks
D58	70	1032	6	1026	Dug	360	Bull	Well to be sealed
D58	16	1044	NA	NA	Dug	NA	NA	Well to be sealed
D58	45	1032	NA	NA	Dug	NA	NA	Well to be sealed
D59	17	1019	6	1013	Dug	110	Morris	Well to be sealed
D60	8	1046	NA	NA	Dug	NA	NA	Well to be sealed
D61	28	1028	6	1022	Dug	1650	Levering	Well to be sealed
D61	28	1018	6	1011	Dug	NA	Levering	Well to be sealed
D61	140	1033	19	1014	Drilled	NA	Levering	Well to be sealed
D62	29	1018	7	1012	Dug	320	Delong	None
D63	32	1055	4	1051	Dug	110	Delong	Well to be sealed
D64	NA	NA	NA	NA	NA	100	Gooch	None
D65	18	1018	AGS	1018	Dug	210	Green	None
D65	21	1018	AGS	1018	Drilled	NA	Green	None
D66	104	1052	8	1044	Dug	2030	Werber	None
D66	27	1015	3	1012	Dug	NA	Werber	None
D67	20	1012	15	997	Dug	410	Gum	None
D68	18	1020	11	1009	Dug	470	Saueressig	None

Location[a]	Well Depth (feet)	Approximate Land Surface Elevation (feet, MSL)	Depth to Water Level (feet)	Approximate Elevation of Water Level (feet, MSL)	Type of Well	Estimated Pumpage Rate (gpd)	Name of Owner or Tenant[d]	Remarks
D69	40	1026	NA	NA	Dug	560	Means	None
D70	32	1035	10	1025	Dug	660	Robinson	None
D71	25	1040	AGS	1040	Dug	800	Engel	None
D72	32	1040	4	1036	Dug	510	Reed	None
D73	NA	1080	NA	NA	NA	NA	NA	None
D74	41	1070	NA	NA	NA	NA	NA	None
D75	NA	1070	NA	NA	NA	NA	NA	None
D76	19	1042	NA	NA	Dug	NA	Hamman	None
D77	13.5	1075	NA	NA	NA	NA	Reinker	None
D78	25	1094	NA	NA	NA	NA	Paxton	None
D78	9	1094	NA	NA	Dug	NA	Paxton	None
D79	25	1085	NA	NA	NA	NA	Ellen	None
D80	16	1093	NA	NA	NA	NA	Mooris	None
D81	12	1085	NA	NA	NA	NA	Reinker	None
D82	25	1085	NA	NA	NA	NA	Martens	None
D82	5	1083	NA	NA	Dug	NA	Martens	None
D83	20	1061	NA	NA	NA	NA	Snyder	None
D83	7	1061	NA	NA	NA	NA	Snyder	None
D84	19	1060	NA	NA	NA	NA	Hess	None
D85	10	1080	NA	NA	Dug	NA	NA	Cistern
E2	32	1009	NA	NA	Drilled	510	Williams	None

TABLE 2.4-29a

PLUGGING OF EXISTING PIEZOMETERS AND EXISTING WELLS

General: All existing piezometers and existing wells located within the area to be inundated by the cooling lake were sealed prior to filling of the lake, with the exception of well D38B (see note 1), and wells D-58, X-D39-1 and X-D18 (see note 2). This includes all piezometers and wells within the drainage boundaries of the lake below elevation 1997.5 ft. (SNUPPS) or 1097.5 ft. (USGS) with the exception of piezometers at Borings B-17, P-14 (see note 3), and LK-10. Piezometers at Borings B-17 and LK-10 will be maintained to monitor groundwater levels during plant operations.

Note 1: The well was flooded by the water storage pond at wash plant.

2: The wells are in waste areas and cannot be located.

3: Piezometer P-14 was damaged during construction and could not be located. Currently, P-14 is covered by an asphalt parking lot which should protect against ground water contamination.

TABLE 2.4-29b

WELLS IN COOLING LAKE AREA THAT REQUIRE SEALING

Well Location[(a)]	Name of Owner or Tenant	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
A-4	Phillips	Not Available	(b)
A-17 (cistern)	Abbey	1100	11/19/80
	Abbey	1100	(c)
A-18	Anderson	1100	08/01/80
A-23	Williams	1090	08/01/80

[a]Well locations refer to the property locations used for the 1973 well inventory as shown on Figure 2.4-52 and as listed in Table 2.4-29 (FSAR).

[b]Wells A-4 and C-1 are currently being used by occupied dwellings.

[c]Well A-17 was lost during clearing and excavation to bury remains of structures in area.

[d]Wells D-35 and D-59 were eliminated during removal of material from Borrow Area H and Borrow Area I.

[e]Wells D-37 and D-61 have been eliminated during excavation of foundation for Baffle Dike A and Main Dam.

[f]Well D-58 is in waste area and cannot be located.

[g]Well C-5 and Cisterns C-17 and C-18 are reported in Table 240.7-2 as X-C5-11, X-C17-6 and X-C18-1, respectively.

[h]Cistern D-12 was lost during construction.

TABLE 2.4-29b (continued)

Well Location[a]	Name of Owner Or Tenant	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
C-1	Houser	1097	(b)
(pond)	Houser	1097	(b)
C-5 (cistern)	Woods	1085	07/28/80
	Woods	1085	07/28/80
	Woods	1085	(g)
C-7	Skillman	1075	07/29/80
C-17 (cistern)	Hunter	1084	(g)
	Hunter	1084	11/14/77
C-18	Robinett	1080	07/28/80
(cistern)	Robinett	1080	(g)
D-11	Johnson	1088	07/30/80
	Johnson	1088	07/30/80
D-12	Kellerman	1049	07/25/80
	Kellerman	1048	07/24/80
(cistern)	Kellerman	1048	(h)
D-25	Hess	1095	07/24/80
	Hess	1095	07/24/80

TABLE 2.4-29b (continued)

Well Location[a]	Name of Owner Or Tenant	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
D-29	Hildebrand	1071	07/25/80
(cistern)	Hildebrand	1071	08/15/80
D-32	Hamman	1063	03/16/79
	Hamman	1063	03/16/79
D-33	Snider	1062	03/16/79
	Snider	1060	11/14/77
D-34	Salava	1040	03/16/79
D-35	Wynn	Not Available	(d)
D-36	Riffenbark	1030	03/18/78
	Riffenbark	1030	03/18/78
D-37	Danford	1035	(e)
(cistern)	Danford	1035	07/25/80
D-38	Iseman	1063	08/15/80
D-39	Hess	1062	03/15/79
	Hess	1057	03/15/79
D-56	Hutson	1088	03/15/79

TABLE 2.4-29b (continued)

Well Location[(a)]	Name of Owner Or Tenant	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
D-57	Vincent	1054	03/15/79
D-58	Bull	1032	(f)
D-59	Morris	1019	(d)
D-61	Levering	1028	07/25/80
	Levering	1018	(e)
	Levering	1033	(e)
D-63	DeLong	1055	06/05/78

TABLE 2.4-29c

ADDITIONAL WELLS IN COOLING LAKE AREA
FOUND AND SEALED DURING CONSTRUCTION

Number	Location Approximate Coordinates North	East	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
A-19-A	108,000	91,300	1087	(a)
A-19-B	108,000	91,200	1087	(a)
D-34-A	88,650	101,200	1092	09/20/78
D-38-B	90,500	104,700	1063	(b)
D-58-B	85,350	102,900	1032	(c)
X-A6	107,000	88,500	1092	07/29/80
X-A18-3	109,650	91,400	1098	08/01/80
X-A18-4	109,500	91,450	1094	08/01/80
X-A18-5	109,700	91,400	1099	08/01/80
X-A23-1	107,650	98,650	1092	08/01/80

[a] Wells are currently being used by occupied dwelling.
[b] Well was flooded by water storage pond at wash plant.
[c] Wells are in waste areas and cannot be located.
[d] Well was eliminated during removal of material from Borrow Area A.
[e] Wells have been eliminated during excavation of foundation for Baffle Dike A.
[f] Wells were eliminated during removal of material from Borrow Area D.

TABLE 2.4-29c (continued)

Number	Location Approximate Coordinates North	East	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
X-A23-2	107,600	98,750	1092	08/10/80
X-C1	100,950	96,400	1092	11/29/78
X-C2	100,890	96,300	1092	11/29/78
X-C5-A-1	103,600	97,200	1092	07/28/80
X-C5-11	103,600	97,200	1092	07/28/80
X-C5-11-1	98,500	91,900	1092	07/28/80
X-C6	100,500	94,500	1092	07/30/80
X-C7	103,000	96,300	1092	07/31/80
X-C7-A	105,200	91,100	1092	07/28/80
X-C8	103,800	93,600	1092	(d)
X-C8-12	106,800	89,000	1092	07/29/80
X-C8-13	106,800	88,700	1092	07/29/80
X-C8-14	106,100	91,000	1092	07/29/80
X-C8-15	106,150	91,200	1092	07/29/80
X-C8-15-3	106,000	89,200	1092	09/23/80
X-C8-16	106,150	90,200	1092	07/29/80

TABLE 2.4-29 c (continued)

Number	Location Approximate Coordinates North	Location Approximate Coordinates East	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
X-C8-17	106,180	91,210	1092	11/19/80
X-C9	105,500	90,500	1092	07/29/80
X-C10	102,700	96,250	1092	09/23/80
X-C16	102,700	94,600	1092	07/31/80
X-C17	102,100	96,000	1092	07/31/80
X-C17-6	96,000	95,000	1092	07/28/80
X-C18-1	96,200	96,000	1092	07/25/80
X-C19-A	98,720	96,150	1092	07/28/80
X-C19-B	98,720	96,150	1092	07/28/80
X-C19-C	98,760	96,450	1092	07/28/80
X-D1	95,365	101,740	1092	(e)
X-D2	95,265	101,740	1092	(e)
X-D3	95,700	101,600	1092	05/16/80
X-D4	94,720	101,780	1092	03/18/78
X-D8	104,100	96,600	1092	07/30/80
X-D10	86,100	108,800	1092	07/25/80

TABLE 2.4-29c (continued)

Number	Location Approximate Coordinates North	East	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
X-D10-1	87,100	109,000	1092	11/20/80
X-D10-20	107,350	98,600	1092	08/01/80
X-D11	85,100	97,900	1092	03/16/79
X-D11-9	103,350	96,600	1092	07/30/80
X-D12	99,400	98,200	1092	07/30/80
X-D13	100,000	98,000	1092	01/80
X-D14	91,000	100,150	1092	09/21/78
X-D17	90,500	99,950	1092	09/21/78
x-D18	95,950	101,000	1092	(c)
X-D19	104,100	96,600	1092	07/30/80
X-D20	103,900	96,500	1092	10/14/80
X-D21	107,300	99,000	1092	08/01/80
X-D21-1	107,500	98,960	1092	11/19/80
X-D22	90,900	100,250	1092	09/21/78
X-D23	94,800	102,750	1092	05/20/80
X-D24	95,850	98,900	1092	(f)

TABLE 2.4-29c (continued)

Number	Location Approximate Coordinates North	East	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
X-D25	95,950	98,700	1092	(f)
X-D25-C	92,300	107,900	1092	11/20/80
X-D26	96,000	98,300	1092	08/08/80
X-D27	87,100	107,500	1092	07/25/80
X-D27-1	87,200	107,300	1092	09/17/80
X-D28	92,200	107,100	1092	07/24/80
X-D29	92,400	107,200	1092	07/25/80
X-D30	95,800	104,000	1092	05/20/80
X-D31	99,400	97,900	1092	07/30/80
X-D32	101,800	98,800	1092	07/31/80
X-D33	96,300	97,200	1092	07/25/80
X-D33-5	89,500	99,500	1092	03/16/79
X-D35	94,600	96,000	1092	07/28/80
X-D39-1	85,500	104,400	1060	(c)
X-D41-6	91,000	107,800	1092	07/23/80
X-D41-7	91,000	107,800	1092	07/23/80

TABLE 2.4-29c (continued)

Number	Location Approximate Coordinates North	East	Approximate Surface Elevation (feet, mean sea level)	Date Sealed
X-D41-15	90,750	108,100	1092	07/23/80
X-D41-16	90,550	107,500	1092	07/23/80
X-D42	96,200	105,000	1092	11/19/80
X-D43	94,300	104,300	1092	11/19/80
X-D56	85,500	105,800	1092	09/17/80
X-D57	107,830	102,750	1115	03/31/81
X-D58	101,630	101,544	1110	08/04/81

TABLE 2.4-30

PUBLIC SUPPLY WELLS WITHIN A
20-MILE RADIUS OF SITE

Location[a]	Approx.[b] Elev.	Well Depth (feet)	Well Diameter (inches)	Screen Interval (feet)	Static[c] Level (feet)	Pumping[d] Level (feet)	Aquifer	Test Yield (gpm)
Waverly #1	1100	280	6	170-190 200-230	950	935	Tonganoxie	20
Waverly #2	1100	260	6	165-195 255-265	970	945	Tonganoxie	22
Waverly #3	1100	228	6	199-205	NA	NA	Tonganoxie	10
Waverly #4	1100	270	6	142-192 263-268	958	943	Tonganoxie	20
Waverly #5	1100	300	6	NA	938	NA	Tonganoxie	16
Williamsburg #1	1280	190	6	NA	1158	NA	Tonganoxie	10
Williamsburg #2	1280	190	6	NA	1164	NA	Tonganoxie	10
Williamsburg #3	1280	210	6	NA	NA	NA	Tonganoxie	18
Williamsburg #4	1280	300	6	NA	NA	NA	Tonganoxie	18
New Strawn[e]	1010	32	24	NA	998	NA	Alluvium	30
Melvern #1	1015	168	6	50-100	906	NA	Tonganoxie	13
Melvern #2	1015	160	6	NA	NA	NA	Tonganoxie	6
Melvern #3	1015	94	6	46-71 74-94	NA	NA	Tonganoxie	20
Melvern #4	1015	97	6	47-97	NA	NA	Tonganoxie	30
Melvern #5	1015	80	6	50-80	NA	NA	Tonganoxie	14
Melvern #6	1015	179	NA	NA	NA	NA	Tonganoxie	10
Hartford #1	1036	30	NA	NA	1004	NA	Alluvium	NA

[a]Locations of municipalities shown on Figure 2.4-53.

[b]Approximate elevations in feet above MSL of wells taken from U.S. Geological Survey Topographic Maps. See base map reference for Figure 2.4-53.

[c]Static level shown as elevation above mean sea level.

[d]Pumping level shown as elevation above mean sea level.

[e]Well for New Strawn located in alluvium of Neosho River about 1/2 mile downstream from John Redmond Dam (see Reischick below).

Sources: Gettinger, L., 1979, Record, Kansas State Board of Agriculture, Division of Water Resources, Topeka, Kansas, written communication (August 24).
Kansas Water Resources Board, 1973a, Open-file Material.
Reischick, L., 1973, Farmer's Home Administration, Burlington, Kansas, written communication (September).

TABLE 2.4-31

PROJECTED FUTURE USE OF WATER IN COFFEY COUNTY, KANSAS*

WATER USE	1965			1980			2000			2020		
	SURFACE	GROUND	TOTAL	SURFACE	GROUND	TOTAL	SURFACE	GROUND	TOTAL	SURFACE	GROUND	TOTAL
Irrigation	210	20	230	700	0	700	1,800	0	1,800	4,000	0	4,000
Livestock	1,006	112	1,118	1,499	167	1,666	2,361	263	2,624	3,585	399	3,984
Manufacturing	0	0	0	86	5	91	132	7	139	235	13	248
Utilities	0	1	1	7,185	0	7,185	12,045	0	12,045	10,995	0	10,995
Mining	46	0	46	166	0	166	169	0	169	335	0	335
Urban Domestic	331	25	356	529	28	557	531	28	559	803	43	846
Rural Domestic	27	262	289	141	8	149	151	8	159	146	8	154
Total	1,620	420	2,040	10,306	208	10,514	17,189	306	17,495	20,099	463	20,562

*All usage values expressed in acre-feet (1 acre-foot equals 325,851 gallons) of water.

Sources: Flickinger, G., 1979, Kansas Water Resources Board, Topeka, Kansas, telephone communication (June 6).

Kansas Water Resources Board, 1973a, Open-file Material.

<u>Table 2.4-31a</u>

Projected Future Use of Water in Coffey County, Kansas*

Water Use	1965 (b)	1980 (a)	2000 (a)	2020 (a)	2035 (a)
Domestic and Manufacturing	645	804	860	1,004	1,099
Mining	46	169	169	178	184
Thermal Electric	1	4,203	29,684	29,684	29,684
Livestock	1,118	1,495	1,781	1,977	2,075
Irrigation	230	970	1,535	1,612	1,689
Total	2,040	7,641	34,029	34,455	34,731

*All usage values expressed in acre-feet (1 acre-foot equals 325,851 gallons of water)

Sources:

(a) Flickinger, G., 1984 - Kansas Water Office, Topeka, Kansas, letter dated 2/20/84

(b) Flickinger, G., 1979 - Kansas Water Resources Board, Topeka, Kansas, telephone communication (June 6)

(c) Kansas Water Office 1984 open-file material

TABLE 2.4-32

PIEZOMETER WATER LEVEL READINGS - B BORINGS

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-1, P-1	8-04-73	11.5	1,008.3
	8-04-73	10.1[a]	1,009.7
	8-11-73	11.2	1,008.7
	8-23-73	11.7	1,008.1
Interval: 132-272	8-30-73	11.5	1,008.3
(130-272)	9-06-73	11.3	1,008.5
Tonganoxie	9-13-73	11.4	1,008.4
Sandstone	9-20-73	11.4	1,008.4
	9-27-73	10.9	1,008.9
	10-18-73	10.9	1,008.9
	11-15-73	10.9	1,008.9
	12-14-73	5.4	1,014.4
	1-14-74	10.8	1,009.0
	3-14-74	10.9	1,008.9
	4-19-74	11.0	1,008.8
	5-16-74	10.9	1,008.9
	7-18-74	11.5	1,008.3
	8-15-74	11.5	1,008.3
	9-12-74	11.2	1,008.6
	10-17-74	11.2	1,008.6
	11-14-74	11.0	1,008.8
	12-19-74	11.0	1,008.8
	1-15-75	11.2	1,008.6
	3-13-75	11.0	1,008.8
	4-18-75	10.9	1,008.9
	5-22-75	11.1	1,008.7
	9-15-75	11.6	1,008.2
	12-22-75	11.6	1,008.2
	3-25-76	11.6	1,008.2
	9-10-76	14.8	1,005.0
	12-14-76	14.6	1,005.2

Note: Effective interval given in parenthesis following slotted interval if intervals differ. Interval depths reported are to the nearest foot. Ground surface elevation is given on the logs of borings in Section 2.5.

[a] Value obtained following falling head permeameter testing.

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-1, P-1 (cont'd)	4-15-77	11.9	1,007.9
	6-03-77	11.6	1,007.1
	8-10-77	12.7	1,007.1
	11-04-77	11.7	1,008.1
	4-21-78	12.5	1,007.3
	8-25-78	Lost	--
B-1, P-2	8-04-73	12.2 [a,b]	1,007.6
	8-04-73	+2.4	1,022.2
	8-11-73	6.3	1,013.5
	8-23-73	9.6	1,010.2
Interval: 118-125	8-30-73	10.3	1,009.5
	9-06-73	10.3	1,009.5
Vinland Shale	9-13-73	10.5	1,009.3
	9-20-73	10.6	1,009.2
	9-27-73	10.6	1,009.2
	10-18-73	10.6	1,009.2
	10-15-73	10.6	1,009.2
	12-14-73	10.6	1,009.2
	1-14-74	10.5	1,009.3
	3-14-74	10.6	1,009.2
	4-19-74	11.0	1,008.8
	5-16-74	11.2	1,008.6
	7-18-74	11.8	1,008.0
	8-15-74	11.8	1,008.0
	9-12-74	12.0	1,007.8
	10-17-74	12.1	1,007.7
	11-14-74	12.2	1,007.6
	12-19-74	12.1	1,007.7
	1-15-75	12.7	1,007.1
	3-13-75	12.6	1,007.2
	4-18-75	12.6	1,007.2
	5-22-75	12.7	1,007.1
	9-15-75	12.4	1,007.4
	12-22-75	12.8	1,007.0
	3-25-76	12.9	1,006.9
	9-10-76	15.3	1,004.3
	12-14-76	15.6	1,004.2

---

[b] + indicates value above ground surface.

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-1, P-2 (cont'd)	4-15-77	13.0	1,006.8
	6-03-77	12.8	1,007.0
	8-19-77	11.6	1,008.2
	11-04-77	13.2	1,006.6
	4-21-78	13.2	1,006.6
	8-25-78	Lost	Lost
B-1, P-3	8-04-73	11.9	1,007.9
	8-04-73	6.7[(a)]	1,013.1
	8-11-73	6.8	1,013.0
	8-23-73	7.0	1,012.8
Interval: 24-84	8-30-73	7.2	1,012.6
	9-06-73	7.1	1,012.8
Ireland Sandstone	9-13-73	7.0	1,012.8
	9-20-73	7.1	1,012.8
	9-27-73	6.5	1,013.3
	10-18-73	6.2	1,013.6
	10-15-73	5.9	1,013.9
	12-14-73	5.5	1,014.3
	1-14-74	5.1	1,014.7
	3-14-74	4.7	1,015.1
	4-19-74	5.0	1,014.8
	5-16-74	5.1	1,014.7
	7-18-74	6.2	1,013.6
	8-15-74	6.6	1,013.2
	9-12-74	6.0	1,013.8
	10-17-74	6.1	1,013.7
	11-14-74	5.4	1,014.4
	12-19-74	5.5	1,014.3
	1-15-75	5.1	1,014.7
	3-13-75	4.3	1,015.5
	4-18-75	4.3	1,015.5
	5-22-75	4.9	1,014.9
	9-15-75	6.7	1,013.1
	12-22-75	7.1	1,012.7
	3-25-76	7.5	1,012.3
	9-10-76	11.4	1,008.4
	12-14-76	11.8	1,008.0
	4-15-77	9.2	1,010.6
	6-03-77	7.6	1,012.2
	8-19-77	8.2	1,011.6
	11-04-77	11.5	1,008.3

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-1, P-3 (cont'd)	4-21-78	12.4	1,007.4
	8-25-78	Lost	Lost
B-4, P-1	8-07-73	60.2	1,038.3
	8-07-73	10.8 (a)	1,087.7
	8-23-73	50.0	1,048.5
	8-30-73	50.0	1,048.5
Interval: 109-188	9-06-73	50.0	1,048.5
	9-13-73	49.9	1,048.6
Ireland Sandstone	9-20-73	49.9	1,048.6
	9-27-73	51.8	1,046.7
	10-04-73	49.9	1,048.6
	10-18-73	50.0	1,048.5
	11-15-73	50.0	1,048.5
	12-13-73	49.9	1,048.6
	1-14-74	49.8	1,048.7
	2-14-74	49.8	1,048.7
	3-14-74	49.7	1,048.8
	4-19-74	49.7	1,048.8
	5-16-74	49.7	1,048.8
	6-07-74	49.8	1,048.7
	7-18-74	50.1	1,048.4
	8-15-74	50.1	1,048.4
	9-12-74	49.8	1,048.7
	10-17-74	49.8	1,048.7
	11-14-74	49.8	1,048.7
	12-19-74	49.8	1,048.7
	1-15-75	49.9	1,048.6
	2-14-75	49.9	1,048.6
	3-12-75	49.9	1,048.6
	4-18-75	49.9	1,048.6
	5-21-75	50.1	1,048.4
	6-19-75	50.0	1,048.5
	9-15-75	50.2	1,048.3
	12-22-75	50.4	1,048.1
	3-25-76	50.4	1,048.1
	9-10-76	52.9	1,045.6
	12-14-76	52.8	1,045.7
B-4, P-2	8-07-73	57.8	1,040.7
	8-07-73	18.0 (a)	1,080.5
	8-23-73	48.6	1,049.9
	8-30-73	48.3	1,050.2

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-4, P-2 (cont'd)	9-06-73	48.4	1,050.1
	9-13-73	48.1	1,050.4
Interval: 60-86	9-20-73	48.1	1,050.4
	9-27-73	48.2	1,050.3
Snyderville Shale to Unnamed Lawrence	10-04-73	47.6	1,050.9
	10-18-73	47.8	1,050.7
	11-15-73	46.1	1,052.4
	12-13-73	45.7	1,052.8
	1-14-74	45.2	1,053.3
	2-14-74	46.1	1,052.4
	3-14-74	46.0	1,052.5
	4-19-74	46.4	1,052.1
	5-16-74	46.3	1,052.2
	6-07-74	46.2	1,052.3
	7-18-74	46.9	1,051.6
	8-15-74	46.8	1,051.7
	9-12-74	46.6	1,051.9
	10-17-74	46.5	1,052.0
	11-14-74	46.5	1,052.0
	12-19-74	46.2	1,052.3
	1-15-75	46.3	1,052.2
	2-14-75	46.2	1,052.3
	3-12-75	46.1	1,052.4
	4-18-75	45.7	1,052.8
	5-21-75	46.1	1,052.4
	6-19-75	45.9	1,052.6
	9-15-75	46.6	1,051.9
	12-22-75	47.2	1,051.3
	3-25-76	47.0	1,052.5
	9-10-76	49.8	1,049.7
	12-14-76	49.7	1,049.8
B-4, P-3	8-07-73	42.6 [a,b]	1,055.9
	8-07-73	+1.0 [a,b]	1,099.5
Interval: 35-48	8-23-73	12.5	1,086.0
	8-30-73	13.6	1,084.9
Heumader Shale to Plattsmouth Limestone	9-06-73	14.2	1,084.3
	9-13-73	14.3	1,084.2
	9-20-73	14.3	1,084.2
	9-27-73	37.9 [c]	1,060.6
	10-04-73	35.4 [c]	1,063.1

---

[c] Low value resulting from slow recovery following purging of piezometers.

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-4, P-3 (cont'd)	10-18-73	30.7(c)	1,067.8
	11-15-73	18.5(c)	1,080.0
	12-13-73	14.3	1,084.2
	1-14-74	12.2	1,086.3
	2-14-74	10.9	1,087.6
	3-14-74	16.0	1,082.5
	4-19-74	10.9	1,087.6
	5-16-74	9.5	1,089.0
	6-07-74	9.0	1,089.5
	7-18-74	9.3	1,089.2
	8-15-74	9.5	1,089.0
	9-12-74	9.4	1,089.1
	10-17-74	9.5	1,089.0
	11-14-74	9.3	1,089.2
	12-19-74	8.9	1,089.6
	1-15-75	8.3	1,090.2
	2-14-75	7.7	1,090.8
	3-12-75	7.3	1,091.2
	4-18-75	6.8	1,091.7
	5-21-75	6.8	1,091.7
	6-19-75	7.0	1,091.5
	9-15-75	8.6	1,089.9
	12-22-75	8.9	1,089.6
	3-25-76	7.4	1,091.1
	9-10-76	10.8	1,087.7
	12-14-76	10.9	1,087.6
B-4, P-4	8-07-73	20.3(a,b)	1,078.2
	8-07-73	+1.0	1,099.5
	8-23-73	6.5	1,092.0
	8-30-73	6.5	1,092.0
Interval: 5-26	9-06-73	6.5	1,092.0
	9-13-73	6.4	1,092.1
Heumader Shale	9-20-73	6.3	1,092.2
	9-27-73	10.8(c)	1,087.7
	10-14-73	8.0(c)	1,090.5
	11-18-73	8.4(c)	1,090.1
	11-15-73	6.3	1,092.2
	12-13-73	5.2	1,093.3
	1-14-74	3.4	1,095.1
	2-14-74	3.8	1,094.7
	3-14-74	7.6	1,090.9
	4-19-74	5.7	1,092.8

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-4, P-4 (cont'd)	5-16-74	4.9	1,093.6
	6-07-74	4.5	1,094.0
	7-18-74	4.6	1,093.9
	8-15-74	4.7	1,093.8
	9-12-74	4.2	1,094.3
	10-17-74	3.7	1,094.8
	11-14-74	3.1	1,095.4
	12-19-74	2.8	1,095.7
	1-15-75	2.6	1,095.9
	2-14-75	2.6	1,095.9
	3-12-75	2.8	1,095.7
	4-18-75	3.0	1,095.5
	5-21-75	3.8	1,094.7
	6-19-75	3.9	1,094.6
	9-15-75	4.4	1,094.1
	12-22-75	6.8	1,091.7
	3-25-76	8.1	1,090.4
	9-10-76	8.8	1,089.7
	12-14-76	9.1	1,089.4
B-5, P-1	8-09-73	59.5 (a)	1,034.4
	8-09-73	4.1 (a)	1,089.8
	8-23-73	73.7	1,020.2
	8-30-73	74.8	1,019.1
Interval: 288-348	9-06-73	75.4	1,018.5
	9-13-73	75.9	1,018.0
Tonganoxie Sandstone	9-20-73	75.9 (c)	1,018.0
	9-27-73	78.1 (c)	1,015.8
	10-04-73	77.5	1,016.5
	10-18-73	77.5	1,016.4
	11-15-73	77.6	1,016.3
	12-13-73	77.3	1,016.6
	1-14-74	77.6	1,016.3
	2-14-74	77.8	1,016.1
	3-14-74	77.6	1,016.3
	4-19-74	77.7	1,016.2
	5-16-74	77.7	1,016.2
	6-07-74	77.7	1,016.2
	7-18-74	78.1	1,015.8
	8-15-74	78.0	1,015.9
	9-12-74	77.9	1,016.0
	10-17-74	77.8	1,016.1
	11-14-74	77.6	1,016.3
	12-19-74	77.8	1,016.1

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-5, P-1 (cont'd)	1-15-75	77.7	1,016.2
	2-14-75	77.8	1,016.1
	3-12-75	77.6	1,016.3
	4-18-75	77.5	1,016.4
	5-21-75	77.4	1,016.5
	6-19-75	77.6	1,016.3
	9-15-75	77.8	1,016.1
	12-22-75	77.8	1,016.1
	3-25-76	77.8	1,016.1
	9-10-76	79.0	1,014.9
	12-14-76	78.6	1,015.3
B-5, P-2	8-09-73	59.0	1,034.9
	8-09-73	11.4[(a)]	1,082.5
	8-23-73	53.6	1,040.3
	8-30-73	53.5	1,040.4
Interval: 86-98	9-06-73	53.4	1,040.5
	9-13-73	53.1	1,040.8
Unnamed	9-20-73	52.9	1,041.0
Lawrence	9-27-73	52.7	1,041.2
	10-04-73	52.1	1,041.8
	10-18-73	52.1	1,041.8
	11-15-73	51.1	1,042.8
	12-13-73	49.4	1,044.5
	1-14-74	47.8	1,046.1
	2-14-74	46.5	1,047.4
	3-14-74	46.0	1,047.9
	4-19-74	45.9	1,048.0
	5-16-74	45.8	1,048.1
	6-07-74	45.4	1,048.5
	7-18-74	45.7	1,048.2
	8-15-74	45.7	1,048.2
	9-12-74	45.6	1,048.3
	10-17-74	45.5	1,048.4
	11-14-74	45.4	1,048.5
	12-19-74	45.6	1,048.3
	1-15-75	45.5	1,048.4
	2-14-75	45.5	1,048.4
	3-12-75	45.4	1,048.5
	4-18-75	45.4	1,048.5
	5-21-75	45.5	1,048.4
	6-19-75	45.5	1,048.4
	9-15-75	45.9	1,048.0
	12-22-75	46.0	1,047.9

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-5, P-2 (cont'd)	3-25-76	45.9	1,048.0
	9-10-76	48.0	1,045.9
	12-14-76	49.0	1,044.9
B-5, P-3	8-09-73	30.9 [a]	1,063.0
	8-09-73	17.3	1,076.6
	8-23-73	9.6	1,084.3
	8-30-73	10.5	1,083.5
Interval: 5-72	9-06-73	12.7	1,081.2
	9-13-73	9.3	1,084.6
Overburden to Toronto Limestone	9-20-73	8.7	1,085.2
	9-27-73	0.2	1,093.7
	10-04-73	0.4	1,093.5
	10-18-73	6.3	1,087.6
	11-15-73	1.5	1,092.4
	12-13-73	0.8	1,093.1
	2-14-74	0.7	1,093.2
	3-14-74	0.4	1,093.5
	4-19-74	1.7	1,092.2
	5-16-74	1.4	1,092.5
	6-07-74	1.4	1,092.5
	7-18-74	7.2	1,086.7
	8-15-74	9.9	1,084.0
	9-12-74	5.9	1,088.0
	10-17-74	6.7	1,087.2
	11-14-74	1.8	1,092.1
	12-19-74	1.4	1,092.5
	1-15-75	5.9	1,088.0
	2-14-75	2.7	1,091.2
	3-12-75	0.7	1,093.2
	4-18-75	1.4	1,092.5
	5-21-75	5.3	1,088.6
	6-19-75	1.4	1,092.5
	9-15-75	25.5	1,068.4
	12-22-75	25.6	1,068.3
	3-25-76	23.6	1,070.3
	9-10-76	31.9	1,062.0
	12-14-76	34.3	1,059.6
B-6, P-1	7-06-73	102.4	1,026.0
	7-28-73	91.5 [a]	1,036.9
	7-28-73	92.9	1,035.5

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-6, P-1 (cont'd)	8-09-73	100.7	1,027.7
	8-23-73	93.2	1,035.2
Interval: 263-333	8-30-73	93.4	1,035.0
(262-333)	9-06-73	93.5	1,034.9
	9-13-73	93.2	1,035.2
Tonganoxie	9-20-73	93.4	1,035.0
Sandstone	9-27-73	179.1(c)	949.3
	10-04-73	125.5(c)	1,002.9
	10-18-73	114.4(c)	1,014.0
	11-15-73	97.7	1,030.7
	12-13-73	94.0	1,034.4
	10-17-74	93.3	1,035.1
	11-14-74	93.3	1,035.1
	12-19-74	93.5	1,034.9
	1-15-75	93.3	1,035.1
	2-14-75	93.4	1,035.0
	3-12-75	93.4	1,035.0
	4-18-75	93.5	1,034.9
	5-21-75	93.4	1,035.0
	6-19-75	93.6	1,034.8
	9-15-75	93.6	1,034.8
	12-22-75	93.9	1,034.5
	3-25-76	93.8	1,034.6
	9-10-76	96.6	1,031.8
	12-14-76	96.2	1,032.2
	4-15-77	94.4	1,034.0
	6-03-77	94.0	1,034.4
	8-19-77	93.4	1,035.0
	11-02-77	93.3	1,035.1
	4-21-78	93.4	1,035.0
	8-25-78	94.5	1,033.9
	4-03-79	93.8	1,034.6
	7-25-79	93.6	1,034.8
B-6, P-2	7-06-73	24.1	1,104.3
	7-29-73	23.2	1,105.2
	7-29-73	17.7(a)	1,110.7
Interval: 83-99	8-09-73	30.1	1,098.3
	8-23-73	22.9	1,105.5
Snyderville Shale to	8-30-73	23.2	1,105.2
Toronto	9-06-73	23.2	1,105.2
Limestone	9-13-73	23.0	1,105.4

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-6, P-2 (cont'd)	9-20-73	23.1	1,105.3
	10-04-73	22.3	1,106.1
	10-18-73	23.0	1,105.4
	11-15-73	22.8	1,105.6
	12-13-73	49.8	1,078.6
	1-14-74	60.7	1,067.7
	2-14-74	61.6	1,066.8
	3-14-74	62.4	1,066.0
	4-19-74	63.5	1,064.9
	5-16-74	64.2	1,064.2
	6-07-74	63.5	1,064.9
	7-18-74	65.4	1,063.0
	8-15-74	66.0	1,062.4
	9-10-74	66.2	1,062.2
	10-17-74	66.3	1,062.1
	11-14-74	66.2	1,062.2
	12-19-74	66.3	1,062.1
	1-15-75	66.4	1,062.0
	2-14-75	66.3	1,062.1
	3-12-75	66.4	1,062.0
	4-18-75	66.5	1,061.9
	5-21-75	66.8	1,061.6
	6-19-75	66.8	1,061.6
	9-15-75	67.6	1,060.8
	12-22-75	67.4	1,061.0
	3-25-76	67.2	1,061.2
	9-10-76	70.1	1,058.3
	12-14-76	69.8	1,058.6
	4-15-77	67.8	1,060.6
	6-03-77	67.4	1,061.0
	8-19-77	67.3	1,061.1
	11-02-77	67.3	1,061.1
	4-21-78	67.1	1,061.3
	8-25-78	67.9	1,060.5
	4-03-79	67.1	1,061.3
	7-25-79	67.6	1,060.8
B-6, P-3	7-06-73	23.4	1,105.0
	7-29-73	22.7	1,105.7
	7-29-73	6.2[(a)]	1,124.2
Interval: 5-26	8-09-73	22.4	1,106.0
	8-23-73	22.7	1,105.7

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-6, P-3 (cont'd)	8-30-73	22.9	1,105.5
	9-06-73	23.1	1,105.3
Jackson Park Shale	9-13-73	22.8	1,105.6
	9-20-73	23.0	1,105.4
	9-27-73	23.1	1,105.3
	10-04-73	22.3	1,106.1
	10-18-73	22.8	1,105.6
	11-15-73	22.5	1,105.9
	12-13-73	21.4	1,107.0
	1-14-74	21.5	1,106.9
	2-14-74	20.8	1,107.6
	3-14-74	18.7	1,109.7
	4-19-74	18.8	1,109.6
	5-16-74	17.9	1,110.5
	6-07-74	18.8	1,109.6
	7-18-74	21.1	1,107.3
	8-15-74	21.7	1,106.7
	9-10-74	21.1	1,107.3
	10-17-74	21.7	1,106.7
	11-14-74	15.8	1,112.6
	12-19-74	16.2	1,113.2
	1-15-75	13.7	1,114.7
	2-14-75	12.1	1,116.3
	3-12-75	10.9	1,117.5
	4-18-75	8.7	1,119.7
	5-22-75	9.9	1,118.5
	6-19-75	8.6	1,119.8
	9-15-75	12.9	1,115.5
	12-22-75	15.9	1,112.5
	3-25-76	11.5	1,116.3
	9-10-76	16.0	1,112.4
	12-14-76	19.9	1,114.0
	4-15-77	14.4	1,114.0
	6-03-77	9.5	1,118.9
	8-19-77	11.9	1,116.5
	11-02-77	10.3	1,118.1
	4-21-78	6.7	1,121.6
	8-25-78	9.9	1,118.4
	4-03-79	10.1	1,118.3
	7-25-79	9.5	1,118.9

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-7, P-1	8-09-73	37.7[a]	1,060.8
	8-23-73	53.9	1,044.6
Interval: 145-195	8-30-73	52.0	1,046.5
	9-06-73	55.0	1,043.5
Ireland	9-13-73	53.4	1,045.1
Sandstone	9-20-73	54.7	1,043.8
	9-27-73	54.5	1,044.0
	10-18-73	54.7	1,043.8
B-7, P-2	8-09-73	51.8[a,b]	1,046.7
	8-09-73	+0.9	1,099.4
Interval: 79-99	8-23-73	52.3	1,046.2
	8-30-73	52.3	1,046.2
Snyderville Shale to	9-06-73	52.3	1,046.2
Toronto	9-13-73	52.3	1,046.2
Limestone	9-20-73	52.5	1,046.0
	9-27-73	52.4	1,046.1
	10-18-73	52.4	1,046.1
B-7, P-3	8-09-73	48.3[a,b]	1,050.2
	8-09-73	+1.8	1,100.3
Interval: 40-50	8-23-73	3.2	1,095.3
	8-30-73	4.6	1,093.9
Kereford Limestone to	9-06-73	5.8	1,092.7
Heumader Shale	9-13-73	4.2	1,094.3
	9-20-73	8.2	1,090.3
	9-27-73	10.2	1,088.3
	10-18-73	11.7	1,086.8
B-8, P-1	8-09-73	20.2[a]	1,047.4
	8-09-73	6.0	1,061.6
Interval: 44-64	8-23-73	20.4	1,047.2
	8-30-73	20.4	1,047.2
Snyderville Shale to	9-06-73	20.6	1,047.0
Toronto Limestone	9-13-73	20.5	1,047.1
	9-20-73	20.5	1,047.1
	9-20-73	20.5	1,047.1
	9-27-73	20.4	1,047.2
	10-04-73	20.2	1,047.4
	10-18-73	20.3	1,047.3
	11-15-73	20.0	1,047.6
	12-14-73	19.5	1,048.1
	1-14-74	18.6	1,049.0
	2-14-74	18.0	1,049.6
	3-14-74	17.7	1,049.9
	4-19-74	17.6	1,050.0

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-8, P-1 (cont'd)	5-16-74	17.7	1,049.9
	6-07-74	17.9	1,049.7
	7-18-74	19.3	1,048.3
	8-15-74	19.7	1,047.9
	9-10-74	19.8	1,047.8
	10-17-74	19.6	1,048.0
	11-14-74	19.1	1,048.5
	12-19-74	19.4	1,048.2
	1-15-75	17.8	1,049.8
	2-14-75	17.2	1,050.4
	3-12-75	16.9	1,050.7
	4-18-75	16.5	1,051.1
	5-22-75	17.3	1,050.3
	6-19-75	12.8	1,054.8
	9-15-75	19.9	1,047.7
	12-22-75	18.9	1,048.7
	3-25-76	17.1	1,050.5
	9-10-76	21.4	1,046.2
	12-14-76	20.4	1,047.2
	4-15-77	17.0	1,050.6
	8-19-77	18.6	1,049.0
	11-03-77	19.1	1,048.5
B-8, P-2	8-09-73	Dry	Dry
	8-09-73	0.9[(a)]	1,066.7
	8-23-73	13.4	1,054.2
	8-30-73	14.0	1,053.6
Interval: 22-34	9-06-73	14.4	1,053.2
	9-13-73	14.5	1,053.1
Plattsmouth Limestone	9-20-73	14.6	1,053.0
	9-27-73	23.1[(c)]	1,044.5
	10-04-73	12.4	1,055.2
	10-18-73	12.2	1,055.4
	11-15-73	12.8	1,054.8
	12-14-73	11.5	1,056.1
	1-14-74	11.5	1,056.1
	2-14-74	10.7	1,056.9
	3-14-74	9.7	1,057.9
	4-19-74	10.0	1,057.6
	5-16-74	10.2	1,057.4
	6-07-74	10.8	1,056.8
	7-18-74	12.9	1,054.7
	8-15-74	14.2	1,053.4

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-8, P-2 (cont'd)	9-10-74	10.7	1,056.9
	10-17-74	13.2	1,054.4
	11-14-74	10.3	1,057.3
	12-19-74	11.3	1,056.3
	1-15-75	8.3	1,059.3
	2-14-75	10.9	1,056.7
	3-12-75	7.5	1,060.1
	4-18-75	9.3	1,058.3
	5-22-75	9.7	1,057.9
	6-19-75	9.9	1,057.7
	9-15-75	13.3	1,054.3
	12-22-75	14.8	1,052.8
	3-25-76	14.8	1,052.8
	9-10-76	15.7	1,051.9
	12-14-76	15.8	1,051.8
	4-15-77	3.1	1,064.5
	6-03-77	4.8	1,062.8
	8-19-77	10.1	1,057.5
	11-03-77	4.9	1,062.7
B-8, P-3	8-09-73	Dry[(a)]	Dry
	8-09-73	5.9	1,061.7
	8-23-73	9.4	1,058.2
	8-30-73	9.7	1,057.9
Interval: 5-17	9-06-73	9.9	1,057.7
	9-13-73	10.0	1,057.6
Overburden to Heumader Shale	9-20-73	10.1	1,057.5
	9-27-73	10.3	1,057.3
	10-04-73	7.8	1,059.8
	10-18-73	7.8	1,059.8
	11-15-73	8.3	1,059.3
	12-14-73	7.3	1,060.3
	1-14-74	7.3	1,060.3
	2-14-74	6.6	1,061.0
	3-14-74	5.8	1,061.8
	4-19-74	6.2	1,061.4
	5-16-74	6.4	1,061.2
	6-07-74	7.0	1,060.6
	7-18-74	9.0	1,058.6
	8-15-74	10.2	1,057.4
	9-10-74	7.3	1,060.3
	10-17-74	8.8	1,058.8
	11-14-74	7.2	1,060.4
	12-19-74	7.8	1,059.8

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-8, P-3 (cont'd)	1-15-75	8.3	1,059.3
	2-14-75	6.9	1,060.7
	3-12-75	4.7	1,062.9
	4-18-75	5.2	1,062.4
	5-22-75	6.0	1,061.6
	6-19-75	5.4	1,062.2
	9-15-75	10.4	1,057.2
	12-22-75	11.6	1,056.0
	3-25-76	11.8	1,055.8
	9-10-76	14.7	1,052.9
	12-14-76	15.3	1,052.3
	4-15-77	2.4	1,065.2
	6-03-77	5.8	1,061.8
	8-19-77	10.9	1,056.7
	11-03-77	1.9	1,065.7
B-9, P-1	7-06-73	31.9	1,046.1
	7-29-73	31.5	1,046.5
	7-29-73	1.9 (a)	1,076.1
Interval: 56-75	8-09-73	31.8	1,046.2
	8-23-73	31.9	1,046.1
	8-30-73	31.9	1,046.0
Toronto Limestone	9-06-73	32.1	1,045.9
	9-13-73	31.9	1,046.1
	9-20-73	31.9	1,046.1
	9-27-73	32.1	1,045.9
	10-04-73	51.8 (c)	1,026.2
	10-18-73	32.1	1,045.9
	11-15-73	32.2	1,045.8
	12-13-73	32.0	1,046.0
	1-14-74	32.3	1,045.7
	2-14-74	32.1	1,045.9
	3-14-74	31.8	1,046.2
	4-19-74	31.6	1,046.4
	5-16-74	31.3	1,046.7
	6-07-74	31.1	1,046.9
	7-18-74	31.4	1,046.6
	8-15-74	31.6	1,046.4
	9-12-74	31.3	1,046.7
	10-17-74	31.6	1,046.4
	11-14-74	31.8	1,046.2
	12-19-74	31.7	1,046.3

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-9, P-1 (cont'd)	1-15-75	31.8	1,046.2
	2-14-75	31.4	1,046.6
	3-12-75	31.1	1,046.9
	4-18-75	30.6	1,047.4
	5-21-75	30.7	1,047.3
	6-19-75	30.6	1,047.4
	9-15-75	30.9	1,047.1
	12-22-75	31.6	1,046.4
	3-25-76	31.2	1,046.8
	9-10-76	34.4	1,049.6
	12-14-76	34.4	1,049.6
B-9, P-2	7-06-73	28.3	1,049.7
	7-29-73	16.8 (a)	1,061.2
	7-29-73	8.4	1,069.6
Interval: 28-40	8-09-73	14.1	1,063.9
	8-23-73	13.8	1,064.2
	8-30-73	13.8	1,064.2
Plattsmouth Limestone	9-06-73	13.7	1,064.3
	9-13-73	13.4	1,064.6
	9-20-73	13.4 (c)	1,064.6
	9-27-73	20.0	1,058.0
	10-04-73	14.7	1,063.3
	10-18-73	14.6	1,063.4
	11-15-73	13.4	1,064.6
	12-14-73	12.6	1,065.4
	1-14-74	12.7	1,065.3
	2-14-74	12.0	1,066.0
	3-14-74	11.9	1,066.1
	4-19-74	11.8	1,066.2
	5-16-74	11.5	1,066.5
	6-07-74	11.8	1,066.2
	7-18-74	12.2	1,065.8
	8-15-74	12.2	1,065.8
	9-12-74	11.9	1,066.1
	10-17-74	12.0	1,066.0
	11-14-74	11.9	1,066.1
	12-19-74	11.6	1,066.4
	1-15-75	11.8	1,066.2
	2-14-75	11.4	1,066.6
	3-12-75	11.2	1,066.8
	4-18-75	10.7	1,067.3
	5-21-75	11.2	1,066.8

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-9, P-2 (cont'd)	6-19-75	11.5	1,066.5
	9-15-75	12.1	1,065.9
	12-22-75	11.9	1,066.1
	3-25-76	11.5	1,066.5
	9-10-76	14.8	1,063.2
	12-14-76	14.2	1,063.8
B-9, P-3	7-06-73	17.8	1,060.2
	7-29-73	3.1 (a)	1,074.9
	7-29-73	2.4	1,075.6
Interval: 6-21	8-09-73	3.5	1,074.5
	8-23-73	3.7	1,074.3
	8-30-73	3.8	1,074.2
Overburden to Heumader Shale	9-06-73	3.9	1,074.1
	9-13-73	3.6	1,074.4
	9-20-73	3.5	1,074.5
	9-27-73	1.9	1,076.1
	10-04-73	0.8	1,077.2
	10-18-73	1.0	1,077.0
	11-15-73	1.1	1,076.9
	12-13-73	1.8	1,076.2
	2-14-74	0.8	1,077.2
	3-14-74	0.6	1,077.4
	4-19-74	1.2	1,076.8
	5-16-74	1.4	1,076.6
	6-07-74	1.2	1,076.8
	7-18-74	3.7	1,074.3
	8-15-74	4.2	1,073.8
	9-12-74	2.5	1,075.5
	10-17-74	3.5	1,074.5
	11-14-74	1.7	1,076.3
	12-19-74	1.0	1,077.0
	1-15-75	1.3	1,076.7
	2-14-75	0.8	1,077.2
	3-12-75	0.6	1,077.4
	4-18-75	0.3	1,077.7
	5-21-75	2.0	1,076.0
	6-19-75	0.6	1,077.4
	9-15-75	4.0	1,074.0
	12-22-75	5.4	1,072.6
	3-25-76	5.0	1,073.0
	9-10-76	8.3	1,069.7
	12-14-76	9.7	1,068.3

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-10, P-1	8-07-73	29.3	1,057.5
	8-07-73	1.3[(a)]	1,085.5
	8-23-73	22.2	1,064.4
	8-30-73	19.0	1,067.8
Interval: 40-57	9-06-73	22.1	1,064.7
(38-57)	9-13-73	22.1	1,064.7
Snyderville Shale to	9-20-73	22.1	1,064.7
Toronto	9-27-73	21.8	1,065.0
Limestone	10-04-73	24.3	1,062.5
	10-18-73	21.5	1,065.3
	11-15-73	20.8	1,066.0
	12-13-73	19.7	1,067.1
	1-14-74	18.7	1,068.1
	2-14-74	17.7	1,069.1
	3-14-74	17.0	1,069.8
	4-19-74	17.4	1,069.4
	5-16-74	17.6	1,069.2
	7-18-74	20.1	1,066.7
	8-15-74	20.9	1,065.9
	9-12-74	19.4	1,067.4
	10-17-74	20.1	1,066.7
	11-14-74	19.7	1,067.1
	12-19-74	19.8	1,067.0
	1-15-75	17.5	1,069.3
	3-13-75	15.7	1,071.1
	4-18-75	15.7	1,071.1
	5-22-75	16.9	1,069.9
	6-19-75	17.8	1,069.0
	9-15-75	21.0	1,065.8
	12-22-75	18.9	1,067.9
	3-25-76	16.5	1,070.3
	9-10-76	22.2	1,064.6
	12-14-76	20.2	1,066.6
	4-15-77	16.4	1,070.4
	6-03-77	17.1	1,069.7
	8-19-77	22.8	1,064.0
	11-04-77	19.4	1,067.4
	4-21-78	15.3	1,071.5
	8-25-78	20.6	1,066.2
	4-03-79	16.1	1,070.7
	7-26-79	19.0	1,067.8

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-10, P-2	8-07-73	23.6	1,063.2
	8-07-73	3.7[(a)]	1,083.1
	8-23-73	15.3	1,071.5
	8-30-73	15.7	1,071.1
Interval: 5-28	9-06-73	16.0	1,070.8
	9-13-73	15.7	1,071.1
Heumader Shale to	9-20-73	15.4	1,071.4
Snyderville Shale	9-27-73	14.5	1,072.3
	10-04-73	13.9	1,072.9
	10-18-73	14.9	1,071.9
	11-15-73	14.1	1,072.7
	12-13-73	14.5	1,072.3
	1-14-74	15.1	1,071.7
	2-14-74	13.9	1,072.9
	3-14-74	14.3	1,072.5
	4-19-74	15.0	1,071.8
	5-16-74	14.6	1,072.2
	7-18-74	16.4	1,070.4
	8-15-74	15.7	1,071.1
	9-12-74	14.3	1,072.5
	10-17-74	15.1	1,071.7
	11-14-74	14.2	1,072.6
	12-19-74	19.8	1,067.0
	1-15-75	14.3	1,072.5
	3-13-75	12.8	1,074.0
	4-18-75	13.0	1,073.8
	5-22-75	13.7	1,073.1
	6-19-75	13.9	1,072.9
	9-15-75	15.0	1,071.8
	12-22-75	16.0	1,070.8
	3-25-76	15.3	1,071.5
	9-10-76	18.0	1,068.8
	12-14-76	17.9	1,068.9
	4-15-77	16.8	1,070.0
	6-03-77	19.0	1,067.8
	8-19-77	18.4	1,068.4
	11-04-77	14.7	1,072.1
	4-21-78	13.2	1,073.6
	8-25-78	16.8	1,070.0
	4-03-79	15.0	1,071.8
	7-26-79	19.2	1,067.6

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-11, P-1	8-06-73	Piezometer is inoperative	
	8-23-73	5.6	1,084.4
	8-30-73	Blocked	
	9-06-73	Blocked	
Interval: 178-240	9-13-73	Blocked	
(175-240)	9-20-73	Blocked	
	9-27-73	Blocked	
Robbins Shale to	10-04-73	5.6	1,084.4
Vinland Shale	10-18-73	3.6	1,086.4
	11-15-73	3.6	1,086.4
	12-13-73	2.7	1,087.3
	1-14-74	3.0	1,087.0
	2-14-74	2.9	1,087.1
	3-14-74	2.5	1,087.5
	4-19-74	3.6	1,086.4
	5-16-74	3.7	1,086.3
	6-07-74	4.1	1,085.9
	7-18-74	Piezometer damaged	
B-11, P-2	6-26-73	24.0	1,066.0
	8-06-73	5.3 (a,b)	1,084.7
	8-06-73	+1.4 (a,b)	1,091.4
Interval: 18-35	8-09-73	5.3	1,084.7
(16-35)	8-23-73	5.6	1,084.4
	8-30-73	5.7	1,084.3
Toronto	9-06-73	5.7	1,084.3
Limestone	9-13-73	5.3	1,084.7
	9-20-73	5.3	1,084.7
	9-27-73	4.4	1,085.6
	10-04-73	3.4	1,086.6
	10-18-73	3.6	1,086.4
	11-15-73	3.6	1,086.4
	12-13-73	2.7	1,087.3
	1-14-74	3.0	1,087.0
	2-14-74	3.0	1,087.0
	3-14-74	2.5	1,087.5
	4-19-74	3.5	1,086.5
	5-16-74	3.7	1,086.3
	6-07-74	4.1	1,085.9
	7-18-74	Piezometer damaged	
B-11, P-3	7-26-73	7.5	1,082.5
	8-06-73	3.5 (a)	1,086.5
	8-06-73	2.4 (a)	1,087.6

TABLE 2.4-32 (continued) Sheet 22 of 42

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-11, P-3 (cont'd)	8-09-73	2.8	1,087.2
	8-23-73	3.1	1,086.9
Interval: 5-13	8-30-73	3.5	1,086.5
	9-06-73	3.8	1,086.2
Overburden to	9-13-73	1.9	1,088.1
Snyderville Shale	9-20-73	2.1[c]	1,087.9
	9-27-73	6.1	1,083.9
	10-04-73	0.6	1,089.4
	10-18-73	1.4	1,088.6
	11-15-73	2.2	1,087.8
	12-13-73	1.5	1,088.5
	1-14-74	2.2	1,087.8
	2-14-74	2.2	1,087.8
	3-14-74	1.2	1,088.8
	4-19-74	1.8	1,088.2
	5-16-74	2.3	1,087.7
	6-07-74	2.2	1,087.8
	7-18-74	Piezometer damaged	
B-12, P-1	8-08-73	58.2[a]	1,030.3
	8-08-73	51.9	1,036.6
	8-23-73	58.7	1,029.8
	8-30-73	58.8	1,029.7
Interval: 90-192	9-06-73	58.9	1,029.6
	9-13-73	58.7	1,029.8
Ireland	9-20-73	58.8	1,029.7
Sandstone	9-27-73	58.5	1,030.0
	10-04-73	58.4	1,030.1
	10-18-73	58.6	1,029.9
	11-15-73	58.5	1,030.0
	12-13-73	58.4	1,030.1
	1-14-74	58.5	1,030.0
	2-14-74	58.6	1,029.9
	3-14-74	58.4	1,030.1
	4-19-74	58.4	1,030.1
	5-16-74	58.5	1,030.0
	7-18-74	59.0	1,029.5
	8-15-74	59.1	1,029.4
	9-12-74	58.8	1,029.7
	10-17-74	58.9	1,029.6
	11-14-74	58.9	1,029.6
	12-19-74	58.8	1,029.7

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-12, P-1 (cont'd)	1-15-75	58.9	1,029.6
	3-12-75	58.7	1,029.8
	4-18-75	58.7	1,029.8
	5-21-75	58.9	1,029.6
	6-19-75	58.8	1,029.7
	9-15-75	59.2	1,029.3
	12-22-75	59.3	1,029.2
	3-25-76	59.2	1,029.3
	9-10-76	62.5	1,026.0
	12-14-76	Blocked	--
B-12, P-2	8-08-73	38.6	1,049.9
	8-08-73	1.1[(a)]	1,087.4
	8-23-73	39.2	1,049.3
	8-30-73	39.4	1,049.1
Interval: 41-61	9-06-73	39.5	1,049.0
	9-13-73	39.4	1,049.1
Toronto Limestone	9-20-73	39.4	1,049.1
	9-27-73	39.2	1,049.3
	10-18-73	39.4	1,049.1
	11-15-73	39.3	1,049.2
	12-13-73	38.9	1,049.6
	1-14-74	39.0	1,049.5
	2-14-74	38.8	1,049.7
	3-14-74	38.4	1,050.1
	4-19-74	38.3	1,050.2
	5-16-74	38.2	1,050.3
	7-18-74	38.7	1,049.8
	8-15-74	38.9	1,049.6
	9-12-74	38.7	1,049.8
	10-17-74	38.8	1,049.7
	11-14-74	38.8	1,049.7
	12-19-74	38.8	1,049.7
	1-15-75	38.7	1,049.8
	3-12-75	38.1	1,050.4
	4-18-75	37.7	1,050.8
	5-21-75	37.9	1,050.6
	6-19-75	37.9	1,050.6
	9-15-75	38.8	1,049.7
	12-22-75	39.1	1,049.4
	3-25-76	38.4	1,050.1
	9-10-76	41.4	1,047.1
	12-14-76	41.2	1,047.3

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-12, P-2 (cont'd)	4-15-78	38.4	1,050.1
	6-03-78	38.3	1,050.2
	8-19-78	39.2	1,049.3
	11-04-78	39.4	1,049.1
B-12, P-3	8-08-73	8.8 (a)	1,079.7
	8-08-73	2.4	1,086.1
	8-23-73	8.9	1,079.6
	8-30-73	9.8	1,078.7
Interval: 5-32	9-06-73	10.7	1,077.8
	9-13-73	10.8	1,077.7
Heumader Shale to Snyderville Shale	9-20-73	11.0	1,077.5
	9-27-73	11.2	1,077.3
	10-04-73	13.6	1,074.9
	10-18-73	11.6	1,076.9
	11-15-73	13.4	1,075.1
	12-13-73	15.7	1,072.8
	1-14-74	15.5	1,073.0
	2-14-74	15.7	1,072.8
	3-14-74	15.6	1,072.9
	4-19-74	18.4	1,070.1
	5-16-74	23.9	1,064.6
	7-18-74	25.7	1,062.7
	8-15-74	26.9	1,061.6
	9-12-74	9.0	1,079.5
	10-17-74	14.8	1,073.7
	11-14-74	4.5	1,084.0
	12-19-74	5.9	1,082.6
	1-15-75	7.7	1,080.8
	3-12-75	9.2	1,079.3
	4-18-75	10.7	1,077.8
	5-21-75	11.7	1,076.8
	6-19-75	11.5	1,077.0
	9-15-75	13.1	1,075.4
	12-22-75	15.2	1,073.3
	3-25-76	14.2	1,074.3
	9-10-76	27.3	1,061.2
	12-14-76	Plugged	--
B-14, P-1	8-05-73	115.9 (a)	1,000.5
	8-05-73	72.0	1,044.4
	8-11-73	113.4	1,003.0
	8-23-73	115.1	1,001.3

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-14, P-1 (cont'd)	8-30-73	114.9	1,001.5
	9-06-73	115.1	1,001.3
Interval: 280-290	9-13-73	114.9	1,001.5
(271-290)	9-20-73	114.9	1,001.5
	9-27-73	114.7	1,001.7
	10-04-73	114.5	1,001.9
Vinland Shale to	10-18-73	114.6	1,001.8
Tonganoxie	11-15-73	114.5	1,001.9
Sandstone	12-14-73	114.2	1,002.2
	1-14-74	114.2	1,002.2
	2-14-74	114.2	1,002.2
	3-14-74	114.0	1,002.4
	4-19-74	114.1	1,002.3
	5-16-74	114.1	1,002.3
	6-07-74	114.2	1,002.2
	7-18-74	114.8	1,001.6
	8-15-74	115.0	1,001.4
	9-12-74	114.6	1,001.8
	10-17-74	114.7	1,001.7
	11-14-74	114.6	1,001.8
	12-19-74	114.7	1,001.7
	1-15-75	114.5	1,001.9
	2-14-75	114.4	1,002.0
	3-12-75	114.2	1,002.2
	4-18-75	114.0	1,002.4
	5-22-75	114.3	1,002.1
	6-19-75	114.4	1,002.0
	9-15-75	115.0	1,001.4
	12-22-75	115.1	1,001.3
	3-25-76	115.3	1,001.1
	9-10-76	117.8	998.6
	12-14-76	117.7	998.7
	4-15-77	114.6	1,001.8
	6-03-77	114.1	1,002.3
	8-19-77	113.9	1,002.5
	11-03-77	113.7	1,002.7
	4-21-78	113.9	1,002.5
	8-25-78	114.5	1,001.9
	4-03-79	115.0	1,001.4
	7-25-79	115.2	1,001.2

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-14, P-2	8-05-73	Piezometer is inoperative	
	8-23-73	0.6	1,115.8
	8-30-73	0.5	1,115.9
	9-06-73	0.7	1,115.7
Interval: 85-100	9-13-73	0.6	1,115.8
	9-20-73	0.6	1,115.8
Toronto Limestone	9-27-73	82.7	1,033.7
	10-04-73	82.7	1,033.7
	10-18-73	82.7	1,033.7
	11-15-73	82.7	1,033.7
	12-14-73	82.5	1,033.9
	1-14-74	82.5	1,033.9
	2-14-74	82.4	1,034.0
	3-14-74	82.3	1,034.1
	4-19-74	82.3	1,034.1
	5-16-74	82.2	1,034.2
	6-07-74	82.2	1,034.2
	7-18-74	82.2	1,034.2
	8-15-74	82.2	1,034.2
	9-12-74	82.2	1,034.2
	10-17-74	82.3	1,034.1
	11-14-74	82.3	1,034.1
	12-19-74	82.3	1,034.1
	1-15-75	82.2	1,034.2
	2-14-75	82.2	1,034.2
	3-12-75	82.2	1,034.2
	4-18-75	82.2	1,034.2
	5-22-75	82.1	1,034.3
	6-19-75	82.1	1,034.3
	9-15-75	82.2	1,034.2
	12-22-75	82.1	1,034.3
	3-25-76	82.0	1,034.4
	9-10-76	84.2	1,032.2
	12-14-76	84.1	1,032.3
	4-15-77	80.4	1,036.0
	6-03-77	80.0	1,036.4
	8-19-77	80.1	1,036.3
	11-03-77	80.1	1,036.3
	4-21-78	79.6	1,036.8
	8-25-78	79.5	1,036.9
	4-03-79	79.2	1,037.2
	7-25-79	79.0	1,037.4

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-14, P-3	8-05-73	15.8	1,100.6
	8-05-73	14.2[(a)]	1,102.2
	8-23-73	15.7	1,100.7
	8-30-73	16.0	1,100.4
Interval: 7-30	9-06-73	16.3	1,100.1
	9-13-73	16.6	1,099.8
Clay Creek Limestone to Kereford Limestone	9-20-73	16.7	1,099.7
	9-27-73	12.9	1,103.5
	10-04-73	11.3	1,105.1
	10-18-73	11.9	1,104.5
	11-15-73	13.3	1,103.1
	12-14-73	12.7	1,103.7
	1-14-74	12.2	1,104.2
	2-14-74	12.3	1,104.0
	3-14-74	10.4	1,106.0
	4-19-74	12.0	1,104.4
	5-16-74	11.8	1,104.6
	6-07-74	12.4	1,104.0
	7-18-74	14.9	1,101.5
	8-15-74	16.3	1,100.1
	9-12-74	13.0	1,103.4
	10-17-74	16.4	1,100.0
	11-14-74	11.9	1,104.5
	12-19-74	14.2	1,102.2
	1-15-75	12.3	1,104.1
	2-14-75	11.8	1,104.6
	3-12-75	11.4	1,105.0
	4-18-75	10.7	1,105.7
	5-22-75	12.8	1,103.6
	6-19-75	10.3	1,106.1
	9-15-75	17.0	1,099.4
	12-22-75	18.6	1,097.8
	3-25-76	16.2	1,100.2
	9-10-76	20.4	1,096.0
	12-14-76	24.2	1,092.2
	4-15-77	19.7	1,096.7
	6-03-77	12.7	1,103.7
	8-19-77	13.8	1,102.6
	11-03-77	10.1	1,106.3

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-14, P-3 (cont'd)	4-21-78	10.3	1,106.1
	8-25-78	16.9	1,099.5
	4-03-79	13.2	1,103.2
	7-25-79	12.4	1,104.0
B-15, P-1	8-04-73	68.9	1,019.1
	8-04-73	56.3[(a)]	1,031.7
	8-11-73	64.4	1,023.6
	8-23-73	64.8	1,023.2
Interval: 124-154	8-30-73	67.9	1,020.1
(122-154)	9-06-73	65.0	1,023.0
Ireland	9-13-73	64.7	1,023.3
Sandstone	9-20-73	64.9	1,023.1
	9-27-73	64.8	1,023.2
	10-04-73	64.6	1,023.4
	10-18-73	64.7	1,023.3
	11-15-73	64.6	1,023.4
	12-18-73	64.3	1,023.7
	1-14-74	64.3	1,023.7
	2-14-74	64.4	1,023.6
	3-14-74	64.1	1,023.9
	4-19-74	64.3	1,023.7
	5-16-74	64.3	1,023.7
	6-07-74	64.3	1,023.7
	7-18-74	65.1	1,022.9
	8-15-74	65.2	1,022.8
	9-12-74	65.0	1,023.0
	10-17-74	65.1	1,022.9
	11-14-74	65.2	1,022.8
	12-19-74	65.1	1,022.9
	1-15-75	64.9	1,023.1
	2-14-75	64.8	1,023.2
	3-12-75	63.7	1,024.3
	4-18-75	64.6	1,023.4
	5-22-75	64.9	1,023.1
	6-19-75	64.8	1,023.2
	9-15-75	65.5	1,022.5
	12-22-75	65.4	1,022.6
	3-25-76	65.1	1,022.9
	9-10-76	68.2	1,019.8
	12-14-76	68.0	1,020.0

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-15, P-1 (cont'd)	4-15-77	65.2	1,022.8
	6-03-77	64.8	1,023.2
	8-19-77	65.4	1,022.6
	11-03-77	65.5	1,022.5
B-15, P-2	8-04-73	49.4	1,038.6
	8-04-73	33.7[a]	1,054.3
	8-11-73	48.9	1,039.1
	8-23-73	51.0	1,037.0
Interval: 40-80	8-30-73	48.9	1,039.1
	9-06-73	49.1	1,038.9
Toronto	9-13-73	48.7	1,039.3
Limestone to	9-20-73	49.0	1,039.0
Unnamed	9-27-73	48.8	1,039.2
Lawrence	10-04-73	48.6	1,039.4
	10-18-73	48.8	1,039.2
	11-15-73	48.4	1,039.6
	12-18-73	47.9	1,040.1
	1-14-74	47.7	1,040.3
	2-14-74	47.3	1,040.7
	3-14-74	47.0	1,041.0
	4-19-74	47.0	1,041.0
	5-16-74	46.7	1,041.3
	6-07-74	46.9	1,041.1
	7-18-74	47.7	1,040.3
	8-15-74	47.9	1,040.1
	9-12-74	47.6	1,040.4
	10-17-74	47.7	1,040.3
	11-14-74	47.5	1,040.5
	12-19-74	47.6	1,040.4
	1-15-75	47.1	1,040.9
	2-14-75	48.8	1,039.2
	3-12-75	46.4	1,041.6
	4-18-75	46.2	1,041.8
	5-22-75	46.5	1,041.5
	6-19-75	46.6	1,041.4
	9-15-75	47.5	1,040.5
	12-22-75	47.7	1,040.3
	3-25-76	47.6	1,040.4
	9-10-76	50.5	1,037.5
	12-14-76	50.5	1,037.5

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-15, P-2 (cont'd)	4-15-77	47.6	1,040.4
	6-03-77	50.1	1,037.9
	8-19-77	47.9	1,040.1
	11-03-77	48.1	1,039.9
B-15, P-3	8-04-73	17.7	1,070.3
	8-04-73	1.8[a]	1,086.2
	8-11-73	5.3	1,082.7
	8-23-73	5.4	1,082.6
Interval: 5-29	8-30-73	5.6	1,082.4
(4-29)	9-06-73	5.6	1,082.4
Heumader Shale to	9-13-73	5.7	1,082.3
Plattsmouth	9-20-73	5.8	1,082.2
Limestone	9-27-73	2.7	1,085.3
	10-04-73	2.0	1,086.0
	10-18-73	2.5	1,085.5
	11-15-73	3.4	1,084.6
	12-18-73	3.0	1,085.0
	1-14-74	3.9	1,084.1
	2-14-74	3.6	1,084.4
	3-14-74	2.1	1,085.9
	4-19-74	3.1	1,084.9
	5-16-74	3.1	1,084.9
	6-07-74	3.6	1,084.4
	7-18-74	5.2	1,082.8
	8-15-74	5.5	1,082.5
	9-12-74	2.8	1,085.2
	10-17-74	5.6	1,082.4
	11-14-74	2.7	1,085.3
	12-19-74	3.7	1,084.3
	1-15-75	4.2	1,083.8
	2-14-75	3.4	1,084.6
	3-12-75	3.1	1,084.9
	4-18-75	2.2	1,085.8
	5-22-75	3.2	1,084.8
	6-19-75	2.0	1,086.0
	9-15-75	5.5	1,082.5
	12-22-75	7.3	1,080.7
	3-25-76	6.2	1,081.8
	9-10-76	8.5	1,079.5
	12-14-76	10.4	1,077.6

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-15, P-3 (cont'd)	4-15-77	9.3	1,078.7
	6-03-77	3.6	1,084.4
	8-19-77	5.2	1,082.8
	11-03-77	2.3	1,085.7
B-16, P-1	6-27-73	47.0	1,057.7
	7-28-73	64.5 [(a)]	1,040.2
	7-28-73	17.3 [(a)]	1,087.4
Interval: 68-91	8-11-73	14.5	1,090.2
(61-91)	8-23-73	63.4	1,041.3
	8-30-73	63.4	1,041.3
Amazonia	9-06-73	63.5	1,041.2
Limestone to	9-13-73	63.5	1,041.2
Ireland	9-20-73	Blocked	
Sandstone	9-27-73	Blocked	
	10-04-73	63.5	1,041.2
	10-18-73	63.8	1,040.9
	11-15-73	64.8	1,039.9
	12-14-73	64.5	1,040.2
	1-14-74	63.1	1,041.6
	2-14-74	62.6	1,042.1
	3-14-74	62.0	1,042.7
	4-19-74	57.7	1,047.0
	5-16-74	61.9	1,042.8
	Piezometer Blocked		
B-16, P-2	6-27-73	36.5	1,068.2
	7-28-73	22.9 [(a)]	1,081.8
	7-28-73	7.8 [(a)]	1,096.9
Interval: 23-37	8-11-73	14.5	1,090.2
	8-23-73	15.1	1,089.6
	8-30-73	15.2	1,089.2
Toronto	9-06-73	Blocked	
Limestone	9-13-73	Blocked	
	9-20-73	Blocked	
	9-27-73	Blocked	
	10-04-73	Blocked	
	10-18-73	Blocked	
	11-15-73	Blocked	
	12-14-73	Blocked	
	1-14-74	13.8	1,090.9
	2-14-74	14.1	1,090.6
	3-14-74	14.5	1,090.2
	4-19-74	15.4	1,089.3
	5-16-74	16.1	1,088.6
	Piezometer Blocked		

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-17, P-1	8-06-73	Piezometer is inoperative	
	8-06-73	9.9[a]	1,091.3
	8-09-73	35.5	1,065.7
Interval: 186-320	8-11-73	39.5	1,061.7
	8-23-73	66.4	1,034.8
	8-30-73	72.7	1,028.5
Tonganoxie Sandstone	9-06-73	86.1	1,015.1
	9-13-73	78.2	1,023.0
	9-20-73	79.3	1,021.9
	9-27-73	132.0[c]	969.2
	10-04-73	100.9[c]	1,000.3
	10-18-73	94.5[c]	1,006.7
	11-15-73	85.0	1,016.2
	12-13-73	82.3	1,018.9
	1-14-74	81.5	1,019.7
	3-14-74	80.2	1,021.0
	4-19-74	80.0	1,021.2
	5-16-74	Piezometer blocked	
	10-17-74	80.6	1,020.6
	11-14-74	80.4	1,020.8
	12-19-74	80.5	1,020.7
	1-15-75	79.9	1,021.3
	2-14-75	79.6	1,021.6
	3-12-75	79.4	1,021.8
	4-18-75	79.2	1,022.0
	5-22-75	79.3	1,021.9
	6-19-75	79.3	1,021.9
	9-15-75	80.2	1,021.0
	12-22-75	79.8	1,021.4
	3-25-76	79.1	1,022.1
	9-10-76	82.2	1,019.0
	12-14-76	81.7	1,019.5
	4-15-77	78.5	1,022.7
	6-03-77	78.3	1,022.9
	8-19-77	78.6	1,022.6
	11-03-77	78.7	1,022.5
	4-21-78	77.7	1,023.5
	8-25-78	78.8	1,022.4
	4-03-79	77.8	1,023.4
	7-25-79	78.1	1,023.1

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-17, P-2	8-06-73	60.3	1,040.9
	8-06-73	5.4 (a)	1,095.8
	8-09-73	59.0	1,042.2
	8-23-73	53.1	1,048.1
Interval: 65-121	8-30-73	53.3	1,047.9
	9-06-73	53.4	1,047.8
Ireland Sandstone	9-13-73	53.4	1,047.8
	9-20-73	53.4	1,047.8
	9-27-73	54.7	1,046.5
	10-04-73	53.3	1,047.9
	10-18-73	53.4	1,047.8
	11-15-73	53.3	1,047.9
	12-13-73	52.8	1,048.4
	1-14-74	52.7	1,048.5
	3-14-74	52.6	1,048.6
	4-19-74	52.7	1,048.5
	5-16-74	52.9	1,048.3
	10-17-74	53.6	1,047.6
	11-14-74	53.4	1,047.8
	12-19-74	53.5	1,047.7
	1-15-75	53.0	1,048.2
	2-14-75	52.9	1,048.3
	3-12-75	52.7	1,048.5
	4-18-75	52.8	1,048.4
	5-22-75	53.2	1,048.0
	6-19-75	53.2	1,048.0
	9-15-75	54.1	1,047.1
	12-22-75	53.4	1,047.8
	3-25-76	53.3	1,047.9
	9-10-76	56.8	1,044.4
	12-14-76	56.1	1,045.1
	4-15-77	53.6	1,047.6
	6-03-77	53.6	1,047.6
	8-19-77	53.8	1,047.4
	11-03-77	53.7	1,047.5
	4-21-78	53.3	1,047.9
	8-25-78	54.3	1,046.9
	4-03-79	53.2	1,048.2
	7-25-79	53.9	1,049.3

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-17, P-3	8-06-73	29.6	1,071.6
	8-06-73	2.0[(a)]	1,099.2
	8-09-73	20.6	1,080.6
	8-23-73	21.8	1,079.4
Interval: 25-40	8-30-73	21.9	1,079.3
	9-06-73	21.8	1,079.4
Toronto Limestone	9-13-73	21.5	1,079.7
	9-20-73	21.4	1,079.8
	9-27-73	21.2	1,080.0
	10-04-73	19.7	1,081.5
	10-18-73	19.6	1,081.6
	11-15-73	18.8	1,082.4
	12-13-73	18.5	1,082.7
	1-14-74	19.0	1,082.2
	3-14-74	19.4	1,081.8
	4-19-74	20.6	1,080.6
	5-16-74	20.7	1,080.5
	6-07-74	21.0	1,080.2
	7-18-74	21.6	1,079.6
	8-15-74	21.3	1,079.9
	9-12-74	19.8	1,081.4
	10-17-74	19.7	1,081.5
	11-14-74	18.6	1,082.6
	12-19-74	18.6	1,082.6
	1-15-75	18.7	1,082.5
	2-14-75	18.9	1,082.3
	3-12-75	18.4	1,082.8
	4-18-75	19.9	1,081.3
	5-22-75	21.4	1,079.8
	6-19-75	20.8	1,080.4
	9-15-75	20.5	1,080.7
	12-22-75	20.6	1,080.6
	3-25-76	24.8	1,076.4
	9-10-76	24.8	1,076.4
	12-14-76	23.8	1,077.4
	4-15-77	25.0	1,076.2
	6-03-77	24.6	1,076.6
	8-19-77	22.4	1,078.8
	11-03-77	19.4	1,081.8
	4-21-78	21.6	1,079.6
	8-25-78	22.4	1,078.8
	4-03-79	23.1	1,078.1
	7-25-79	22.2	1,079.0

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-18, P-1	8-08-73	11.4	1,050.7
	8-08-73	0.1[(a)]	1,062.0
	8-23-73	11.5	1,050.6
	8-30-73	11.5	1,050.6
Interval: 76-100	9-06-73	11.5	1,050.6
(74-100)	9-13-73	11.4	1,050.7
Ireland	9-20-73	11.4	1,050.7
Sandstone	9-27-73	12.3	1,049.8
	10-04-73	11.4	1,050.7
	10-18-73	11.5	1,050.6
	11-15-73	11.4	1,050.7
	12-13-73	11.4	1,050.7
	1-14-74	11.5	1,050.6
	2-14-74	11.9	1,050.2
	3-14-74	11.6	1,050.5
	4-19-74	11.7	1,050.4
	5-16-74	11.6	1,050.5
	7-18-74	11.9	1,050.2
	8-15-74	11.7	1,050.4
	9-12-74	11.5	1,050.6
	10-17-74	11.6	1,050.5
	11-14-74	11.8	1,050.3
	12-19-74	11.8	1,050.3
	1-15-75	11.8	1,050.3
	2-14-75	11.9	1,050.2
	3-12-75	11.9	1,050.2
	4-18-75	11.7	1,050.4
	5-22-75	11.8	1,050.3
	6-19-75	11.5	1,050.6
	9-15-75	11.8	1,050.3
	12-22-75	11.9	1,050.2
	3-25-76	12.0	1,050.1
	9-10-76	14.7	1,047.4
	12-14-76	14.5	1,047.6
	4-15-77	12.1	1,050.0
	6-03-77	11.7	1,050.4
	8-19-77	11.5	1,050.6
	11-02-77	11.3	1,050.8

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-18, P-2	8-08-73	1.4[a]	1,060.7
	8-23-73	6.5	1,055.6
	8-30-73	7.3	1,054.8
Interval: 19-35	9-06-73	7.2	1,054.9
	9-13-73	6.8	1,055.3
Snyderville Shale to Toronto Limestone	9-20-73	6.6	1,055.5
	9-27-73	6.5	1,055.6
	10-04-73	5.3	1,056.8
	10-18-73	5.3	1,056.8
	11-15-73	5.4	1,056.7
	12-13-73	5.8	1,056.3
	1-14-74	6.9	1,055.2
	2-14-74	8.5	1,053.6
	3-14-74	9.1	1,053.0
	4-19-74	9.7	1,052.4
	5-16-74	8.8	1,053.3
	7-18-74	8.8	1,053.3
	8-15-74	8.3	1,053.8
	9-12-74	6.4	1,055.7
	10-17-74	6.6	1,055.5
	11-14-74	6.1	1,056.0
	12-19-74	6.5	1,055.6
	1-15-75	7.6	1,054.5
	2-14-75	8.7	1,053.4
	3-12-75	9.9	1,052.2
	4-18-75	9.4	1,052.7
	5-22-75	9.4	1,052.7
	6-19-75	7.2	1,054.9
	9-15-75	6.9	1,055.2
	12-22-75	7.8	1,054.3
	3-25-76	9.9	1,052.2
	9-10-76	10.8	1,051.3
	12-14-76	11.4	1,050.7
	4-15-77	12.0	1,050.1
	6-03-77	10.4	1,051.7
	8-19-77	8.0	1,054.1
	11-03-77	5.0	1,057.1

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-18, P-3	8-08-73	4.3	1,057.8
	8-08-73	1.6[(a)]	1,060.5
	8-23-73	4.8	1,057.3
	8-30-73	4.9	1,057.2
Interval: 5-14	9-06-73	4.9	1,057.2
	9-13-73	4.8	1,057.3
Heebner Shale to	9-20-73	4.8	1,057.3
Snyderville Shale	9-27-73	3.9	1,058.2
	10-04-73	2.9	1,059.2
	10-18-73	4.4	1,057.7
	11-15-73	5.4	1,056.7
	12-13-73	6.3	1,055.8
	1-14-74	6.6	1,055.5
	2-14-74	6.6	1,055.5
	3-14-74	4.5	1,057.6
	4-19-74	6.7	1,055.4
	5-16-74	Piezometer blocked	
	10-17-74	6.6	1,055.5
	11-14-74	5.0	1,057.1
	12-19-74	5.6	1,056.5
	1-15-75	5.7	1,056.4
	2-14-75	5.3	1,056.8
	3-12-75	6.2	1,055.9
	4-18-75	5.7	1,056.4
	5-22-75	6.1	1,056.0
	6-19-75	3.3	1,058.8
	9-15-75	5.8	1,056.3
	12-22-75	6.7	1,055.4
B-20, P-1	8-11-73	Piezometer is inoperative	
	8-11-73	+2.3[(a,b)]	1,136.8
	8-23-73	13.1	1,121.4
	8-30-73	17.1	1,117.4
Interval: 101-114	9-06-73	19.8	1,114.7
	9-13-73	18.3	1,116.2
Clay Creek	9-20-73	24.0	1,110.5
Limestone to	9-27-73	41.3[(c)]	1,093.2
Jackson Park Shale	10-04-73	42.4[(c)]	1,092.1
	10-18-73	42.3[(c)]	1,092.2
	11-15-73	42.5[(c)]	1,092.0
	12-13-73	42.4[(c)]	1,092.1

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-20, P-1 (cont'd)	1-14-74	42.5	1,092.0
	2-14-74	42.5	1,092.0
	3-14-74	42.3	1,092.2
	4-19-74	42.3	1,092.2
	5-16-74	42.4	1,092.1
	6-07-74	42.5	1,092.0
	7-18-74	42.4	1,092.1
	8-15-74	42.5	1,092.0
	9-10-74	42.5	1,092.0
	10-17-74	42.5	1,092.0
	11-14-74	42.5	1,092.0
	12-19-74	42.6	1,091.9
	1-15-75	42.5	1,092.0
	2-14-75	42.5	1,092.0
	3-12-75	42.5	1,092.0
	4-18-75	42.5	1,092.0
	5-21-75	42.4	1,092.1
	6-19-75	42.6	1,091.9
	9-15-75	42.6	1,091.9
	12-22-75	42.5	1,092.0
	3-25-76	42.7	1,091.8
	9-10-76	45.7	1,088.8
	12-14-76	45.4	1,089.1
	4-15-77	42.0	1,092.5
	6-03-77	42.4	1,092.1
	8-19-77	42.5	1,092.0
	11-03-77	42.5	1,092.0
	4-21-78	41.6	1,092.9
	8-25-78	44.8	1,089.7
	4-03-79	42.7	1,091.8
	7-25-79	43.1	1,091.4
B-20, P-2	8-11-73	38.6 (a,b)	1,095.9
	8-11-73	+2.2	1,136.7
	8-20-73	36.3	1,098.2
	8-23-73	32.8	1,101.7
Interval: 41-81	9-06-73	37.7	1,096.8
	9-13-73	38.3	1,096.2
Spring Branch Limestone to Stull Shale	9-20-73	38.8 (c)	1,095.7
	9-27-73	56.7 (c)	1,077.8
	10-04-73	49.9 (c)	1,084.6
	10-18-73	42.3 (c)	1,092.2
	11-15-73	43.9	1,090.6
	12-13-73	41.1	1,093.4

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-20, P-2 (cont'd)	1-14-74	41.1	1,093.4
	2-14-74	40.4	1,094.1
	3-14-74	39.9	1,094.6
	4-19-74	39.8	1,094.7
	5-16-74	39.3	1,095.2
	6-07-74	39.5	1,094.9
	7-18-74	40.0	1,094.5
	8-15-74	39.6	1,094.9
	9-10-74	41.8	1,092.7
	10-17-74	39.4	1,095.1
	11-14-74	39.1	1,095.4
	12-19-74	39.0	1,095.5
	1-15-75	38.6	1,095.9
	2-14-75	38.2	1,096.3
	3-12-75	37.8	1,096.7
	4-18-75	37.5	1,097.0
	5-21-75	37.6	1,096.9
	6-19-75	37.7	1,096.8
	9-15-75	37.9	1,096.6
	12-22-75	37.1	1,097.4
	3-25-76	36.3	1,098.2
	9-10-76	40.0	1,094.5
	12-14-76	39.4	1,095.1
	4-15-77	35.7	1,098.8
	6-03-77	35.8	1,098.7
	8-19-77	36.4	1,098.1
	11-03-77	36.3	1,098.2
	4-21-78	34.3	1,100.2
	8-25-78	37.6	1,096.9
	4-03-79	34.9	1,099.6
	7-25-79	35.9	1,098.6
B-20, P-3	8-11-73	12.7[(a)]	1,121.8
	8-11-73	12.0	1,122.5
	8-23-73	12.6	1,121.9
	8-30-73	13.0	1,121.5
Interval: 21-29	9-06-73	13.2	1,121.3
	9-13-73	13.0	1,121.5
Doniphan Shale	9-20-73	13.3	1,121.2
	9-27-73	13.8	1,120.7
	10-04-73	13.0	1,121.5
	10-18-73	13.4	1,121.1
	11-15-73	13.0	1,121.5
	12-13-73	13.0	1,121.5

TABLE 2.4-32 (continued) Sheet 40 of 42

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-20, P-3 (cont'd)	1-14-74	13.5	1,121.0
	2-14-74	13.4	1,121.1
	3-14-74	13.1	1,121.4
	4-19-74	12.7	1,121.8
	5-16-74	12.0	1,122.5
	6-07-74	11.9	1,122.6
	7-18-74	12.2	1,122.3
	8-15-74	12.6	1,121.9
	9-12-74	12.7	1,121.8
	10-17-74	13.4	1,121.1
	11-14-74	13.7	1,120.8
	12-19-74	13.7	1,120.8
	1-15-75	14.0	1,120.5
	2-14-75	13.6	1,120.9
	3-12-75	13.0	1,121.5
	4-18-75	11.5	1,123.0
	5-21-75	11.8	1,122.7
	6-19-75	11.5	1,123.0
	9-15-75	12.1	1,122.4
	12-22-75	14.5	1,120.0
	3-25-76	15.8	1,118.7
	9-10-76	17.0	1,117.5
	12-14-76	18.7	1,115.8
	4-15-77	17.1	1,117.4
	6-03-77	15.8	1,118.7
	8-19-77	14.1	1,120.4
	11-03-77	12.9	1,121.6
	4-21-78	12.6	1,121.8
	8-25-78	14.7	1,119.8
	4-03-79	15.5	1,119.0
	7-25-79	11.9	1,122.6
B-21, P-1	8-10-73	62.8[(a,b)]	1,055.0
	8-10-73	+2.1	1,119.9
	8-23-73	51.6	1,066.2
	8-30-73	57.5	1,060.3
Interval: 74-91	9-06-73	60.5	1,057.3
	9-13-73	61.9	1,055.9
Toronto	9-20-73	62.9[(a)]	1,054.9
Limestone	9-27-73	11.7	1,106.1
	10-04-73	64.8	1,053.0

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-21, P-1 (cont'd)	10-18-73	64.3	1,053.5
	11-15-73	63.6	1,054.2
	12-13-73	63.0	1,054.8
	1-14-74	62.7	1,055.1
	2-14-74	62.5	1,055.3
	3-14-74	62.4	1,055.4
	4-19-74	62.6	1,055.2
	5-16-74	62.8	1,055.0
	6-07-74	62.9	1,054.9
	7-18-74	63.1	1,054.7
	8-15-74	63.2	1,054.6
	9-12-74	63.1	1,054.7
	10-17-74	62.9	1,054.9
	11-14-74	63.1	1,054.7
	12-19-74	62.7	1,055.1
	1-15-75	62.6	1,055.2
	2-14-75	62.6	1,055.2
	3-12-75	62.5	1,055.3
	4-18-75	62.5	1,055.3
	5-21-75	62.6	1,055.2
	6-19-75	62.5	1,055.3
	9-15-75	62.9	1,054.9
	12-22-75	62.8	1,055.0
	3-25-76	63.0	1,054.8
	9-10-76	65.8	1,052.0
	12-14-76	65.4	1,052.4
B-21, P-2	8-10-73	Piezometer is inoperative	
	8-10-73	1.3[a]	1,116.5
	8-23-73	8.4	1,109.4
	8-30-73	11.0	1,106.8
Interval: 48-60	9-06-73	13.2	1,104.6
	9-13-73	15.2	1,102.6
Plattsmouth Limestone	9-20-73	17.0	1,100.8
	9-27-73	37.1[c]	1,080.7
	10-04-73	37.4[c]	1,080.4
	10-18-73	37.6[c]	1,080.2
	11-15-73	38.7[c]	1,079.1
	12-13-73	38.5[c]	1,079.3
	1-14-74	40.1	1,077.7
	2-14-74	40.3	1,077.5
	3-14-74	40.1	1,077.7
	4-19-74	40.1	1,077.7

TABLE 2.4-32 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
B-21, P-2 (cont'd)	5-16-74	40.1	1,077.7
	6-07-74	40.3	1,077.5
	7-18-74	Piezometer blocked	
B-21, P-3	8-10-73	11.4	1,106.4
	8-10-73	3.3[(a)]	1,114.5
	8-23-73	11.2	1,106.6
	8-30-73	11.3	1,106.5
Interval: 5-43	9-06-73	11.5	1,106.3
	9-13-73	11.1	1,106.7
	9-20-73	11.5	1,106.3
Jackson Park	9-27-73	11.2	1,106.6
Shale to	10-04-73	11.4	1,106.4
Heumader Shale	10-18-73	11.9	1,105.9
	11-15-73	11.8	1,106.0
	12-13-73	12.0	1,105.8
	1-14-74	12.6	1,105.2
	2-14-74	12.7	1,105.1
	3-14-74	12.6	1,105.2
	4-19-74	12.3	1,105.5
	5-16-74	11.6	1,106.2
	6-07-74	12.4	1,105.4
	7-18-74	11.6	1,106.2
	8-15-74	11.5	1,106.3
	9-12-74	11.6	1,106.2
	10-17-74	12.1	1,105.7
	11-14-74	12.6	1,105.2
	12-19-74	12.7	1,105.1
	1-15-75	13.2	1,104.6
	2-14-75	13.2	1,104.7
	3-12-75	13.0	1,104.8
	4-18-75	11.8	1,106.0
	5-21-75	12.0	1,105.8
	6-19-75	11.6	1,106.2
	9-15-75	11.7	1,106.1
	12-22-75	13.1	1,104.7
	3-25-76	13.8	1,104.0
	9-10-76	15.9	1,101.9
	12-14-76	17.2	1,100.6

TABLE 2.4-33 Sheet 1 of 15

PIEZOMETER WATER LEVEL READINGS - P - HS - ESW - LK - BORINGS

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-1, P-1	12-21-73	45.9	1,056.4
Interval: 66-82	1-30-74	47.0	1,055.3
(65-83)	2-14-74	48.1	1,054.2
	2-15-74	47.9	1,054.4
Toronto Limestone	2-20-74	47.5	1,054.8
	3-03-74	47.1	1,055.2
	4-22-74	48.3	1,054.0
	5-21-74	48.7	1,053.6
	6-25-74	49.0	1,053.3
	9-22-74	48.7	1,053.6
	10-29-74	48.6	1,053.7
	3-11-75	47.9	1,054.4
	4-11-75	48.3	1,054.0
P-1, P-2	12-21-73	6.0	1,096.3
Interval: 7-48	1-30-74	4.9	1,097.4
(2-50)	2-14-74	5.9	1,096.4
	2-15-74	5.3	1,097.0
Jackson Park Shale to	2-20-74	5.2	1,097.1
Plattsmouth Limestone	3-03-74	9.4	1,092.9
	4-22-74	4.4	1,097.9
	5-21-74	4.6	1,097.7
	6-25-74	4.9	1,097.4
	9-22-74	6.3	1,096.0
	10-29-74	6.6	1,095.7
	3-11-75	4.2	1,098.1
	4-11-75	3.9	1,098.4
P-3, P-1	12-21-73	5.1	1,108.1
		Piezometer damaged	
Interval: 71-89			
(70-90)			
Toronto Limestone			

Note: Effective interval given in parenthesis following slotted interval if intervals differ. Interval depths reported are to the nearest foot. Ground surface elevations are given on the logs of borings in Section 2.5.

TABLE 2.4-33 (continued) Sheet 2 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-3, P-2	12-21-73	Water frozen at ground surface	
Interval: 6-54 (4-56)	1-30-74	4.1	1,109.1
	2-14-74	8.1	1,105.1
	2-15-74	5.0	1,108.2
Jackson Park Shale to Plattsmouth Limestone	2-20-74	4.8	1,108.4
	3-03-74	4.7	1,108.5
	4-22-74	4.7	1,108.5
	5-21-74	5.2	1,108.0
	6-25-74	8.0	1,105.2
	9-22-74	6.9	1,106.3
	10-29-74	7.4	1,105.8
	3-11-75	4.8	1,108.4
	4-11-75	4.5	1,108.7
P-9, P-1	12-21-73	46.3	1,058.2
Interval: 69-80	1-30-74	47.9	1,056.6
	2-08-74	49.2	1,055.3
Toronto Limestone	2-15-74	48.8	1,055.7
	2-20-74	48.7	1,055.8
	4-22-74	49.6	1,054.9
	5-21-74	50.2	1,054.3
	6-25-74	50.5	1,054.0
	9-22-74	50.5	1,054.0
	10-29-74	50.7	1,053.8
	3-11-75	49.4	1,055.1
	4-11-75	49.8	1,054.7
P-9, P-2	12-21-73	20.2	1,084.3
Interval: 4-51	1-30-74	7.1	1,097.4
	2-08-74	7.2	1,097.3
Jackson Park Shale to Plattsmouth Limestone	2-14-74	6.9	1,097.6
	2-15-74	11.4	1,093.1
	2-20-74	8.8	1,095.7
	4-22-74	6.2	1,098.3
	5-21-74	6.2	1,098.3
	6-25-74	4.6	1,099.9
	9-22-74	5.0	1,099.5
	10-29-74	41.1	1,063.4

TABLE 2.4-33 (continued) Sheet 3 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-9, P-2 (cont'd)	3-11-75	5.0	1,099.5
	4-11-75	5.4	1,099.1
P-10A, P-1	12-21-73	44.1	1,064.3
Interval: 135-155	1-30-74	56.5	1,051.9
(134-155)	2-15-74	57.2	1,051.2
	2-20-74	57.4	1,051.0
Ireland Sandstone	3-03-74	59.2	1,049.2
	4-22-74	60.7	1,047.7
	5-21-74	59.1	1,049.3
	6-25-74	59.8	1,048.6
	9-22-74	60.0	1,048.4
	10-29-74	60.4	1,048.0
	3-11-75	59.6	1,048.8
	4-11-75	59.7	1,048.7
P-10A, P-2	12-21-73	47.6	1,060.8
Interval: 71-87	2-15-74	53.0	1,055.4
	2-20-74	52.5	1,055.9
Toronto Limestone	3-03-74	52.3	1,056.1
	4-22-74	53.6	1,054.8
	5-21-74	54.3	1,054.1
	6-25-74	54.9	1,053.5
	9-22-74	54.8	1,053.6
	10-29-74	54.6	1,053.8
	3-11-75	53.8	1,054.6
	4-11-75	54.1	1,054.3
P-10A, P-3	12-21-73	5.3	1,103.1
Interval: 4-52	1-30-74	5.0	1,103.4
	2-14-74	5.1	1,103.3
Jackson Park Shale to	2-15-74	9.5	1,098.9
Plattsmouth Limestone	2-20-74	7.4	1,101.0
	3-03-74	0.9	1,107.5
	4-22-74	3.7	1,104.7
	5-21-74	4.0	1,104.4
	6-25-74	3.9	1,104.5
	9-22-74	4.6	1,103.8
	10-29-74	4.9	1,103.5

TABLE 2.4-33 (continued) Sheet 4 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-10A, P-3 (cont'd)	3-11-75	3.5	1,004.9
	4-11-75	3.3	1,005.1
P-12, P-1	12-21-73	21.7	1,080.5
Interval: 67-83	1-30-74	55.9	1,046.3
	2-08-74	48.0	1,054.2
Toronto Limestone	2-14-74	47.1	1,055.1
	2-15-74	48.8	1,053.4
	2-20-74	53.0	1,049.2
	3-03-74	51.0	1,051.2
		Piezometer blocked	
P-12, P-2	12-21-73	8.0	1,094.2
Interval: 3-50	1-30-74	22.1	1,080.1
	2-14-74	8.0	1,094.2
Jackson Park Shale to	2-15-74	7.6	1,094.6
Plattsmouth Limestone	2-20-74	7.4	1,094.8
		Piezometer blocked	
	10-29-74	8.1	1,094.1
	3-11-75	7.1	1,095.1
	4-11-75	3.5	1,098.7
P-14, P-1	12-21-73	Piezometer blocked	
Interval: 66-83	2-15-74	49.6	1,054.3
(65-83)	2-20-74	51.6	1,052.3
	4-22-74	52.1	1,051.8
Toronto Limestone	5-21-74	52.6	1,051.3
	6-25-74	52.5	1,051.4
	9-22-74	52.6	1,051.3
	10-29-74	52.5	1,051.4
	3-11-75	51.7	1,052.2
	4-11-75	52.0	1,051.9
	4-21-78	48.5	1,055.4
	8-25-78	50.5	1,053.4
	4-03-79	48.4	1,055.5
	7-25-79	48.3	1,055.6
P-14, P-2	12-21-73	2.1	1,101.8
Interval: 4-49	1-30-74	0.8	1,103.1
(3-50)	2-14-74	2.0	1,101.9

TABLE 2.4-33 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-14, P-2 (cont'd)	2-15-74	2.0	1,101.9
	2-20-74	2.0	1,101.9
Jackson Park Shale to Plattsmouth Limestone	4-22-74	3.3	1,100.6
	5-21-74	1.8	1,102.1
	6-25-74	2.6	1,101.3
	9-22-74	4.0	1,099.9
	10-29-74	4.6	1,099.3
	3-11-75	0.9	1,103.0
	4-11-75	1.9	1,102.0
	4-21-78	5.8	1,098.1
	8-25-78	8.9	1,095.0
	4-03-79	5.9	1,098.0
	7-25-79	8.7	1,095.2
P-20, P-1	12-21-73	48.3	1,058.2
Interval: 71-84	2-08-74	50.8	1,055.7
(70-86)	2-14-74	50.5	1,056.0
	2-15-74	53.0	1,053.5
Toronto Limestone	2-20-74	50.4	1,056.1
	3-03-74	51.2	1,055.3
	4-22-74	51.5	1,055.0
	5-21-74	51.7	1,054.8
	9-22-74	52.0	1,054.5
	10-29-74	51.5	1,055.0
	3-11-75	51.3	1,055.2
	4-11-75	48.8	1,057.7
P-20, P-2	12-21-73	5.0	1,101.5
Interval: 4-50	2-08-74	4.5	1,102.0
(7-50)	2-14-74	9.7	1,096.8
	2-15-74	4.5	1,102.0
Jackson Park Shale to Plattsmouth Limestone	2-20-74	4.3	1,102.2
	3-03-74	4.4	1,102.1
	4-22-74	3.8	1,102.7
	5-21-74	3.8	1,102.7
	9-22-74	5.1	1,101.4
	10-29-74	6.7	1,099.8
	3-11-75	3.7	1,102.8
	4-11-75	3.2	1,103.3

TABLE 2.4-33 (continued) Sheet 6 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-32, P-1	12-21-73	45.2	1,056.0
Interval: 66-78	2-08-74	49.0	1,052.2
(65-78)	2-14-74	47.0	1,054.2
	2-15-74	48.9	1,052.3
Toronto Limestone	2-20-74	46.2	1,055.0
	3-03-74	46.8	1,054.4
	4-22-74	47.0	1,054.2
	5-21-74	47.7	1,053.5
	6-25-74	48.0	1,053.2
	9-22-74	47.6	1,053.6
	10-29-74	48.9	1,052.3
	3-11-75	46.5	1,054.7
	4-11-75	46.9	1,054.3
P-32, P-2	12-21-73	4.1	1,097.1
Interval: 4-51	2-08-74	3.9	1,097.3
	2-14-74	4.0	1,097.2
Jackson Park Shale to	2-15-74	3.8	1,097.4
Plattsmouth Limestone	2-20-74	3.6	1,097.6
	3-03-74	3.3	1,097.9
	4-22-74	3.1	1,098.1
	5-21-74	3.6	1,097.6
	6-25-74	4.3	1,096.9
	9-22-74	5.1	1,096.1
	10-29-74	6.1	1,095.1
	3-11-75	2.9	1,098.3
	4-11-75	2.9	1,098.3
P-36	5-13-74	41.5	1,065.6
	6-28-74	39.7	1,067.4
Interval: 44-47	7-01-74	43.7	1,063.4
(41-47)	7-08-74	43.3	1,063.8
	7-23-74	42.6	1,064.5
Plattsmouth Limestone	9-11-74	36.6	1,070.5
	9-19-74	36.8	1,070.3
	9-22-74	36.6	1,070.5
	9-25-74	37.5	1,069.6
	9-29-74	38.0	1,069.1
	10-03-74	38.0	1,069.1
	10-06-74	36.3	1,070.8
	10-29-74	36.8	1,070.3

TABLE 2.4-33 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-36 (cont'd)	3-11-75	32.3	1,074.8
	4-11-75	31.8	1,075.3
	5-21-75	30.8	1,076.3
	6-19-75	30.2	1,076.9
	7-17-75	30.2	1,076.9
	8-12-75	29.2	1,077.9
	9-15-75	28.8	1,078.3
	10-29-75	28.3	1,078.8
	11-12-75	28.2	1,078.9
	12-22-75	28.1	1,079.0
	1-14-76	27.7	1,079.4
	2-13-76	27.5	1,079.6
	3-25-76	27.3	1,079.8
	5-06-76	26.8	1,080.3
	9-10-76	29.2	1,077.9
	10-15-76	28.9	1,078.2
	11-19-76	28.5	1,078.6
	12-14-76	28.3	1,078.8
	1-26-77	28.2	1,078.9
	2-09-77	28.3	1,078.8
P-37	5-13-74	41.5	1,061.0
	6-28-74	37.5	1,065.0
	7-01-74	41.5	1,061.0
Interval: 47-49	7-08-74	40.9	1,061.6
(44-50)	7-23-74	40.2	1,062.3
Plattsmouth Limestone	9-11-74	33.8	1,068.7
	9-19-74	33.9	1,068.6
	9-22-74	33.8	1,068.7
	9-25-74	33.8	1,068.7
	9-29-74	34.9	1,067.6
	10-03-74	35.0	1,067.5
	10-06-74	34.5	1,068.0
	10-29-74	33.5	1,069.0
	3-11-75	28.4	1,074.1
	4-11-75	27.9	1,074.6
	5-21-75	26.9	1,075.6
	6-19-75	26.3	1,076.2
	7-17-75	26.3	1,076.2
	8-12-75	25.3	1,077.2
	9-15-75	24.9	1,077.6
	10-29-75	24.2	1,078.3
	11-12-75	24.2	1,078.3
	12-22-75	23.6	1,078.9

TABLE 2.4-33 (continued) Sheet 8 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
P-37 (cont'd)	1-14-76	23.4	1,079.1
	2-13-76	23.1	1,079.4
	3-25-76	22.9	1,079.6
	5-06-76	22.4	1,080.1
	9-10-76	24.4	1,078.1
	10-15-76	24.4	1,078.1
	11-19-76	24.0	1,078.5
	12-14-76	23.7	1,078.8
	1-26-77	23.6	1,078.9
	2-09-77	23.9	1,078.6
HS-1, P-1	1-30-74	13.2	1,056.3
	2-08-74	13.6	1,055.9
Interval: 30-37	3-08-74	14.5	1,055.0
Snyderville Shale to	4-22-74	15.8	1,053.7
Toronto Limestone	5-26-74	19.0	1,050.5
	10-29-74	17.9	1,051.6
	3-11-75	13.7	1,055.8
	4-11-75	15.5	1,053.8
HS-1, P-2	1-30-74	2.0	1,067.5
	2-08-74	2.6	1,066.9
Interval: 3-20	3-08-74	2.5	1,067.0
(7-20)	4-22-74	1.9	1,067.6
Overburden to	5-26-74	2.6	1,066.9
Plattsmouth Limestone	6-24-74	2.1	1,067.4
	10-29-74	5.2	1,064.3
	3-11-75	2.2	1,067.3
	4-11-75	2.2	1,067.3
HS-3	1-30-74	6.6	1,054.1
	2-08-74	7.3	1,053.4
Interval: 3-18	4-22-74	6.6	1,054.1
Plattsmouth Limestone to	5-26-74	6.6	1,054.1
Toronto Limestone	6-24-74	7.5	1,053.2
	10-29-74	7.2	1,053.5
	3-11-75	6.5	1,054.2
	4-06-75	6.8	1,053.9

TABLE 2.4-33 (continued) Sheet 9 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
HS-5, P-1	1-30-74	13.2	1,055.9
	2-08-74	13.1	1,056.0
Interval: 24-30	3-08-74	14.4	1,054.7
	4-22-74	15.3	1,053.8
Toronto Limestone	5-26-74	14.8	1,054.3
	6-24-74	15.7	1,053.4
	10-29-74	10.0	1,059.1
	3-11-75	14.7	1,054.4
	4-06-75	16.1	1,053.0
HS-5, P-2	1-30-74	9.3	1,059.8
	2-08-74	7.4	1,061.7
Interval: 5-10	3-08-74	7.7	1,061.4
(4-10)	4-22-74	7.4	1,061.7
Plattsmouth Limestone	5-26-74	7.2	1,061.9
	6-24-74	7.6	1,061.5
	10-29-74	9.0	1,060.1
	3-11-75	3.2	1,065.9
	4-06-75	5.8	1,063.3
	5-21-75	Piezometer damaged	
HS-8, P-1	1-30-74	12.0	1,058.5
	2-08-74	13.0	1,057.5
Interval: 31-40	3-08-74	13.0	1,057.5
	4-22-74	14.8	1,055.7
Toronto Limestone	5-26-74	16.5	1,054.0
	6-25-74	17.7	1,052.8
	10-29-74	15.8	1,054.7
	1-17-75	13.5	1,057.0
	3-11-75	11.8	1,058.7
	4-06-75	13.4	1,057.1
	5-21-75	18.3	1,052.2
HS-8, P-2	1-30-74	3.7	1,066.8
	2-08-74	4.5	1,066.0
Interval: 5-10	3-08-74	4.2	1,066.3
	4-22-74	5.0	1,065.5
Plattsmouth Limestone	5-26-74	5.2	1,065.3
	6-25-74	5.6	1,064.9
	10-29-74	7.8	1,062.7
	1-17-75	7.0	1,063.5
	3-11-75	3.4	1,067.1
	4-06-75	3.2	1,067.3
	5-21-75	6.7	1,063.8

TABLE 2.4-33 (continued)

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
HS-10, P-1	2-08-74	32.5	1,045.2
	3-08-74	28.6	1,049.1
Interval: 43-50	4-22-74	27.1	1,050.6
Toronto Limestone	5-23-74	27.1	1,050.6
	6-24-74	27.7	1,050.0
	10-29-74	30.5	1,047.2
	3-12-75	26.7	1,051.0
	4-06-75	26.5	1,051.2
	4-12-75	26.4	1,051.3
	5-21-75	29.2	1,048.1
HS-10, P-2	2-08-74	20.2	1,057.5
	3-08-74	24.5	1,053.2
Interval: 17-25	4-22-74	23.1	1,054.6
	5-23-74	22.4	1,055.3
Plattsmouth Limestone	6-24-74	22.1	1,055.6
	10-29-74	15.1	1,062.6
	3-12-75	15.1	1,062.6
	4-06-75	15.7	1,062.0
	4-12-75	15.8	1,061.9
	5-21-75	19.0	1,058.7
HS-20, P-1	2-08-74	Frozen	
	3-08-74	9.1	1,073.8
Interval: 35-43	4-22-74	10.4	1,072.5
	5-26-74	11.3	1,071.6
Toronto Limestone	6-25-74	7.0	1,075.9
	10-29-74	7.3	1,075.6
	3-11-75	Piezometer blocked	
HS-20, P-2	2-08-74	3.8	1,079.1
	3-08-74	2.7	1,080.2
Interval: 2-18	4-22-74	2.9	1,080.0
	5-26-74	2.8	1,080.1
Overburden to	6-25-74	2.7	1,080.2
Plattsmouth Limestone	10-29-74	2.8	1,080.1
	3-11-75	Piezometer blocked	

TABLE 2.4-33 (continued) Sheet 11 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
HS-29, P-1	2-15-74	41.5	1,049.9
	3-09-74	42.0	1,049.4
Interval: 61-67	4-22-74	41.1	1,050.3
(57-68)	5-27-74	39.9	1,051.5
	6-24-74	41.5	1,049.9
Toronto Limestone	10-29-74	Piezometer blocked	
	3-12-75	41.3	1,050.1
	4-06-75	41.2	1,050.2
	4-12-75	41.2	1,050.2
	6-19-75	40.6	1,050.8
	7-17-75	40.7	1,050.7
	8-12-75	40.7	1,050.7
	9-15-75	40.7	1,050.7
	10-29-75	41.1	1,050.3
	11-12-75	41.2	1,050.2
	12-22-75	46.6	1,044.8
	1-14-76	40.8	1,050.6
	2-13-76	41.5	1,049.9
	3-25-76	41.6	1,049.8
	5-06-76	41.1	1,050.3
	9-10-76	47.6	1,043.8
	10-15-76	43.1	1,048.3
	11-19-76	42.7	1,048.7
	12-14-76	42.9	1,048.5
	1-26-77	43.0	1,048.4
	2-09-77	43.2	1,048.2
HS-29, P-2	2-15-74	16.7	1,074.7
	3-09-74	16.3	1,075.1
Interval: 5-44	4-22-74	15.4	1,076.0
(4-44)	5-27-74	15.2	1,076.2
Overburden Heumader	6-24-74	14.9	1,076.5
Shale to Plattsmouth Limestone	10-29-74	18.6	1,072.8
	3-12-75	10.5	1,080.9
	4-06-75	10.4	1,081.0
	4-12-75	10.8	1,080.6
	6-19-75	10.1	1,081.3
	7-17-75	10.8	1,080.6
	8-12-75	13.9	1,077.5
	9-15-75	17.5	1,073.9

TABLE 2.4-33 (continued) Sheet 12 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
HS-29, P-2 (cont'd)	10-29-75	20.3	1,071.1
	11-12-75	21.1	1,070.3
	12-22-75	26.1	1,065.3
	1-14-76	29.1	1,062.3
	2-13-76	31.8	1,059.6
	3-25-76	35.6	1,055.8
	5-06-76	38.7	1,052.7
	9-10-76	46.2	1,045.2
	10-15-76	46.3	1,045.1
	11-19-76	46.5	1,044.9
	12-14-76	46.4	1,045.0
	1-26-77	Piezometer dry	
	2-09-77	Piezometer dry	
HSA-1, P-1	1-30-74	3.9	1,050.1
	2-08-74	5.0	1,049.0
Interval: 15-22	3-08-74	5.0	1,049.0
	4-22-74	4.6	1,049.4
Toronto Limestone	5-27-74	5.0	1,049.0
	6-24-74	5.4	1,048.6
	10-29-74	6.7	1,047.3
	3-11-75	Piezometer blocked	
HSA-1, P-2	1-30-74	5.3	1,048.7
	2-08-74	Piezometer blocked	
Interval: 3-12 Overburden			
ESW-10	9-29-74	36.1	1,059.3
Interval: 42-50	10-03-74	36.7	1,058.7
(41-50)	10-06-74	34.6	1,060.8
Plattsmouth Limestone	10-29-74	32.3	1,063.1
	3-12-75	22.2	1,073.2
	4-06-75	21.6	1,073.8
	4-12-75	21.5	1,073.9
	5-21-75	20.7	1,074.7
	6-19-75	20.2	1,075.2
	7-17-75	20.2	1,075.2
	8-12-75	19.7	1,075.7
	9-15-75	19.7	1,075.7

TABLE 2.4-33 (continued) Sheet 13 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
ESW-10 (cont'd)	10-29-75	19.9	1,075.5
	11-12-75	20.0	1,075.4
	12-22-75	20.3	1,075.1
	1-14-76	20.2	1,075.2
	2-13-76	20.2	1,075.2
	3-25-76	20.3	1,075.1
	5-06-76	19.8	1,075.6
	9-10-76	21.5	1,073.9
	10-15-76	22.0	1,073.4
	11-19-76	21.8	1,073.6
	12-14-76	21.9	1,073.5
	1-26-77	21.9	1,073.5
	2-09-77	22.2	1,073.2
ESW-23	9-29-74	Piezometer dry	
Interval: 36-44 (35-44)	10-29-74	43.5	1,049.3
Plattsmouth Limestone	2-20-75	43.3	1,049.5
	3-12-75	43.3	1,049.5
	4-06-75	43.2	1,049.6
	4-12-75	43.2	1,049.6
	5-21-75	34.5	1,058.3
	6-19-75	34.8	1,058.0
	7-17-75	34.8	1,058.0
	8-12-75	35.1	1,057.7
	9-15-75	Piezometer damaged	
LK-3, P-1	1-30-74	Piezometer dry	
Interval: 3.0-7.0	1-31-74	Piezometer dry	
Brown Silty Clay	2-09-74	Piezometer dry	
	4-13-74	Piezometer dry	
	5-22-74	Piezometer dry	
LK-3, P-2	1-30-74	49.4	1,043.1
Interval: 81.5-96.5	1-31-74	49.8	1,042.7
Toronto Limestone	2-09-74	49.3	1,043.2
	4-13-74	49.5	1,043.0
	5-22-74	44.1	1,048.4
	6-25-74	50.0	1,042.5
	10-29-74	50.9	1,041.6

TABLE 2.4-33 (continued) Sheet 14 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
LK-3C	2-09-74	1.7	1,073.1
Interval: 1.5-5.0	4-13-74	1.3	1,073.5
Brown Silty Clay	5-22-74	2.5	1,072.3
	6-25-74	3.3	1,071.5
	10-29-74	5.1	1,069.7
LK-3D	2-09-74	Ground surface	1,070.7
Interval: 10.5-14.0	4-13-74	Ground surface	1,070.7
Jackson Park Sandstone	5-22-74	1.5	1,069.2
	6-25-74	2.0	1,068.7
	10-29-74	3.3	1,067.4
LK-6A	1-30-74	1.3	1,056.0
Interval: 2.0-10.0	2-09-74	2.3	1,055.0
Plattsmouth Limestone	4-13-74	2.0	1,055.3
	5-21-74	2.7	1,054.6
	10-29-74	3.7	1,053.6
	4-15-77	1.6	1,055.7
	6-03-77	2.2	1,055.1
	8-19-77	3.1	1,054.2
	11-03-77	0.5	1,056.8
	4-21-78	1.5	1,055.8
	8-25-78	3.4	1,053.9
	4-03-79	1.4	1,055.9
	7-25-79	2.2	1,055.1
LK-7, P-1	1-28-74	3.0	1,050.0
Interval: 5.0-10.7	2-09-74	4.1	1,048.9
Toronto Limestone	4-13-74	5.2	1,047.8
	5-22-74	5.4	1,047.6
	10-30-74	7.7	1,045.3
LK-7, P-2	1-28-74	34.0	1,019.0
Interval: 33.0-91.7	2-09-74	34.1	1,018.9
Unnamed Lawrence	4-13-74	33.0	1,020.0
	5-21-74	37.5	1,015.5
	10-30-74	35.3	1,017.7
LK-8	1-30-74	8.7	1,015.0
Interval: 8.6-24.6	2-09-74	9.4	1,014.3
Silty Clay (Alluvium)	4-13-74	10.9	1,012.8
	5-21-74	11.5	1,012.2
	10-30-74	11.8	1,011.9

TABLE 2.4-33 (continued) Sheet 15 of 15

Boring/Piezometer	Date	Water Level Depth	Water Level Elevation
LK-9 Interval: 3.0-6.0 Brown Silty Clay	1-30-74	4.6	1,069.2
	2-09-74	5.4	1,068.4
	4-13-74	5.8	1,068.0
	5-22-74	5.8	1,068.0
	10-30-74	5.9	1,067.9
LK-10 Interval: 2.0-5.0 Silty Clay	4-13-74	2.4	1,095.2
	5-09-74	2.4	1,095.2
	5-22-74	2.4	1,095.2
	11-03-77	0.9	1,096.7
	4-21-78	1.7	1,095.9
	8-25-78	Piezometer dry	
	4-03-79	1.3	1,096.3

TABLE 2.4-34

PERMEABILITIES OF ROCK UNITS BY DEPTH (a,b)

Rock Units (c)	Permeability (cm/sec) 0 - 20 Feet: Weighted Average (e)	0 - 20 Feet: Range	Greater Than 20 Feet: Weighted Average (e)	Greater Than 20 Feet: Range
Alluvium	$3x10^{-5}$	$2x10^{-5}$ to $4x10^{-5}$	-- (d)	-- (d)
Doniphan Shale	-- (d)	--	$5x10^{-6}$	-- (d)
Spring Branch Limestone	$4x10^{-6}$	$3x10^{-7}$ to $7x10^{-5}$	-- (d)	-- (d)
Stull Shale	--	--	$2x10^{-6}$	$3x10^{-7}$ to $4x10^{-6}$
Clay Creek Limestone	--	--	--	--
Jackson Park Shale	$4x10^{-5}$	$5x10^{-7}$ to $5x10^{-5}$	$4x10^{-6}$	$9x10^{-7}$ to $1x10^{-5}$
Heumader Shale	$6x10^{-6}$	$3x10^{-7}$ to $3x10^{-5}$	$8x10^{-7}$	$5x10^{-7}$ to $8x10^{-6}$
Plattsmouth Limestone	$2x10^{-5}$	$4x10^{-6}$ to $2x10^{-4}$	$2x10^{-6}$	$1x10^{-7}$ to $3x10^{-5}$
Heebner Shale	$4x10^{-6}$	--	$1x10^{-6}$	Ø to $2x10^{-7}$
Leavenworth Limestone	$1x10^{-6}$	Ø to $4x10^{-6}$	$4x10^{-7}$	$2x10^{-7}$ to $4x10^{-7}$
Snyderville Shale	$1x10^{-6}$	Ø to $4x10^{-6}$	$6x10^{-7}$	Ø to $9x10^{-7}$
Toronto Limestone	$2x10^{-5}$	--	$1x10^{-6}$	Ø to $5x10^{-6}$
Unnamed Lawrence Shale	$2x10^{-5}$	Ø to $6x10^{-5}$	$2x10^{-6}$	Ø to $2x10^{-5}$
Amazonia Limestone	$2x10^{-5}$	--	$3x10^{-6}$	Ø to $3x10^{-5}$
Ireland Sandstone	-- (d)	-- (d)	$4x10^{-6}$	Ø to $2x10^{-5}$
Robbins Shale	-- (d)	-- (d)	$1x10^{-7}$	Ø to $1x10^{-7}$

[a] Typical permeabilities for units below the Robbins Shale are presented in Table 2.4-28.

[b] Numbers refer to the depths below ground surface for which the indicated permeability values are valid. Permeabilities were measured by field falling head permeameter tests and by water pressure tests.

[c] Lithologic descriptions are presented in Table 2.4-28.

[d] Unit not penetrated at this depth in the test borings.

[e] Weighted averages were calculated from permeability test data by summing over the thickness of each formation, the product of the permeability, and the thickness over which it was applicable. Then the sum was divided by the formation thickness.

Ø Represents "no take" during test.

TABLE 2.4-35

DETAILS OF TANKS POSTULATED TO RUPTURE IN ACCIDENT ANALYSIS FOR WOLF CREEK GENERATING STATION[a]

Location	Spent Resin Storage Tank (Primary)	Boron Recycle Holdup Tank (A OR B)	Refueling Water Storage Tank
Location	In Radwaste Building	In Radwaste Building	Outside; between Radwaste Building and the Turbine-Reactor Complex
Elevation of Bottom Slab (ft above msl)	1,071.5	1,071.5	1,095.0
Diameter (ft)	7.0	20.0	40.0
Filled Height (ft)	7.3	19.1	42.5
Volume of Liquid Contents (gal)	2,095.0	44,800	400,000
Volume of Liquid Contents (ml)	7.929×10^{6}	1.696×10^{8}	1.514×10^{9}
Curie Content for Radionuclides			

Radionuclide	Half-Life (days)	Spent Resin Storage Tank	Boron Recycle Holdup Tank	Refueling Water Storage Tank
H-3[b]	4,478.	Negligible	5.92×10^{2}	3.79×10^{3}
Mn-54	303.	2.91×10^{1}	1.12×10^{-3}	6.99×10^{-6}
Co-58	71.3	6.10×10^{2}	5.36×10^{-2}	3.36×10^{-4}
Co-60	1,924.9	2.56×10^{2}	7.37×10^{-3}	4.58×10^{-5}
Sr-89	52.0	9.80×10^{0}	9.67×10^{-3}	5.92×10^{-5}
Sr-90	10,263.5	1.35×10^{0}	3.08×10^{-4}	1.92×10^{-6}
Nb-95	35.2	3.00×10^{0}	1.75×10^{-4}	1.31×10^{-6}
Zr-95	65.0	2.12×10^{0}	1.99×10^{-4}	1.25×10^{-6}
I-131	8.07	1.17×10^{3}	3.99×10^{0}	2.34×10^{-2}
Cs-134	748.8	1.78×10^{3}	9.29×10^{0}	1.39×10^{-2}
Cs-137	11,099.9	1.48×10^{3}	6.75×10^{0}	1.01×10^{-2}
Ba-140	12.8	1.63×10^{0}	4.05×10^{-3}	2.56×10^{-5}

[a] From Standard Plant FSAR Table 11.1-6.

[b] Tritium inventories in the tanks are based on an assumed tritium concentration of 3.5 μCi/gm in the primary coolant which is applicable only for plants with maximum recycling. This compares with the value of 1 μCi/gm given by NUREG-0017 which is applicable for plants with moderate recycling. (See Chapter 11 of Standard Plant FSAR.)

TABLE 2.4-36

PARAMETER VALUES USED IN MODELING GROUND-WATER TRANSPORT OF RADIONUCLIDES FOLLOWING POSTULATED RUPTURE OF LIQUID RADWASTE TANKS AT WOLF CREEK GENERATING STATION

Origin	Spent Resin Storage Tank (Primary) or Boron Recycle Holdup Tank		Refueling Water Storage Tank	
Destination	Cooling Lake	Tributary to Wolf Creek	Cooling Lake	Tributary to Wolf Creek
Direction from origin	S30°E	S80°W	S30°E	S80°W
Distance (cm) along flow path to destination (discharge point)	19,507	74,676	23,470	80,772
Average hydraulic gradient, i	0.0195	0.0210	0.0162	0.0194
Horizontal permeability (cm/day), K_h	17.3	17.3	17.3	17.3
Total porosity, n	0.15	0.15	0.15	0.15
Effective porosity, n_e	0.12	0.12	0.12	0.12
Dispersion coefficients (cm^2/day)				
D_x	0.58	0.58	0.58	0.58
D_y	0.58	0.58	0.58	0.58
D_z	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$
Total concentration of cations in ground water (meq/ml), C_{Ca}	0.034	0.034	0.034	0.034
Cation exchange capacity (meq/g), Q	0.061	0.061	0.061	0.061
Equilibrium exchange constants, E				
Co-Ca	2.10	2.10	2.10	2.10
Sr-Ca	1.01	1.01	1.01	1.01
Cs-Ca	6.30	6.30	6.30	6.30
Initial dimensions of slug in formation (cm)				
x_o	375.3* (1042)	375.3* (1042)	2,878	2,878
y_o	375.3* (1042)	375.3* (1042)	2,878	2,878
z_o	375.3* (1042)	375.3* (1042)	1,219	1,219

*Dimensions in parentheses refer to the boron recycle holdup tank, while those without parentheses refer to the spent resin storage tank (Primary).

TABLE 2.4-37

RESULTS OF COMPUTER SIMULATION

A. POSTULATED RUPTURE OF THE SPENT RESIN STORAGE TANK (PRIMARY)

Radionuclide	At Nearest Point on the Cooling Lake		At Nearest Point On Tributary To Wolf Creek		Maximum Permissible Concentration In 10 CFR 20, Appendix B, Table II For Unrestricted Areas (μCi/ml)
	c_{max}[a]	t_{max}[b]	c_{max}[a]	t_{max}[b]	
H-3[e]	--[d]	--[d]	--[d]	--[d]	1×10^{-3}
Mn-54	4.4×10^{-7}	6.93×10^{3}	6.2×10^{-25}	2.47×10^{4}	1×10^{-4}
Co-58[c]	$< 10^{-50}$	4.1×10^{5}	$< 10^{-50}$	1.4×10^{6}	1×10^{-4}
Co-60[c]	$< 10^{-50}$	3.96×10^{5}	$< 10^{-50}$	1.41×10^{6}	5×10^{-5}
Sr-89[c]	$< 10^{-50}$	2.0×10^{5}	$< 10^{-50}$	7.0×10^{5}	3×10^{-6}
Sr-90[c]	2.9×10^{-7}	1.95×10^{5}	3.6×10^{-22}	6.95×10^{5}	3×10^{-7}
Nb-95	$< 10^{-50}$	6.88×10^{3}	$< 10^{-50}$	2.46×10^{4}	1×10^{-4}
Zr-95	2.3×10^{-33}	6.90×10^{3}	$< 10^{-50}$	2.46×10^{4}	6×10^{-5}
I-131	$< 10^{-50}$	6.80×10^{3}	$< 10^{-50}$	2.5×10^{4}	3×10^{-7}
Cs-134[c]	$< 10^{-50}$	1.2×10^{6}	$< 10^{-50}$	4.3×10^{6}	9×10^{-6}
Cs-137[c]	1.6×10^{-30}	1.18×10^{6}	$< 10^{-50}$	4.20×10^{6}	2×10^{-5}
Ba-140	$< 10^{-50}$	6.83×10^{3}	$< 10^{-50}$	2.5×10^{4}	3×10^{-5}

[a] c_{max} = peak concentration in μCi/ml at specified discharge point.

[B] t_{max} = time of peak concentration, in days after occurrence of postulated rupture.

[C] Cation exchange hold-back included in simulation.

[D] Present in tank only in negligible amounts.

[E] Tritium concentrations at tanks are based on an assumed tritium concentration of 3.5 μCi/gm in the primary coolant which is applicable only for plants with maximum recycling; this compares with the value of 1 μCi/gm for tritium in the reactor coolant given by NUREG-0017 applicable for plants with moderate recycling. (See Chapter 11 of Standard Plant FSAR.)

TABLE 2.4-37
(sheet 2)

B. POSTULATED RUPTURE OF THE BORON RECYCLE HOLDUP TANK (A OR B)

Radionuclide	At Nearest Point on the Cooling Lake		At Nearest Point On Tributary To Wolf Creek		Maximum Permissible Concentration In 10 CFR 20, Appendix B, Table II For Unrestricted Areas (μCi/ml)
	c_{max}[a]	t_{max}[b]	c_{max}[a]	t_{max}[b]	
H-3[e]	1.21×10^{-0}	6.85×10^{3}	7.7×10^{-2}	2.46×10^{4}	1×10^{-3}
Mn-54	1.1×10^{-12}	6.81×10^{3}	2.4×10^{-30}	2.46×10^{4}	1×10^{-4}
Co-58[c]	$< 10^{-50}$	4.1×10^{5}	$< 10^{-50}$	1.4×10^{6}	1×10^{-4}
Co-60[c]	$< 10^{-50}$	3.90×10^{5}	$< 10^{-50}$	1.41×10^{6}	5×10^{-5}
Sr-89[c]	$< 10^{-50}$	2.0×10^{5}	$< 10^{-50}$	7.0×10^{5}	3×10^{-6}
Sr-90[c]	4.1×10^{-12}	1.92×10^{5}	7.8×10^{-27}	6.93×10^{5}	3×10^{-7}
Nb-95	$< 10^{-50}$	6.76×10^{3}	$< 10^{-50}$	2.45×10^{4}	1×10^{-4}
Zr-95	3.8×10^{-38}	6.79×10^{3}	$< 10^{-50}$	2.45×10^{4}	6×10^{-5}
I-131	$< 10^{-50}$	6.67×10^{3}	$< 10^{-50}$	2.5×10^{4}	3×10^{-7}
Cs-134[c]	$< 10^{-50}$	1.2×10^{6}	$< 10^{-50}$	4.3×10^{6}	9×10^{-6}
Cs-137[c]	1.3×10^{-33}	1.16×10^{6}	$< 10^{-50}$	4.19×10^{6}	2×10^{-5}
Ba-140	$< 10^{-50}$	6.9×10^{3}	$< 10^{-50}$	2.5×10^{4}	3×10^{-5}

C. POSTULATED RUPTURE OF THE REFUELING WATER STORAGE TANK

H-3[e]	5.7×10^{-1}	9.56×10^{3}	3.0×10^{-2}	2.85×10^{3}	1×10^{-3}
Co-60[c]	$< 10^{-50}$	5.42×10^{5}	$< 10^{-50}$	1.63×10^{6}	5×10^{-5}
Sr-90[c]	1.6×10^{-17}	2.68×10^{5}	3.3×10^{-33}	8.04×10^{5}	3×10^{-7}
Cs-137[c]	7.8×10^{-50}	1.61×10^{6}	$< 10^{-50}$	4.84×10^{6}	2×10^{-5}

TABLE 2.4-38

TEST BORING PIEZOMETERS IN COOLING LAKE AREA WHICH REQUIRE SEALING

Boring* Number	Number of Piezometers Installed	Surface Elevation (feet, mean sea level)	Date Sealed
B-4	4	1098.5	03-01-77
B-5	3	1093.9	03-01-77
B-8	3	1067.6	11-11-77
B-9	3	1078.0	03-01-77
B-10	2	1086.8	--
B-12	3	1088.5	11-11-77
B-15	3	1088.0	11-22-77
B-18	3	1062.1	11-20-77
HS-1	2	1069.5	11-17-77
HS-3	1	1060.7	11-17-77
HS-5	2	1069.1	11-16-77
HS-8	2	1070.6	11-17-77
HS-10	2	1077.6	01-06-77
HS-20	2	1082.9	--
HS-29	2	1091.4	03-01-77
HSA-1	2	1054.0	11-17-77
ESW-10	1	1095.4	03-01-77
ESW-23	1	1092.8	10-25-77
CWP-1	1	1090.8	01-05-78
CWD-3	1	1087.6	03-01-77
CW-3	1	1097.8	--
LK-3 (SP)	1	1092.2	01-05-78
LK-3	3	1092.5	11-16-77
LK-3C	1	1074.9	11-16-77
LK-3D	1	1070.1	11-16-77
LK-7	2	1053.0	01-06-78
LK-8	1	1023.8	11-22-77
LK-9	1	1073.7	11-22-77

* Locations of B-series borings shown on Figure 2.4-54. Locations of HS- and ESW-series borings shown on Figure 2.4-55. Locations of CW- and LK-series borings which require sealing shown on Figure 2.4-61.

Table 2.4-39 is superseded by Table 2.4-29b

TABLE 2.4-40

SUMMARY OF FIELD, WATER PRESSURE TEST RESULTS, ULTIMATE HEAT SINK

MEMBER	AVERAGE[2] PERMEABILITY (cm/sec)	PERMEABILITY RANGE (cm/sec)	NO. TESTS	NO. OF[1] NO TAKES
Heumader Shale	3.0×10^{-6}	Φ to 6.0×10^{-6}	8	6
Plattsmouth Limestone	4.0×10^{-6}	Φ to 14.0×10^{-6}	26	15
Heebner Shale	9.0×10^{-6}	Φ to 29.0×10^{-6}	29	16
Leavenworth Limestone	7.0×10^{-6}	Φ to 36.0×10^{-6}	29	13
Snyderville Shale	9.0×10^{-6}	Φ to 48.0×10^{-6}	36	17
Toronto Limestone	20.0×10^{-6}	Φ to 100.0×10^{-6}	22	6

(1) Φ = "No take" recorded, i.e. no measured flow into test zone.

(2) 1.0×10^{-8} cm/sec assumed for "no take" records when computing averages.

WOLF CREEK

TABLE 2.4-41

DESIGN GROUND SNOW LOAD

	100-Year Recurrence Snowpack Load Psf	PMP (Winter) Snow Load with 100-Year Recurrence Snowpack psf
Standard plant facilities	91[1]	153
Safety-related site facilities	24	153

(1) The 91 psf load is based on data from the Sterling site and has been retained, even though the Sterling unit has been cancelled.

2.5 GEOLOGY AND SEISMOLOGY

This section provides detailed information on the geological and seismological characteristics of the plant. This section also provides the methods, criteria, and findings of the investigations. Based on the results of those investigations, it is concluded that there are no geological, seismological or foundation support conditions that adversely affect the design, construction and operation of Wolf Creek Generating Station (WCGS).

The final geological and seismological design of the Wolf Creek power block structures, systems and components is based on three sites (Callaway, Wolf Creek and Sterling) to ensure conservatism in the seismic design envelope. Certain items, whose final design was completed prior to the cancellation of Tyrone (the fourth SNUPPS site), are within the envelope for the four original sites.

The Wolf Creek Generating Station site is located in Coffey County, Kansas, approximately 3.5 miles northeast of Burlington, Kansas (Figure 2.5-1). The site is located within the Central Stable Region of the North American Continent. This region was subjected to deformation which resulted in the formation of arches and basins during Mesozoic and Paleozoic time. These of broadscale basins and arches were modified locally by folding and faulting. During geotechnical investigations of the site and surrounding region, no major faults were identified within 15 miles of the site. Shear zones, faults, and folds within the Pennsylvanian age strata are overlain by undeformed Pennsylvanian shale, undeformed sandstone, or gentle anticlinal folds in the overlying material. As these faults are either underlain or overlain by undeformed Pennsylvanian rock, deformation occurred more than 280 million years before the present. These faults can be defined as noncapable according to Appendix A to 10 CFR 100.

The surface bedrock in the site area consists of alternating layers of Pennsylvanian age shales, limestones, sandstones, and a few thin coal seams. These bedrock units dip gently to the west and northwest and have been folded locally into small-scale plunging anticlines and synclines. At the site, the Precambrian surface is at a depth of approximately 2,750 feet. The undifferentiated, clastic/"granite wash" sequence may exceed 1,000 feet in thickness, and appears to rest on a granitic basement complex.

The site area has been submaturely to maturely dissected by the Neosho River and its tributaries to form flat to gently rolling uplands with a maximum topographic gradient of approximately 80 feet per mile from the uplands to the valley floors. Residual soils ranging in thickness from 0 to 16 feet have been developed on the Pennsylvanian strata. Quaternary alluvium, which reaches a thickness of approximately 25 feet, is present in the tributary

valleys, and scattered Teritary age deposits of clayey gravel cap some of the higher hills in the site area. Glaciation during Pleistocene time terminated to the north of the site area; therefore, glacial deposits are not present at the site.

The plant site is located in a relatively seismically stable region of the central United States. No earthquake epicenter has been reported closer than 40 miles to the site, and the nearest shocks have had epicentral intensities no greater than Modified Mercalli Intensity (MMI) III. At distances of about 90 miles from the site, two earthquakes of MMI VII have been recorded. Since 1800, only eight earthquakes of MMI V or greater have occurred within 100 miles of the site, and 16 events of MMI VI or greater have been recorded within 200 miles. Recorded earthquakes have not generated intensities greater than VI at the site. None of the buildings in the vicinity of the site have sustained any known structural damage due to earthquakes, nor is there any geological evidence of major ground motion.

Both an Operating Basis Earthquake (OBE), corresponding to horizontal acceleration of 6 percent of gravity, and a Safe Shutdown Earthquake (SSE) of 12 percent of gravity at the site have been selected as design criteria for the facilities. The specified SSE is derived from consideration of the possible effects of an MMI VII event occurring along the trend of the eastern margin of the Nemaha Anticline (the Humboldt fault zone which is 50 miles to the west at its closest approach to the site); an MMI VIII earthquake at the nearest approach of the seismogenic region associated with the western flank of the Nemaha Anticline; a recurrence of the New Madrid earthquakes of 1811-1812; and a random MMI VII event occurring near the site. However, a seismic evaluation of the WCGS structures using the Lawrence Livermore Laboratories spectrum is contained in Appendix 3C. This spectrum is enveloped by a Regulatory Guide 1.60 spectrum anchored at 0.15g.

The results of comprehensive geotechnical investigations at the site demonstrate that competent foundation materials are present for establishing conservative design and construction criteria for support of the Category I facilities (Figure 2.5-2). Major Category I structures are supported on competent rock. Only minor, localized modification of foundation materials is required to provide uniform support of structures. There are no geologic features at or near the site which would preclude its use for the construction and operation of the nuclear power station.

Geologic investigations to determine site characteristics included a review of published and unpublished data; discussions with individuals, agencies, and companies; field reconnaissance and

detailed investigations, including aerial photographic interpretation, drilling and sampling, and surface and borehold geophysics; geological mapping of excavation surfaces; and laboratory testing of soils, rock, and water samples. The firms that performed the following investigations and services are listed below:

INVESTIGATION OR SERVICE	PERFORMED BY
Geologic Literature Review	Dames & Moore
Geological Investigation, Mapping and Aerial Photo Interpretation	Dames & Moore
Soil Survey	Soil Conservation Service
Drilling	Hemphill Drilling Company and Raymond International, Inc.
Boring Supervision	Dames & Moore
Geophysical Exploration	Dames & Moore Birdwell Division of Seismograph Service Corporation
Laboratory Testing	Dames & Moore Geotesting Inc. Dr. Marshal Silver Dr. F. Michael Wahl Walter H. Flood & Company
Foundation Engineering	Dames & Moore
Slope Stability	Sargent & Lundy
Vibratory Ground Motion	Dames & Moore
Surface Faulting	Dames & Moore
Stability of Subsurface Materials	Dames & Moore
Construction Surveillance	Dames & Moore
Test Blasting and Blast Vibration Monitoring	Dames & Moore

Since 1975, additional investigations of the cooling lake, dam, and dike areas included:

1. Vertical exploratory test borings drilled with a boring spacing that provided, along with other tests that were conducted, sufficient detail of subsurface materials to insure that no unexpected conditions would be encountered during construction. Rock samples were obtained using NX wireline core barrels, which provide rock core approximately 1-7/8 inches in diameter. Undisturbed soil samples were obtained using a 3-1/2 inch outside diameter by 2-3/8 inch inside diameter Dennison sampler. Relatively undisturbed samples were obtained using a Dames & Moore sampler. This sampler obtains samples approximately 2-1/2 inches in diameter. Disturbed samples were obtained using the Standard Penetration Test procedures;

2. Water-pressure testing to evaluate rock quality and to provide permeability data;

3. Piezometers to monitor ground-water conditions and to provide ground-water data;

4. Permeameter tests to obtain additional ground-water parameters;

5. Representative rock core and soil sample testing to evaluate the physical characteristics of the soil and rock. The samples were analyzed as soon as possible after collection. The testing program included the following:

    a. Unconfined compression;

    b. Unconsolidated-undrained triaxial compression;

    c. Consolidated-undrained triaxial compression;

    d. Dynamic triaxial;

    e. Resonant column;

    f. Particle size analysis;

    g. Atterberg limits;

    h. Moisture and density determinations;

    i. Compaction;

j. Consolidation;

k. Shrink-swell of solids;

l. Permeability; and

m. Dispersive soil tests.

These investigations provided the basic data for assessing the response of the soil and geologic materials to the construction and operation of the facilities. Most on-site post-PSAR geotechnical investigations were completed during 1976 (see USAR Section 2.5.1.2.2 and References 58 thru 68).

Geologic mapping of excavation surfaces was started in April 1977 and completed during November 1980. Results were presented in interim reports that also included discussions of investigations concerning site faulting and folding. Relevant data were incorporated into USAR Section 2.5.1.2 (Reference 70).

During 1979, the Wolf Creek Generating Station PSAR and question responses, supplemented with post-PSAR site investigations and other studies, were synthesized into Section 2.5 of the FSAR document. The additional studies included the following:

1. USAR Section 2.5.1.1 - Regional Geology: Information on regional geology, tectonics, and oil and gas exploration wells was updated. State geological surveys were contacted and a literature search, which had been on-going since 1975, was continued to determine if any studies relevant to the site had been conducted. Much of the recently published data has been the product of the NRC-funded Nemaha Uplift Seismotectonic Study Group. These data are presented in USAR Section 2.5.1.1.

2. USAR Section 2.5.1.2 - Site Geology: Information on site geology obtained since 1975 during site geotechnical investigations, excavation surface mapping, interviews, and literature review was incorporated into USAR Section 2.5.1.2. Information on site stratigraphy, faulting and folding, and engineering geology was updated. Geological maps and structure contour maps were modified to incorporate mapping and boring data obtained since 1975.

3. USAR Section 2.5.2 - Vibratory Ground Motion: This section was updated to include data on seismicity, seismology, and regional tectonics published since 1975. These revisions incorporate a discussion of data obtained from the microearthquake network operated by the Kansas Geological Survey.

4. USAR Section 2.5.3 - Surface Faulting: Section 2.5.3 of the PSAR was updated to incorporate the results of investigations concerning penecontemporaneous deformation mapped at the site.

In June 1981, the following additional information was synthesized in order to update Section 2.5:

1. FSAR Section 2.5.1.1.5.1.17 - Geophysical Anomalies and Structures - was updated to include a discussion on the origin of circular positive aeromagnetic anomalies in the Forest City Basin;

2. The LANDSAT lineament map of eastern Kansas was compared with both aeromagnetic and Precambrian surface maps for the area. The results of this investigation are contained in FSAR Section 2.5.1.1.5.1.18 - LANDSAT Lineaments;

3. Information concerning hydrocarbon exploration wells was updated to May 11, 1981; and

4. Frank Wilson, Senior Geologist of the Kansas Geological Survey, and Dr. Otto Nuttli of St. Louis University were contacted in order to address informal questions from the NRC staff.

2.5.1 BASIC GEOLOGIC AND SEISMIC INFORMATION

2.5.1.1 Regional Geology

2.5.1.1.1 Regional Physiography

The regional study area is composed of two major physiographic divisions, the Interior Plains Physiographic Division and the Interior Highland Physiographic Division (Figure 2.5-3). The Interior Plains constitutes the major part of central United States and is characterized by moderate to low relief. The Interior Highland Physiographic Division is characterized by submaturely to maturely dissected hills, plateaus, and second-cycle mountains with moderate to high relief (References 93 and 227, p. 276).

2.5.1.1.1.1 Interior Plains Physiographic Division

Most of the regional area is situated within the Interior Plains Physiographic Division. Within the regional study area, two provinces are recognized: the Central Lowlands Province, which

consists of low relief plains with youthful to mature dissection, and the Great Plains Province, which is characterized by submaturely to maturely dissected plains and plateaus of low to moderate relief.

The Central Lowlands Province is subdivided into the Osage Plains Section, the Dissected Till Plains Section, and the Arkansas River Lowlands Section. The site is located in the Osage Plains Section which is characterized by relatively low relief, gently dipping rock strata and east-facing escarpments. The major rivers in the Osage Plains Section are entrenched and drain from the northwest to the southeast. Bedrock is at or near the earth's surface. The Dissected Till Plains Section is characterized by dissected till plains which have been blanketed with loess. Scattered bedrock outcrops are also present. The Arkansas River Lowland Section contains low relief floodplain deposits consisting of gravels, silts, and clays.

In the study area, the Great Plains Province is represented by the High Plains and the Dissected High Plains Sections. The High Plains are developed on Pliocene and Pleistocene deposits which are largely unconsolidated material and make up a great wedge of silts, clays, and gravel in western Kansas. The High Plains Section is divided by the Arkansas River Lowlands Section of the Central Lowlands Province. The Dissected High Plains generally consist of maturely dissected plains and plateaus which have been eroded from Cretaceous deposits. The eastern and western boundaries of this section roughly delineate the band of Cretaceous outcrops in Kansas.

2.5.1.1.1.2 The Interior Highlands Physiographic Division

Two provinces of the Interior Highlands Division are also included within the regional study area; the Ozark Plateau Province and the Ouachita Province. Within the study area, the Ozark Plateau Province is subdivided into the Springfield-Salem Plateau Section, which is characterized by maturely developed karst topography, and the Boston Mountains Section, a series of submaturely to maturely dissected hills and second-cycle mountains with moderate to high relief. The Arkansas Valley Section is the only subdivision of the Ouachita Province present within the regional area. It is characterized by broad, flat-lying floodplain areas.

2.5.1.1.2 Regional Geologic Setting

The region surrounding the site lies within the Central Stable Region of the North American Continent (Figure 2.5-4) (Reference 137). This province is a tectonically stable area characterized by gently dipping sedimentary rock of Mesozoic and Paleozoic age that overlies a basement complex of Precambrian igneous and meta-

morphic rocks. Scattered surficial deposits of Tertiary and Quaternary age are present throughout the region. The distribution of the geologic units is shown on Figure 2.5-5; generalized west-to-east and south-to-north geologic cross sections are shown on Figure 2.5-6; a structural contour and lithologic map of the Precambrian surface is shown on Figure 2.5-7; a Bouguer gravity anomaly map of the regional area is presented on Figure 2.5-8; and an aeromagnetic map of eastern Kansas is Presented on Figure 2.5-9.

Most of the regional area is located within the Central Lowland Province of the Interior Plains Physiographic Division (Figure 2.5-3) (References 93 and 227, p. 276) and is characterized by low to moderate relief with submature to mature stream dissection.

Quaternary deposits are Pleistocene in age and include glacial, lacustrine, fluvial, and aeolian deposits. Glacial deposits are present only in the northern part of the regional area and were not deposited at the plant site. Quaternary alluvium is found in the valleys of the major drainages within the study area.

Tertiary deposits in the study area consist of the widely scattered erosional remnants of an alluvial plain that extended eastward from the Rocky Mountains during Late Tertiary time. West of the site area, arkosic material derived from the Rocky Mountains interfingers with chert gravels derived from the western Osage Plains (Figure 2.5-3). In the site area, Tertiary deposits are largely accumulations of chert gravel. These deposits occur as dissected terraces, 100 to 200 feet higher than the present major streams (Reference 286).

The Paleozoic bedrock deposits dip very gently to the west within the study area. Erosion has truncated many of these units, and surface rocks become progressively older from west to east across the regional area (Figure 2.5-5). The bedrock strata have been structurally modified by gentle arching and downwarping to form broad domes and basins.

The Precambrian basement in the regional area mainly consists of granitic rocks, silicic volcanics, metamorphic rocks, mafic intrusives, clastic sediments and granite wash. In eastern Kansas, the extent and thickness of undifferentiated clastics, metasediments, and granite wash, which may range in age from Precambrian to Cambrian, has not been determined. The Precambrian surface dips gently to the west across the regional area, but the relief on this surface locally may exceed 500 feet per mile, as it does in the area of the Nemaha Anticline. Reference 45 indicates that the Precambrian surface occurs approximately 2,750 feet beneath the site. Rock below this depth appears to consist of coarse to medium clastic sediments of undetermined thickness (Figure 2.5-

7). The underlying Precambrian crystalline complex is thought to consist of granitic rock (see USAR Sections 2.5.1.1.3.1 and 2.5.1.1). The Precambrian rocks are overlain by younger sedimentary formations which range in age from Cambrian to Pennsylvanian.

The Bouguer Gravity Anomaly Map indicates a gravity high parallel to the axis of the Nemaha Anticline (Figure 2.5-8). This gravity high is an extension of the midcontinent gravity high (Figure 2.5-10, Reference 136). The gravity anomaly is west of the axis of the anticline, suggesting structural control of intrusion along former fracture lines (Reference 277, p. 102). There is evidence of westward dipping reverse faulting along the east flank of this structure (Reference 174, p. 222).

The epicenters of the most significant earthquakes in Kansas appear to be located west of the axis of the Nemaha Anticline. The Kansas Geological Survey has relocated one epicenter to the eastern flank of the Nemaha, but this location is questionable and depends on interpretation of available data. These earthquakes are apparently associated with deep-seated adjustments along fracture zones related to the inferred fault contact between the Central North American Rift System (Midcontinent Geophysical Anomaly) and the western margin of the Nemaha Uplift.

Recent investigations, however, indicate that some microseismicity in northern Kansas appears to be associated with the discontinuous Humboldt fault zone on the eastern margin of the Nemaha Anticline (Reference 272, p. 7, 55; and 249, p. 134-135). At the present time, there is no evidence in the region that any faults should be considered capable.

2.5.1.1.3 Regional Geologic History

The discussion of regional geologic history of the study area is based on a review of published information. All eras of geologic time are represented by strata, but many systems were either not entirely deposited or were removed to some extent by erosion; therefore, many periods are not completely represented. The incompleteness of the time record makes it necessary to assign many of the geologic events to time intervals rather than to a more specific time. The interpretation of the pre-Lower Pennsylvanian geologic history is based on subsurface data, which is sparse in some areas. The interpretation of the post-Lower Pennsylvanian geologic history is based on both borehole data and on surface exposures. Post-Pennsylvanian, pre-Quaternary history in the eastern portion of the area can only be inferred because rocks of this age are missing.

Graphic representation of the evolution of the structural features within the regional area is shown on Figure 2.5-11; the locations of most of these features are shown on Figure 2.5-4; and the stratigraphic units are shown on Figure 2.5-12.

2.5.1.1.3.1 Precambrian Era

Knowledge of the Precambrian within the regional area is based on the interpretation of scattered borehole, geophysical, and geochronologic data. The Precambrian crystalline basement consists of igneous and metamorphic rocks (Figure 2.5-7). Precambrian sediments and mafic igneous rocks occur in an area west of the Nemaha Anticline. The igneous rocks and at least some of these sediments are related to the Central North American Rift System (USAR Section 2.5.1.1.5.1.17). The lithologic nature of the Precambrian surface is still open to debate due to the scarcity of deep well data in many areas (Figure 2.5-7). Based on available data, one interpretation indicates that a sequence, which may exceed 1,000 feet in thickness, of undifferentiated Cambrian to Precambrian clastic sediments, metasediments, igneous and metamorphic rock fragments, and "granite wash" may overlie the crystalline basement complex in a wide band that may extend from Missouri through Kansas into Nebraska (Reference 174, p. 158-169). An alternate interpretation of basement lithology does not show the wide band of Precambrian sediments crossing eastern Kansas, but does show several isolated areas containing metasedimentary rocks (Reference 14 and 272, p. 10).

According to Reference 14, the crystalline basement complex north and west of the site consists of granitic rocks which range in composition from granite to quartz monzonite and which were emplaced at medium crustal levels (mesozonal). These rocks appear to range in age from 1,750 to 1,450 million years before present (m.y.) (Reference 14). The crystalline basement south of the site appears to consist of granitic plutons which were emplaced at shallow crustal levels (epizonal) and associated felsic or silicic volanics with an average age of 1,380 m.y. for this terrain (Reference 14). Granites and felsic volcanics of approximately the same age occur in the basement in northeastern Oklahoma and Missouri (References 14 and 158, Plate 1).

During the Precambrian, the regional study area was a site of deformation, metamorphism, and igneous intrusion about 1,750 to 1,500 m.y. This event appears to coincide with the Penokean Orogeny [1,800 to 1,600 m.y. (Reference 88, Plate 1)]. Southern portions of the regional study area were affected by shallow granitic intrusions and volcanic activity at about 1,380 m.y., although radiometric age dates from Oklahoma indicate a period of thermal activity about 1,200 m.y. (Reference 14 and 158, p. 13). This thermal activity may be related to the Mazatzl Orogeny dated about 1,450 to 1,250 m.y. (Reference 88, Plate 1).

Crustal uplift and erosion was followed by a tectonic event approximately 1,100 m.y. ago that crosscut older terrain. This younger event consisted of faulting, igneous activity and sedimentation along the Central North American Rift System (CNARS) (Figures 2.5-4, 2.5-13 and 2.5-14; USAR Sections 2.5.1.1.4.1 and Nemaha Anticline, initial uplift of this structure may have occurred during the Precambrian and may be related to formation of the CNARS (USAR Section 2.5.1.1.5.1.9).

During Precambrian time, the Central Kansas Uplift (Figure 2.5-4) may have experienced some relative elevation (Figure 2.5-11).

The configuration of the present Precambrian surface is one considerable relief in Kanss (Figure 2.5-7) and in Nebraska (Reference Burchett, 1978, Figure 2). This relief was produced during the Late Precambrian, pre-Paleozoic time interval which represents a major unconformity in the geologic history of the regional area.

During that time, weathering of the granitic basement surface began to produce an arkosic, detrital rock and sediment that may range in age from Precambrian to Middle Pennsylvanian. This material is commonly called "granite wash" in drillers' logs. Arkosic rocks within the band of Precambrian sedimentary rocks have also been described as granite wash. In Kansas, there is no record of Paleozoic deposition until Upper Cambrian time, and locally, the Precambrian may be directly overlain by deposits ranging in age from Cambrian to Pennsylvanian (Reference 124).

2.5.1.1.3.2 Paleozoic Era

Crustal movements within the regional area during Paleozoic time resulted in the formation of broad basins and arches or domes. Some of these major crustal structures may have formed in response to basement tectonics (see USAR Sections 2.5.1.1.5.1.9 and 2.5.2.2). These crustal movements resulted in intermittent emergence and submergence of the land surface. Consequently, a series of marine sedimentary rocks with occasional interbedded nonmarine deposits are preserved within the region. The emergence of the land masses resulted in periods of erosion that are represented by unconformities within the stratigraphic section.

A discussion of the Paleozoic history from Cambrian through Permian time is presented below.

2.5.1.1.3.2.1 Cambrian Period

No Early or Middle Cambrian age rocks have been reported in the midcontinent. The Late Cambrian is represented by a marine sedimentary sequence of a basal arkosic sandstone overlain by beds of dolomite deposited in an epicontinental sea environment.

There is widespread evidence of crustal instability during this period and extending into the Early Ordovician (Figure 2.5-11). The structural activity consisted of downward movement along the Nemaha Anticline, the Hugoton Embayment, and the Anadarko Basin; upward movement along the Ozark Dome and in the area of the North Kansas Basin (the southeast Nebraska Arch, (Reference 123); and a downward tilting of the Central Kansas Uplift to the southeast, the Chautauqua Arch to the southeast, the Forest City basins to the southeast, the Salina Basin to the southwest, and the Sedgwick Basin to the south.

The downward movement of the Hugoton Embayment began in Cambrian time and continued intermittently through the Middle Permian. The southward tilting of the Sedgwick Basin also began in Cambrian time and continued intermittently through Middle Permian time, although the structure was relatively stable at the end of the Early Ordovician and the Mississippian.

The crustal instability that occurred during the Cambrian is best represented by the many angular unconformities in the sequence. An unconformity also separates the Cambrian System from the overlying Ordovician System.

2.5.1.1.3.2.2 Ordovician Period

The Ordovician in the regional study area is represented by a thick marine sequence of dolomites and dolomitic limestones overlain by sandy dolomites, sandstones, and shales.

Crustal movements continued during Ordovician time (Figure 2.5-11). The Anadarko Basin in Oklahoma continued to move downward. In Kansas, movements which began during the Cambrian ceased toward the end of the Lower Ordovician. There were renewed crustal movements along most of the structures in Kansas in the early Middle Ordovician; however, in several instances, these renewed movements represent reversals in the direction experienced during Cambrian time.

Upward movements along the Central Kansas Uplift and the Pratt Anticline started in Early Middle Ordovician and continued through Mississippian time. Northeastern Oklahoma was uplifted during Middle Ordovician time. This portion of Oklahoma probably emerged during the later portion of the Middle Ordovician, submerged during a portion of the Late Ordovician, and emerged again at the close of the Ordovician (Reference 118, p. 106). Downward movement of the North Kansas Basin began in the Middle Ordovician and extended through the Devonian. From Ordovician through Devonian time, the North Kansas Basin comprised most of the area of the later Forest City and Salina basins. Prior to the Middle Ordovician, the area of the North Kansas Basin was a broad southward plunging arch, the southeast Nebraska Arch (Reference 123, p. 160).

Along the Chautauqua Arch, uplift began in the Middle Ordovician and continued through Devonian time. This uplift along the Chautauqua Arch resulted in the exposure at the surface of larger areas of Arbuckle carbonate rocks in southeastern Kansas, western Missouri, northeastern Oklahoma and northeastern Arkansas upon which a karst topography was developed. Sinkholes developed and later were filled with Simpson deposits (Reference 174). Many unconformities are present in the Ordovician system, and a disconformity separates the Ordovician from overlying rocks.

2.5.1.1.3.2.3 Silurian Period

The Silurian System in the regional area is represented by marine limestones and dolomites. These rocks are no younger than mid-Silurian in age (Reference 286, p. 15).

The crustal movements initiated during the Ordovician continued during the Silurian. The continued crustal instability and resulting areas of nondeposition and postdepositional erosion restricted these deposits mainly to the North Kansas Basin.

2.5.1.1.3.2.4 Devonian Period

Devonian strata consist primarily of marine limestones and dolomites in Kansas. Most of the Devonian is no older than mid-Devonian in age (Reference 286, p. 15).

Crustal movements and uplift in Middle to Late Devonian time resulted in the development of unconformities. Figure 2.5-11 shows that such unconformities are recognized in the north and central Oklahoma Platform and along the Nemaha Anticline. Northeastern Oklahoma tilted abruptly to the south during the Middle Devonian, and the Devonian, Silurian, and Ordovician strata were subjected to erosion (Reference 118, p. 106). This area was submerged during Late Devonian time (Reference 118, p. 107). At the close of Devonian time, recognizable unconformities along the Nemaha Anticline, the Chautauqua Arch, and the North Kansas Basin (Figure 2.5-11) were developed. These unconformities represent both periods of nondeposition due to uplifted land masses and periods of erosion of the exposed sediments. Crustal tilting during this period is also reported in northeastern Oklahoma (Reference 118, p. 106).

The exact time break between the Devonian and Mississippian is not clearly defined. This time interval is represented by a thick shale sequence that unconformably overlies older deposits and in turn is disconformable with younger deposits. It is probable that this shale is both Mississippian and Devonian in age (Reference 286, p. 16).

2.5.1.1.3.2.5 Mississippian Period

Deposits of Mississippian Age are mostly shallow water carbonates. The older Mississippian strata are marine, while the younger are both marine and nonmarine.

Mississippian time was one of considerable structural activity. Several unconformities are present within the Mississippian section as illustrated on Figures 2.5-11 and 2.5-12. Northeastern Oklahoma was uplifted, tilted, and eroded during Late Early Mississippian time and submerged again during the Middle Mississippian (Reference 118, p. 107).

A major change in the structural development within the regional area took place near the end of the Mississippian and in the early portion of the Pennsylvanian. Many structures began to develop during this period, and movements along older structures became more pronounced. The upward movement of the Chautauqua Arch ceased at the end of Devonian time, and tilting to the northwest occurred during the Mississippian. The Anadarko Basin started to subside during Early Mississippian time and continued to subside through the Middle Permian.

At and near the end of Mississippian time and during Early Pennsylvanian time, erosion resulted in the development of a major unconformity that is recognized in all the major structural features (Figure 2.5-11). Anticlines were truncated and material was deposited in the synclinal troughs, creating regional unconformities. The Mississippian surface was subjected to deep weathering and the local development of solution features (Reference 174, p. 135).

2.5.1.1.3.2.6 Pennsylvanian Period

Lower Pennsylvanian strata are confined to the extreme southwestern part of the region of study in the Hugoton Embayment and are composed of marine shales, limestones, and sandstones. The Lower Middle Pennsylvanian Series are also restricted mainly to the extreme southwestern part of the region (Hugoton Embayment), which is the northwestern part of the study area, but may extend into northeastern Kansas (Reference 286).

The Middle and Upper Pennsylvanian deposits are cyclic and consist of marine shale and limestones alternating with nonmarine beds containing coal.

Crustal deformation continued during Pennsylvanian time (Figure 2.5-11). Tilting of the Chautauqua Arch ceased at the end of the Mississippian. Mississippian strata had been deposited over the tural element. During the Pennsylvanian, the Cherokee Basin

developed on the Chautauqua Arch and the Nemaha Anticline began actively uplifting and dividing the North Kansas Basin area into the Forest City Basin in the east and the Salina Basin in the west (Reference 174, p. 130, 182). The Bourbon Arch developed as a divide between the Forest City and Cherokee Basins during the Pennsylvanian. This "arch" is marked by a thinning of the Middle Pennsylvanian Cherokee Group (Reference 126, p. 38).

In Oklahoma, the greatest period of mountain building, including folding and faulting, occurred in the Pennsylvanian (Reference 127, p. 1). During the Early and Middle Pennsylvanian, faulting occurred in the Ozarks (References 92, p. 19; and 118, p. 109).

No well-defined boundary exists in the western portion of the area between the Upper Pennsylvanian and Lower Permian, which suggests a transitional sedimentation sequence. A disconformity can be demonstrated only locally (Reference 174). In the eastern portion of the area, the Pennsylvanian strata constitute much of the present land surface. In northeastern Kansas, southeastern Nebraska, southwestern Iowa, and northwestern Missouri, Quaternary deposits unconformably overlie the Pennsylvanian rocks (Reference 286, Figure 13, p. 61). Scattered local deposits of Tertiary age material are present in the central portion of the project area (Coffey, Anderson, Osage, Lyon, Cottonwood, Woodson, and Wilson counties, Kansas); this relationship represents a post-Pennsylvanian, pre-Tertiary unconformity (Reference 286, Figure 11, p. 58).

2.5.1.1.3.2.7 Permian Period

Permian age strata are present only in the western part of the study region. These deposits are predominantly marine in the lower part of the section and marine and nonmarine in the upper part (Reference 286, p. 43). The Permian contains thick evaporite sequences that include salt deposits.

The Nemaha Anticline and the Ozark Uplift were positive features; no deposition took place along the Ozark Uplift. Nondeposition and later erosion have also removed most Permian units from the Nemaha Anticline. Recent mapping in northeastern Kansas and southeastern Nebraska suggests that uplift of the Nemaha Anticline has occurred in that area since the Middle Permian (Reference 29, p. 8-9; and 84, p. 16-17; see USAR Section 2.5.1.1.5.1.9).

The downward movement of the Forest City and Cherokee basins ceased during Early Permian time, and possible downward tilting to the northwest started and continued through the Quaternary.

A major unconformity that represents the close of Permian time is present. In the western portion of the area, the unconformity may

be post-Permian to present; post-Permian, pre-Quaternary; post-Permian, pre-Cretaceous; or post-Permian, pre-Tertiary.

2.5.1.1.3.3 Mesozoic Era

The sequence of geologic events that occurred in the study area during the Mesozoic Era must largely be inferred from surrounding regions due to the regional absence of Triassic and Jurassic age rocks. Cretaceous rocks are found only in limited parts of the regional area.

2.5.1.1.3.3.1 Triassic Period

No rocks of Triassic age are present within the regional area and were probably never deposited. Detailed knowledge of geologic events that occurred during this time interval is not available.

2.5.1.1.3.3.2 Jurassic Period

No rocks of Jurassic age are present within the regional area. Detailed knowledge of geologic events that occurred during this time interval is, therefore, not available.

Jurassic age deposits are present west of the regional study area in western Kansas, and the present margin of these rock units represents an erosional boundary. While the Jurassic deposits may have extended farther east into the regional study area, they probably never extended into the site area.

2.5.1.1.3.3.3 Cretaceous Period

Rocks of Cretaceous age are present in the western part of the region of study. The majority of the Cretaceous strata represent marine deposition, but some nonmarine units are recognized.

The direction of the downward tilting of the Central Kansas Uplift and the Salina Basin changed from the southwest to the northwest and continued through Tertiary time. A major unconformity marks the close of the Cretaceous.

During the Cretaceous, igneous bodies such as the Silver City and Rose domes in Wilson County and the Stockdale Kimberlite and other plugs in Riley County were emplaced. These intrusions apparently occurred along previously existing fracture planes (References 38, p. 3-12; and 24; 285; and 14, p. 2863-2868).

2.5.1.1.3.4 Cenozoic Era

The Cenozoic Era, which includes the Tertiary and Quaternary periods, is represented by widely scattered deposits throughout

the area of study. The absence of Lower Tertiary and Lower Quaternary deposits within the regional area limits the interpretation of the geologic history during this time interval.

2.5.1.1.3.4.1 Tertiary Period

Tertiary deposits in the region of study occur primarily in the western portions. These deposits are nonmarine and are predominantly stream-deposited gravel, sand, and silts. These deposits represent the remains of a Tertiary depositional surface of low relief that extended eastward from the Rocky Mountains. West of the Osage Plains, arkosic material derived from the Rocky Mountains interfingers with chert gravels derived from the western Osage Plains. The scattered Tertiary deposits in the Osage Plains were derived from the plains and consist, predominantly of chert gravel in a brownish red clay matrix (Reference 286, p. 58).

Tertiary deposits rest unconformably over older bedrock and are unconformably overlain by younger material or are present at the surface.

2.5.1.1.3.4.2 Quaternary Period

The Quaternary System is represented in the regional study area mainly by glacial deposits in the northern and northwestern portion of the area. However, glaciation did not extend to the site. Eolian deposits are distributed throughout the area, but are primarily Pleistocene loess and are most extensive in the north and western parts of the region. Quaternary fluvial deposits are present along streams.

Some crustal uplift and tilting possibly continued into Quaternary time (Reference 174). The Central Kansas Uplift and Salina Basin experienced downward tilting to the east. Historic earthquake and recent microearthquake activity associated with the Nemaha Anticline suggests that it is experiencing some deep-seated adjustments.

2.5.1.1.4 Regional Stratigraphy

In preparing USAR Section 2.5.1, every attempt was made to use the same nomenclature as the Kansas Geological Survey. This nomenclature is slightly different from that used by the United States Geological Survey (USGS) in that the Quaternary System, as defined by the USGS, is divided into the Pleistocene and Holocene Series. The Kansas Geological Survey includes only the Pleistocene Series in the Quaternary System. The period of time described by the USGS as Holocene (approximately the last 8,000 to 10,000 years) is termed the Recent Stage of the Pleistocene Series by the Kansas Geological Survey, and the term Holocene is not used.

Sedimentary rocks and deposits representing most periods in the geologic column, with the exception of the Jurassic and Triassic, are present within the region. Rocks older than Pennsylvanian are mainly known through subsurface exploration (wells). Tertiary and Quaternary deposits overlie Paleozoic deposits at several isolated locations.

The discussion of regional stratigraphy in the following section is very generalized and is confined to major time-stratigraphic units. Detailed discussions of rock-stratigraphic units are presented in USAR Section 2.5.1.2.2. A stratigraphic column with a brief lithologic description of the units within the region is shown on Figure 2.5-12.

2.5.1.1.4.1 Precambrian

The shallowest Precambrian age rocks in Kansas were encountered in Nemaha County at an elevation of 588 feet above sea level (Reference 174, p. 157); in Pawnee and Johnson counties, Nebraska, they are in excess of 500 feet above sea level (Reference 31, p. 15; 28, p. 2). The deepest Precambrian age rocks in Kansas were encountered in Barber County at an elevation of 4,595 feet below sea level (Reference 174, p. 158).

Within the regional area, the Precambrian crystalline basement predominantly consists of igneous and metamorphic rocks. These rocks are composed of primarily granitic rocks and minor amounts of mafic igneous rock, quartzite, and schist. Pre-Upper Cambrian sediments consisting of interbedded feldspathic sandstone, shale, and arkose (Rice Formation) have been mapped in the subsurface of Central Kansas (Reference 228). These or similar sediments are associated with the mafic igneous rocks within the Central North American Rift System (USAR Section 2.5.1.1.5.1.17). The lithologic nature of the Precambrian surface is still open to debate due to the scarcity of deep well data in many areas (Figure 2.5-7). One interpretation indicates that a sequence of undifferentiated Precambrian to Cambrian clastic sediments, metasediments, igneous and metamorphic rock fragments, and granite wash may overlie the crystalline basement in a wide band. This sequence may extend from Missouri through Kansas into Nebraska and may exceed 1,000 feet in thickness (Reference 174, p. 158-168; 286, p. 9). These pre-Upper Cambrian clastics have been called "arkose," "red clastics," "granite wash," "metamorphics," "metasediments," "quartzite," "gneiss," and "granite" (Reference 228).

In addition to the Rice Formation mentioned above, three other rock types which have been logged as "granite wash" are feldspathic Reagan (Upper Cambrian) Sandstone, Pennsylvanian basal conglomerate, and in situ weathered granitic crystalline basement rock (Reference 228, p. 382). The age of weathering may range

from Precambrian to Middle Pennsylvanian. An interpretation of geophysical logs from a well in Woodson County, 20 miles from the site, indicates that coarse-to medium-grained clastic rocks were encountered at a depth of 2,750 feet (Reference 331). The presence of this sediment in eastern Kansas supports the contention that undifferentiated Precambrian - Cambrian clastics are present between the Bonneterre Dolomite and the Precambrian crystalline basement.

Another interpretation of basement lithology does not show the band of undifferentiated sediments-granite wash across eastern Kansas, but instead shows several isolated areas containing metasediments (References 14 and 273, p. 10). Since there are no wells that reach the Precambrian surface, no data are presented for Coffey, Anderson and Linn counties. Data from wells, which penetrate the Precambrian crystalline complex in nearby counties, indicate that granitic rock is present beneath the undifferentiated Precambrian - Cambrian clastics. Recent radiometric age dating on granitic to quartz monzonitic rocks north and west of the site resulted in the following ages: 1,660 ± 100 m.y., 1,500 m.y., and 1,636 ±, 20 m.y. [uranium-lead (U-Pb) age of zircons] from Rush, Russell, and Nemaha counties, respectively. The samples from Rush and Russell counties were dated at 1,460 m.y. and 1,382 m.y., respectively by rubidium-strontium (Rb-Sr), whole-rock methods. Radiometric dating of rocks west, south, and east of the site resulted in the following ages: 1,350 m.y. (Rb-Sr whole rock) and 1,350 m.y. (U-Pb age of zircons) from Greenwood County; 1,100 ± 100 m.y. (Rb-Sr whole rock) and 1,400 ± 100 m.y. (U-Pb of zircons) from a xenolith in Rose Dome Cretaceous-age peridotite, Woodson County (Bickford and others, in press). The first group of rocks appears to be older and to have been intruded at medium crustal depths (mesozonal). Southeastern Kansas appears to have been affected by shallow granitic intrusions (epizonal-depth of 6.5 km or less) and felsic volcanic activity at approximately 1,380 m.y. (Reference 14). Potassium-argon and rubidium-strontium feldspar and whole rock dates on similar rocks from northeastern Oklahoma indicate a period of thermal activity at approximately 1,200 m.y. (Reference 158, p. 13). These data appear to be representative of minimum ages of granitic crystalline basement beneath the site.

In north-central Kansas, mafic igneous rocks are flanked and partly overlain by feldspathic sandstone, arkose, and reddish siltstone. These rocks occur along the trend of the Midcontinent Geophysical Anomaly and appear to be a subsurface continuation of the 1,100 m.y. Keweenawan Series exposed in the Lake Superior area (USAR Section 2.5.1.1.5.1.17). The distribution of these mafic and associated clastic rocks is shown on Figures 2.5-10, 2.5-13 and 2.5-14.

2.5.1.1.4.2 Paleozoic

Over 2,000 feet of Paleozoic rocks from Cambrian through Permian age are present within the regional area. A brief description of the Paleozoic systems follows.

2.5.1.1.4.2.1 Cambrian System

Lower and Middle Cambrian age deposits are not present and were probably never deposited within the area. Late Cambrian time is represented by sandstone and dolomite strata resting unconformably on the Precambrian basement (Reference 286, p. 12). Cambrian strata are absent from the highest portions of the Nemaha Anticline.

The basal Cambrian sandstones were not deposited in the site area. The lowest Paleozoic unit in the area is the Bonneterre Formation (Figure 2.5-12).

A thick carbonate sequence, the Arbuckle Group (Figure 2.5-12), which is undifferentiated Upper Cambrian and Lower Ordovician (Reference 286, p. 12-13), is present in the site area and overlies the Bonneterre Formation.

2.5.1.1.4.2.2 Ordovician System

The Lower, Middle, and Upper Ordovician is represented by deposits consisting of dolomites, limestones, sandstones, and shales unconformably overlying the Cambrian deposits (Reference 286, p. 12). Numerous unconformities are present within the Ordovician (Figure 2.5-11), and a disconformity separates the Ordovician deposits from the overlying Silurian deposits (Reference 286, p. 15).

Ordovician age strata are absent from the higher portions of the Nemaha Anticline and the Central Kansas Uplift. Their absence is due either to nondeposition or to erosion (Merriam, 1963, p. 145).

In the site area, a thin carbonate is present between the Middle Ordovician Simpson deposits and the Devonian-Mississippian Chattanooga Shale. It has not yet been established whether this unit is a Middle Ordovician Viola or a Silurian-Devonian Hunton deposit (Reference 295).

2.5.1.1.4.2.3 Silurian System

Silurian age deposits are present in the subsurface throughout much of northeastern Kansas, southeastern Nebraska and northwestern Missouri. They consist primarily of dolomites, which disconformably overlie Ordovician strata (Reference 286, p. 15). A disconformity also separates the Silurian strata from the overlying Devonian strata (Figure 2.5-11) (Reference 150, p. 53).

The Silurian and the lower portion of the Devonian consist of a thick carbonate sequence, which makes the Silurian-Devonian disconformity difficult to recognize. This portion of the section is generally classified as undifferentiated Silurian and Devonian (Reference 286, p. 15).

2.5.1.1.4.2.4 Devonian System

Devonian deposition is represented by dolomites, limestones, sandstones, and shales throughout much of the area. Some Devonian deposits are exposed in the southeastern portion of the region, but they are known to be absent from the crest of the Nemaha Anticline. A disconformity separates the Lower Devonian from the overlying Upper Devonian. The Upper Devonian consists of a shale sequence, the Chattanooga Shale, which is generally classified as undifferentiated Upper Devonian and Lower Mississippian. No well defined break is recognized between the Upper Devonian and Lower Mississippian, which suggests continuous deposition.

2.5.1.1.4.2.5 Mississippian System

The Mississippian age deposits consist primarily of shallow-water marine carbonates with some nonmarine deposits. The older deposits are marine, and the younger are both marine and nonmarine (Reference 286, p. 17). The rock types primarily include dolomites and limestones with some sandstones and shales. The surface distribution of the Mississippian age deposits is shown on Figure 2.5-5. They crop out in the southeastern portion of the regional area.

2.5.1.1.4.2.6 Pennsylvanian System

Pennsylvanian deposits form the bedrock surface at the site area and throughout the eastern portion of the regional area (Figure 2.5-5). The lithologies represented within the Pennsylvanian System (Figure 2.5-12) include shale, limestone, sandstone, and coal. The Middle and Upper Pennsylvanian rocks were deposited in a complex of alternating marine and nonmarine sedimentary environments. These repeating sedimentary units of shale, sandstone, and limestone are called cyclothem deposits and are very well developed within Kansas.

2.5.1.1.4.2.7 Permian System

Permian age deposits are present at the surface or in the subsurface only in the western portion of the regional area and are not present in the site area Figure 2.5-5). The lower portion of the Permian deposits are marine and the upper portion are nonmarine. The lower deposits consist of limestones and shales and the upper

deposits consist of predominantly reddish brown shales, siltstones, and sandstones with interbedded salt, gypsum, anhydrite, and dolomites (Reference 174, p. 80).

2.5.1.1.4.3 Mesozoic

2.5.1.1.4.3.1 Triassic System

There are no Triassic age deposits within the regional area.

2.5.1.1.4.3.2 Jurassic System

There are no Jurassic age deposits within the regional area.

2.5.1.1.4.3.3 Cretaceous System

Cretaceous age deposits are present only in the western portion of the study area (Figure 2.5-5). These deposits are predominantly marine, but some nonmarine deposits are present. The upper portions consist of shales, chalks, limestones, and bentonites. Cretaceous igneous bodies are also present in Riley and Wilson counties.

2.5.1.1.4.4 Cenozoic

2.5.1.1.4.4.1 Tertiary System

Tertiary age deposits are present only as scattered remnants within the central and west-central portion of the area. These deposits are nonmarine and represent alluvial deposits derived from the area to the west (Reference 286, p. 58). They consist of gravels, sands, silts, and clays. Locally, these deposits are cemented with calcium carbonate.

2.5.1.1.4.4.2 Quaternary System

Quaternary deposits are nonmarine and include glacial, lacustrine, fluvial, and eolian sediments. Glacial deposits are present in the northern and northwestern portion of the area. The lacustrine deposits tend to be localized and associated with the glacial deposits. Fluvial deposits are associated with the various rivers and streams. Eolian deposits are distributed throughout the area, but are thin to absent near the central portion of the regional area.

2.5.1.1.5 Regional Tectonic Structures

The site lies within the Central Stable Region tectonic province of the North American Continent (Figure 2.5-4) (Reference 137, p. 23). The tectonic history has included moderate deformation which

resulted in the formation of broad arches and basins during Mesozoic and Paleozoic time (Reference 174, p. 222). These major structural features have been modified locally by faulting and additional folding.

A summary of folding and faulting within the regional area is presented below. No geological conditions are known to exist that adversely affect the design, construction, or operation of the Wolf Creek Generating Station.

2.5.1.1.5.1 Regional Folding

The distribution of the major structural arches and basins within the area of investigation is shown on Figure 2.5-4, and their structural development is graphically summarized on Figure 2.5-11. Tables 2.5-1 through 2.5-6 present a state-by-state compilation of folds within the regional area. The distribution of smaller scale, more localized folds is shown on Figure 2.5-15. The regional cross sections on Figure 2.5-6 illustrate the folds and faults along the cross-sectional lines. The discussion in this section and subsequent sections is based on a review of available literature and information which represents the most current thinking of the state geological surveys in the regional area.

The large-scale tectonic features within the area of investigation include the Central Kansas Uplift, the Pratt Anticline, the North Kansas Basin, the Salina Basin, the Sedgwick Basin, the Anadarko Basin, the Hugoton Embayment, the Nemaha Uplift, the Forest City Basin, the Bourbon Arch, the Cherokee Basin, the Ozark Uplift, and the smaller-scale Abilene Anticline and Irving Syncline. A brief discussion of each of these features is included in the following. The discussion of the smaller-scale, localized features is limited primarily to general characteristics and trends. According to Reference 174, the configuration and magnitude of the various large-scale structural elements are a reflection of the structure of the Precambrian basement.

2.5.1.1.5.1.1 Central Kansas Uplift

The Central Kansas Uplift (Reference 174, p. 180) is the largest positive structural feature in Kansas (Figure 2.5-4). It is located in the western portion of the regional study area, covers approximately 5,700 square miles and trends northwest-southeast. It is considered to be a pre-Middle Pennsylvanian, post-Mississippian structural feature. The Central Kansas Uplift separates the Salina and Sedgwick basins on the east from structural features located to the west. Surface formations of Quaternary, Tertiary, and Cretaceous age mask this underlying structure. The sedimentary strata overlying the crest of the fold are generally less

than 5,000 feet thick. On the crest, Pennsylvanian age strata directly overlie the Precambrian basement. On the flanks, the pre-Pennsylvanian strata are folded, truncated, and overlain by Pennsylvanian rock. On a regional scale, the Central Kansas Uplift appears to extend northwestward into Nebraska as the Cambridge and Chadron Arches.

2.5.1.1.5.1.2 Pratt Anticline

The Pratt Anticline (Reference 174, p. 182-183) is a broad southward-plunging fold which extends from the Central Kansas Uplift into northern Oklahoma (Figure 2.5-4). It separates the Hugoton Embayment on the west from the Sedgwick Basin on the east. This anticline is considered to be pre-Middle Pennsylvanian, post-Mississippian in age. Approximately 5,000 feet of sedimentary strata, including Quaternary, Tertiary, Permian-Pennsylvanian, Mississippian, and Ordovician-Cambrian, overlie the Precambrian basement. Mississippian age strata are absent from the crest of the fold.

2.5.1.1.5.1.3 North Kansas Basin

The North Kansas Basin occupied an area which now contains both the Salina and Forest City basins (Reference 174, p. 182). This basin was a large downwarped area located north of the Chautauqua Arch and east of the Central Kansas Uplift.

It is considered to be pre-Mississippian in age. The basin began to develop in Ordovician time and existed as a structural feature into Mississippian time. Numerous periods of structural adjustment occurred, and a major period of erosion occurred at the end of Mississippian time. Following Mississippian time, structural development of the Nemaha Anticline in Kansas and Nebraska subdivided the North Kansas Basin into the Salina Basin and the Forest City Basin (Figure 2.5-4).

2.5.1.1.5.1.4 Salina Basin

The Salina Basin (Reference 174, p. 182-183) is the second largest basinal feature in Kansas (Figure 2.5-4). It covers approximately 12,700 square miles and is located in the northwestern portion of the regional area. It is considered to be post-Mississippian in age, and Cretaceous age strata indicate the continued development of the structure through this time interval.

The axis of the basin trends northwest and plunges to the north. The basin is limited on the east by the Nemaha Anticline and on the west by the Central Kansas Uplift. Sedimentary strata in the basin have a maximum thickness of approximately 4,500 feet and include Tertiary, Cretaceous, Jurassic, Permian-Pennsylvanian,

Mississippian, Devonian-Silurian, and Ordovician-Cambrian age strata resting on Precambrian clastics, mafic igneous rocks or crystalline basement.

2.5.1.1.5.1.5 Chautauqua Arch

The Chautauqua Arch is an anticlinal extension of an early phase of the Ozark Uplift and occupied the area of the present Cherokee Basin. It is considered to be pre-Mississippian in age and has been modified during post-Mississippian time. Along its crest, Pennsylvanian strata overlie Ordovician-Cambrian strata. Structural development in post-Mississippian time resulted in the development of the Nemaha Anticline, the Sedgwick Basin, and the Cherokee Basin in the general area of the older Chautauqua Arch.

2.5.1.1.5.1.6 Sedgwick Basin

The Sedgwick Basin (Reference 174, p. 183) is a south-dipping, shelf-like area in south-central Kansas that merges with the Anadarko Basin of Oklahoma (Figure 2.5-4). It is considered to be a pre-Middle Pennsylvanian, post-Mississippian structure and is bounded on the east by the Nemaha Anticline and on the west by the Central Kansas Uplift. The basin contains Permian-Pennsylvanian, Mississippian, Devonian-Silurian, and Ordovician-Cambrian strata overlying the Precambrian basement. Quaternary deposits are present at the surface in the northern portion of the basin. Sedimentary deposits are as thick as 5,500 feet.

2.5.1.1.5.1.7 Anadarko Basin

The Anadarko Basin is located in Oklahoma in the southwestern portion of the regional area (Figure 2.5-4). It lies west of the Nemaha Anticline and merges to the north with the Sedgwick Basin in Kansas. The basin is considered to be post-Permian and pre-Cretaceous in age. The basin contains Permian-Pennsylvanian, Mississippian, Devonian, Silurian, Ordovician, and Cambrian age strata estimated to be in excess of 30,000 feet thick.

2.5.1.1.5.1.8 Hugoton Embayment

The Hugoton Embayment (Reference 174, p. 181) is a large, shelf-like extension of the Anadarko Basin into western Kansas (Figure 2.5-4). It is considered to be pre-Mesozoic in age. The eastern edge of the embayment area is limited by the Pratt Anticline and the Central Kansas Uplift. In Kansas, the sedimentary strata which dip southward are estimated to be approximately 9,500 feet thick. These strata include sedimentary deposits of Pleistocene, Tertiary, Cretaceous, Jurassic, Triassic, Permian-Pennsylvanian, Mississippian, and Ordovician-Cambrian age overlying the Precambrian basement.

2.5.1.1.5.1.9 Nemaha Anticline (Uplift)

The Nemaha Anticline is one of the most significant structural features in Kansas (Figure 2.5-4). This feature trends N20 E from Oklahoma to northeastern Kansas and then turns northward into Nebraska. The structural geology of the Nemaha Anticline and adjacent areas can be discussed as a two-level model: Precambrian granitic basement (Nemaha Uplift) and overlying Paleozoic sedimentary rocks (Nemaha Anticline). Drilling, geological, and geophysical data indicate that these structures are bordered on the east by a discontinuous series of steeply dipping fractures known as the Humboldt fault zone (USAR Section 2.5.1.1.5.2). The Nemaha Anticline, as expressed in the sediments, overlies a topographic high located in the basement adjacent to and west of the Humboldt fault zone. The Nemaha Uplift is bordered on the west by the Midcontinent Geophysical Anomaly (MGA) which consists of Precambrian mafic rocks and associated sediments (USAR Section 2.5.1.1.5.1.11). In the Paleozoic sediments, the Nemaha Anticline is bounded on the west by the Irving Syncline. This syncline appears to be located above the basement contact zone between the Nemaha Uplift and rocks associated with the MGA. Based on the spacing of geophysical anomaly contour lines, this contact appears to be a steeply dipping fault zone. To the west of this contact zone, a topographic high in the basement surface coincides with high anomaly values and is overlain by arched Paleozoic sediments forming the Abilene Anticline (USAR Section 2.5.1.1.5.1.15).

Topographic relief on the Precambrian surface is most pronounced at the eastern margin of the Nemaha Uplift under the anticline, but becomes less pronounced as the basement surface dips toward the west.

Seismic surveys in Nemaha County indicate that the Humboldt fault zone may be a wide, complex shear zone (Reference 84). The presence of shear zones in granitic basement along the Nemaha Anticline can be inferred from reports of cataclastic textures (Bickford and others, in press). The topographic relief in the basement underlying the Nemaha Anticline may be due to differential uplift along several subparallel shear zones within the Nemaha Uplift rather than movement along one discreet fault.

Greater relief at the eastern margin of the Nemaha Uplift may be the result of greater displacement along the Humboldt and other, as yet unmapped, fault zones within the Nemaha Uplift crustal block.

The Nemaha Anticline is recognizable by the surface expression of the Permian and Pennsylvanian age strata, but is a more pronounced feature in the subsurface. The anticline separates the Forest City Basin and the Cherokee Basin on the east from the Salina

Basin and the Sedgwick Basin on the west. Pennsylvanian age strata directly overlie Precambrian basement rocks along the crest of the structure. The depth to the Precambrian basement along the crest ranges from approximately 600 feet near the Nebraska-Kansas state line to over 4,000 feet in Oklahoma. On the flanks, the pre-Pennsylvanian strata are folded, truncated, and overlain by Pennsylvanian strata (Reference 174, p. 182).

While the Nemaha Anticline is generally considered as pre-Middle Pennsylvanian, post-Mississippian in age, initial movements occurred prior to this time. Lyons (Reference 159, p. 111) suggested that the geographic and parallel relation between the MGA, which he named the Greenleaf anomaly, and the Nemaha Anticline implied a genetic relationship. He also stated that logs from several wells show that rocks of the Ordovician Simpson Group overlap rocks of the Cambro-Ordovician Arbuckle Group, indicating some topographic relief during the Ordovician (Reference 159, p. 114). If these data and implications are correct, the Nemaha Uplift would be, at least partly, Precambrian in age (USAR Section 2.5.1.1.5.1.17). Additional uplift of the Nemaha Anticline may have occurred before or during Kinderhookian (Lower Mississippian) time (Reference 150, p. 142).

This conclusion is based on the observation that deposition in the North Kansas Basin was interrupted and Kinderhookian deposits are confined east of the Nemaha Anticline. According to reference 150, the distribution of the St. Joe and Reeds Spring formations (Lower Mississippian-Osagian) indicates that these units overlapped the flank of the incipient Nemaha Anticline. Initial uplift of the anticline appears to have initiated the separation of the Forest City and Salina basins as early as Osagian time. Only the Burlington-Keokuk sequence (upper Osagian stage) extended across the Central Kansas Uplift and the rising Nemaha Anticline (Reference 150, p. 142-143). Therefore, during Mississippian time, deformation along the Nemaha Anticline included initial movements and maximum development, which occurred at the end of Mississippian deposition (Reference 150, p. 143). A west-east regional cross section showing the Nemaha Anticline (Figure 2.5-6) illustrates the structure at its closest approach to the site. Figure 2.5-6 also shows no evidence of offset of any strata younger than Mississippian along the Humboldt fault zone. This is also apparent from examination of structure contours on the top of the Mississippian, as fault offset along the Humboldt fault zone does not appear on this horizon (Reference 175) or on younger horizons (Reference 177 and 270). As shown on Figure 2.5-6, the offset at the base of the Kansas City Group occurs along a northwest trending normal fault which crosscuts the Humboldt fault zone (Figure 2.5-7; Reference 270 and 45). This northwest-trending fault does not offset the top of the Lansing Group (Reference 177 - also see USAR Section 2.5.1.1.5.2).

Recent mapping in Nemaha County, Kansas (approximately 130 miles north-northwest of the site) and in southeastern Nebraska suggests that uplift of the Nemaha Anticline has occurred along northern portions of the Humboldt fault zone in post-Permian time. Generally, it cannot be determined whether faulting or folding has occurred (References 29, p. 8-9; 84, p. 16-17; and 249, p. 136-137). Displacement along the Humboldt fault zone appears to decrease, and the absence of Paleozoic rocks is less pronounced further southwest along the Nemaha ridge in Pottawatomie County, Kansas (Reference 272, p. 21). Faulting has resulted in vertical displacement of Late Silurian or Early Devonian through Mississippian rocks in Pottawatomie County. In the northeastern part of this county, faulting was inferred to have offset the base of the Kansas City Group (Upper Pennsylvanian). However, this surface and Upper Pennsylvanian through Lower Permian rocks appear to be folded or draped across the trace of the Humboldt fault zone toward the southwest (Reference 272, p. 21; and 270).

2.5.1.1.5.1.10 Forest City Basin

The Forest City Basin (Reference 174, p. 181) is located in the northeastern portion of the region in Kansas, Nebraska, Missouri, and Iowa (Figure 2.5-4). Lee (Reference 149, p. 13) reported that the Forest City Basin was originally both a structural and topographic basin which did not come into existence until after Mississippian time. The basin was formed by rejuvenation of the Nemaha Anticline prior to Pennsylvanian deposition and associated downwarping of a post-Mississippian unconformity. Its age is considered as post-Mississippian, pre-Pleistocene. The basin is bounded on the west by the Nemaha Anticline and on the south by the Bourbon Arch. The basin contains a maximum of approximately 4,000 feet of Permian, Pennsylvanian, Mississippian, Devonian-Silurian, and Ordovician-Cambrian age sedimentary strata overlying the Precambrian basement.

2.5.1.1.5.1.11 Bourbon Arch

The Bourbon Arch (Reference 174, p. 179) is essentially east-west trending in the central portion of the study area (Figure 2.5-4). It is considered to be pre-Middle Pennsylvanian, post-Mississippian in age. The arch is a low feature which separates the Forest City Basin on the north from the Cherokee Basin on the south.

The term "arch" may be a slight misnomer, because this feature served only as a divide between the Forest City and Cherokee basins during the Pennsylvanian and the position of the arch is marked only by thinning of the Pennsylvanian Cherokee sediments (Reference 126, p. 30). Following development of the Nemaha Anticline, the North Kansas Basin was divided into the Salina Basin and the Forest City Basin. In the area of the Chautauqua

Arch, the Cherokee Basin developed and the Bourbon Arch served as a divide between the Forest City and Cherokee basins. The area of the Bourbon Arch can not be seen on structure contour maps of the top of the Pennsylvanian Lansing Group nor on a structure contour map of the base of the Kansas City Group (both younger than the Cherokee Group) (Reference 126, p. 36; and 270).

While both the Nemaha Anticline and the Bourbon Arch are pre-Middle Pennsylvanian, post-Mississippian in age, examination of structure contour maps and isopach maps indicate that the Nemaha Anticline formed prior to the Bourbon Arch (Reference 151) (USAR Section 2.5.1.1.5.1.9).

According to Reference 151, thicknesses of Mississippian limestones indicate that formation of the arch was initiated during the interval which followed post-Mississippian erosion, prior to Pennsylvanian deposition. Relative thicknesses of lower Pennsylvanian rocks also indicate that the Bourbon Arch had developed by the early Pennsylvanian. "Arching" was contemporaneous with subsidence of the Cherokee Basin to the south. The Forest City Basin, to the north, existed as a land-locked shallow basin within which 200 feet of black shale accumulated. The sedimentary record indicates that the Cherokee and Forest City basins were rejoined when sedimentation occurred continuously across the Bourbon Arch in "middle Cherokee time" (Reference 151, Sheet 6).

In its discussion of the tectonics of the Nemaha and Bourbon Arches, Reference 4 indicated that initial movements of the Nemaha Anticline occurred during the Lower Mississippian. Deposition of Mississippian carbonate rocks continued across the Nemaha trend. After deposition of the St. Louis Limestone near the end of Meramecian time, the Nemaha Anticline bisected the North Kansas Basin. The Mississippian Ste. Genevieve Formation is preserved above a slightly eroded surface on the St. Louis Limestone only to the east of the Nemaha Anticline in the relatively down-dropped Forest City Basin. The Bourbon Arch appears to have remained stationary while the Forest City and Cherokee basins formed in response to reactivation of the Nemaha Anticline.

During the early Middle Pennsylvanian, initial filling of the Forest City Basin resulted from erosion of the elevated Nemaha Uplift and other emergent areas. A completely different provenance is indicated for the Forest City Basin sediments which were deposited after the Bourbon Arch was inundated during later mid-Pennsylvanian time (Reference 4, p. 277).

The development of the Bourbon Arch is considered in the same structural context as the Forest City and Cherokee basins which should be regarded as one continuous structural province, and not

in the structural context of the Nemaha Anticline. The Nemaha Anticline marks the western boundary of the two basins. The Bourbon Arch separated two areas accumulating sediments, but this separation appears to be typical of the Middle and Late Pennsylvanian basins of North America. It would be misleading, therefore, to place too much emphasis on the development of individual basins (Reference 126, p. 30).

2.5.1.1.5.1.12 Cherokee Basin

The Cherokee Basin (Reference 174, p. 180) is located in the south-central portion of the regional area (Figure 2.5-4). It is considered to be pre-Middle Pennsylvanian, post-Mississippian in age and is an extension of the Arkoma Basin of Oklahoma into southeastern Kansas. The northern part of the basin is separated from the Forest City Basin by the Bourbon Arch, and the western side is bounded by the Nemaha Anticline. The basin overlies the older Chautauqua Arch and has a maximum thickness of sedimentary strata of 3,500 feet. Early Pennsylvanian age rocks overlie Cambrian-Ordovician age strata throughout most of the basin. The Precambrian surface does not reflect the basinal structure.

2.5.1.1.5.1.13 Ozark Uplift

The Ozark Uplift is a major structural feature in Missouri. The western portion of the Ozark Uplift is located in the southeastern portion of the area east of the Cherokee Basin (Figure 2.5-4). It is considered to be a dominant structural feature throughout the Paleozoic (Reference 88, p. 55). Subsidence, which occurred in the Ozark region prior to deposition of the St. Peter Sandstone, was followed by uplift during deposition. The Ozark Uplift was exposed to erosion by the end of the Silurian. Deposition of Devonian sediments was followed by another period of uplift and erosion. The Ozarks were inundated and became a site of extensive deposition during the Mississippian. Renewed uplift at the end of the Mississippian was followed by Pennsylvanian transgression which may not have covered the entire area (Reference 88, p. 53-59).

2.5.1.1.5.1.14 Boston Mountains

The Boston Mountains are located in the southeastern portion of the regional area along the southern edge of the Ozark Uplift (Figure 2.5-4). The mountains are characterized by numerous folds and faults with a general east-west trend and secondary northeast and northwest trends. The Boston Mountains appear to be a transitional area between the Ozark Uplift to the north and the Arkansas Valley (Arkoma Basin) to the south (Reference 88, p. 227).

2.5.1.1.5.1.15 Abilene Anticline and Irving Syncline

The Abilene Anticline and Irving Syncline are two smaller structures apparently related to the Nemaha Uplift and MGA (Figure 2.5-15, Table 2.5-3, and USAR Section 2.5.1.1.5.1.9). The Abilene Anticline is an arch in Paleozoic sedimentary rocks (eastern flank of Salina Basin), which is located above a topographic high in the Precambrian surface. This topographic high is located close to the geophysical maxima of the MGA. The axis of the Abilene Anticline trends northeast and plunges to the southwest. The southern portion of the anticline is subparallel to the Nemaha anticlinal axis, but these two structures appear to converge toward the Kansas-Nebraska border. The Irving Syncline (between the Nemaha and Abilene anticlines) is a downwarp in the sediments located above a topographic low in the Precambrian surface. This topographic low appears to coincide with closely spaced geophysical contour lines (Figures 2.5-7, 2.5-8 and 2.5-9). The Irving Syncline, therefore, may be located above a steeply dipping fault zone which separates the Nemaha Uplift from the MGA maxima (See USAR Section 2.5.1.1.5.1.17).

Initial development of the Precambrian surface configuration beneath the Irving Syncline and Abilene Anticline may have occurred during the Precambrian and would be related to the formation of the Central North American Rift System (Section 2.5.1.1.5.1.17). Initial development of the Abilene Anticline and Irving Syncline may have occurred during late Mississippian to early Pennsylvanian time (Reference 38, p. 3). Following Mississipian deposition, uplift exposed Mississippian limestones to erosion along the crest of the Abilene Anticline. All Paleozoic rocks were eroded from the crest in northern Kansas. Since the anticline plunges to the southwest, the depth of erosion decreases in this direction (Reference 238, p. 124-126). The seas reinvaded northeastern Kansas during the Middle Pennsylvanian (Desmoinesian). Renewed periods of uplift during the Late Pennsylvanian (Missourian and Virgilian) are indicated by thinning of the Upper Pennsylvanian Lansing, Douglas, Shawnee, and Wabaunsee Groups above the crest of the Abilene Anticline (Reference 174, p. 112, 113, 115, 118). Further uplift related to emplacement of ultramafic intrusions in Riley County may have occurred during the Cretaceous (USAR Section 2.5.1.1.5.2). The crest of the Nemaha Anticline is located several miles east of the axis of the Irving Syncline, which is several miles east of the axis of the Abilene Anticline. The Irving Syncline probably formed passively as a structural low flanked by two tectonically positive structures: the Nemaha and Abilene anticlines. While the Nemaha Anticline may have formed as a result of uplift in the basement, the Abilene Anticline may have formed as a result of passive folding in the overlying sedimentary rocks (Section 2.5.2.2).

2.5.1.1.5.1.16 Local Structures

The small-scale localized structures are shown on Figure 2.5-15 and listed in Tables 2.5-1 through 2.5-6. These structures are associated with each of the large-scale structural basins and arches. The small-scale fold axes and the strike of the faults generally conform to regional trends: N20 E; N40 to 60 W; and N45 E. Limbs of folds generally dip less than 5 degrees. Most faults dip steeply and have normal displacement. The central portion of the regional area is relatively free of folding or faulting.

The smaller-scale features range in shape from domes to elongated synclines and anticlines. Some are symmetrical, some asymmetrical, and many have associated faults. The limbs of many folds appear to dip more steeply with depth, and several are structural traps for oil and gas. The major periods of folding are listed in Table 2.5-7.

The Kansas Geological Survey performed a seismic reflection survey in 1980 along approximately 4.75 miles of an east-west county road crossing the John Redmond Dam. The survey was performed using the Mini-Sosie* technique for 6-fold data. Preliminary data processing in January 1982 and preliminary interpretation by the Kansas Geological Survey indicated the possibility of a faulted small-scale anticline at depth near the southwestern end of the John Redmond Dam (Reference 313) at a location approximately 6.4 miles west-southwest of the site. Subsequent review of the preliminary data by Dames & Moore and discussions with the Kansas Geological Survey led to the conclusion that evidence of faulting based on the seismic data was not compelling. Surficial and excavation surface geologic mapping along the make-up water system (Reference 326 and 72) and soils and geology exploration by the U.S. Army Corps of Engineers for the foundation of the John Redmond Dam (U.S. Army Corps of Engineers, 1959) show no evidence of surface faulting within 5 miles west-southwest of the site.

In Woodson and Riley counties, Kansas, igneous plugs have intruded into the Paleozoic sediments. Potassium-Argon (K-Ar) dating of the Woodson County mica peridotites (Rose Dome and Silver City Dome) has given ages of 88 to 91 m.y. (Reference 285). Rubidium-Strontium (Rb-Sr) mineral isochron dating of the Stockdale Kimberlite plugs in Riley County (Reference 25), K-Ar mineral, and fission track dating (Reference 24) show that the date of emplacement of these plugs is Cretaceous.

___

*Trademark of Elf-Acquitaine Production.

2.5.1.1.5.1.17 Geophysical Anomalies and Structures

Midcontinent Geophysical Anomaly (Rift System) - The Bouger Gravity Anomaly map (Figure 2.5-8) illustrates a marked agreement between azimuths of anomalies and trends of the Nemaha and Central Kansas uplifts (Reference 277, p. 97). A westward shift of the gravity anomaly from the axis of the Nemaha Anticline strongly suggests structural control of intrusions along preexisting fracture zones (Reference 277, p. 102). These positive gravity anomalies are also characterized by pronounced magnetic anomalies, suggesting igneous or metamorphic rocks of mafic composition at depth (Figure 2.5-9 and Reference 277, p. 94). The gravity and magnetic high parallel with the Nemaha Anticline is a continuation of the MGA. This anomaly can be traced for more than 600 miles from Lake Superior to the Salina Basin in central Kansas and appears to be caused by a sequence of mafic, layered intrusives (and extrusives) and arkosic rocks that are probably fault-bounded and tilted along the margins of the anomaly (Figure 2.5-10).

The Kansas segment of the MGA appears to have been offset 50 miles eastward from its northeastward continuation (Figure 2.5-10). On the basis of magnetic, gravity, and geologic data, Reference 136 postulated that the MGA indicates the presence of a Precambrian Rift System. A model of the geophysical anomaly across the Iowa segment shows a fault-bordered basin of mafic rocks approximately 5 miles thick resting on Precambrian basement rocks (Reference 136, p. 2196).

Reference 202 interpreted gravity, seismic, and geologic data across the MGA to represent the "Central North American Rift System." According to Reference 202, this density contrast was caused by a mafic mass that has a deep central feeder and a larger volume than that proposed by Reference 136 within felsic country rock (Figure 2.5-13). Reference 159, p. 117-118) estimated the high density core to be approximately 33 miles in width, but gave no data on its possible vertical extent (Figure 2.5-14).

The area delineated by the MGA is flanked by clastic sedimentary rocks (Figures 2.5-7 through 2.5-10). The anomaly and sedimentary rocks are also flanked by an older Precambrian metamorphic and igneous terrain. Rocks associated with the anomaly are gabbros and possibly basalts, which are overlain in places by clastic rocks similar to those exposed in Minnesota. Therefore, these rocks appear to be a subsurface continuation of the 1,100 m.y. Keweenawan Series (References 15, 202 and 136). Where control is available, it can be shown that the mafic rocks are bordered on the east and west by high-angle faults (References 202, Figure 5; and 136, Figure 3).

Along the western margin of the MGA in Minnesota and Wisconsin, the Keweenawan volcanic rocks are separated from associated clastic rocks by the steeply dipping Douglas fault. This fault is mapped at the surface and, by using aeromagnetic data, can be extended southward for about 25 miles beneath the Paleozoic cover (Reference 136, p. 2191). A postulated subsidiary feature, the Pine Plains fault, is located east of and extends south of the Douglas fault. The Lake Owens fault in Wisconsin appears to be located near the eastern margin of the MGA. In southwestern Wisconsin and northern Minnesota, gravity and magnetic data show that the steeply westward dipping Hastings fault bounds Keweenawan basalt on its eastern margin (Reference 136, p. 2191-2,192). The spacing of aeromagnetic contour lines suggests the presence of similarly located faults in the Precambrian basement of central Kansas (Figure 2.5-9). The inferred eastern border fault is the contact zone between the Central North American Rift System to the west and the Nemaha Uplift to the east and appears to underlie the Irving Syncline (USAR Sections 2.5.1.1.5.1.15). The MGA appears to have been a Precambrian zone of rifting, sedimentation, and igneous activity at approximately 1,100 m.y.

Other Anomalies - A series of strong positive anomalies in the Forest City Basin is a prominent feature on the aeromagnetic map of eastern Kansas (Figure 2.5-9). From a comparison of geologic sections, magnetic profiles, and the aeromagnetic map, there appears to be little correlation between structure or configuration of the basement rocks and these magnetic anomalies (Figure 2.5-7; Reference 328, p. 157, 160 and 162). On a regional scale, there appears to be little or no correlation between these strong magnetic anomalies and Bouguer gravity anomalies (Figures 2.5-8 and 2.5-9; Reference 1, p. 149). Locally, three of the strong magnetic anomalies in the Forest City Basin appear to have associated weak gravity highs (Reference 328, p. 172; Reference 272, p. 15). A similar, but weaker magnetic anomaly is located in Coffey County approximately 2 miles west of the site. This magnetic anomaly does not appear to have an associated gravity anomaly (Reference 276). However, the results of this and other studies of the Forest City Basin magnetic highs were inconclusive. In general, these geophysical anomalies appeared to be the result of density - magnetic (i.e. lithologic) contrasts within the basement, but not necessarily at the basement surface (Reference 272, p. 15), and did not appear to represent basement configuration. More recently, drilling was completed on one of these circular anomalies, in Miami County, on December 10, 1979 (Figure 2.5-14a - Feature A). The basement rock is coarse-grained granite composed essentially of microcline-perthite, plagioclase, quartz, biotite, and minor muscovite along with accessory minerals. This rock contains about 2 percent magnetite by weight; enough to account for the positive magnetic anomaly (References 246 and 281). A boring on a circular anomaly in Douglas County

was completed on March 19, 1980 (Figure 2.5-14a - Feature B). This rock is a medium-grained granite, mineralogically almost identical to the sample from Miami County. Uranium-lead ages on zircons indicate any age of 1361±6 m.y. from the Miami County sample and 1339±12 m.y. from the Douglas County sample. These circular anomalies, therefore, appear to be mineralogically similar and contain relatively abundant magnetite and sphene. These data suggest that the almost-circular, strong positive magnetic anomalies underlying the Forest City Basin are caused by Precambrian granite intrusions containing a relatively high amount of magnetite.

2.5.1.1.5.1.18 LANDSAT Lineaments

Lineaments in eastern Kansas visible on multiseasonal LANDSAT MSS 5 and MSS 7 imagery were mapped by Reference 166. Figure 2.5-14a is a composite of the aeromagnetic and LANDSAT lineament maps published by the Kansas Geological Survey (Reference 166 and 284). This composite was used to determine which LANDSAT lineaments appear to coincide with aeromagnetic anomalies or trends in contour lines. Figure 2.5-14b is a composite of the LANDSAT lineament map and the map of the Precambrian basement surface (Reference 45). The latter map was used to determine which LANDSAT lineaments appear to coincide with trends or structures in the basement surface.

Lineament No. 1 has the longest trace in eastern Kansas. Lineaments No. 2 through No. 8 appear to correspond to features on both the aeromagnetic and basement surface maps. Lineaments No. 9 through No. 24 appear to correlate with aeromagnetic anomalies or trends in magnetic intensity contour lines. Lineaments No. 25 through No. 34 appear to correspond with either structures or topographic contour trends in the basement surface.

Only a short portion of Lineament No. 1 appears to coincide with the trend of aeromagnetic intensity contours. This lineament, informally termed the "Neosho Lineament" by Reference 272 marks an approximately 90-mile long straight segment of the Neosho River. A segment of approximately 29 miles appears to coincide with trends in magnetic intensity contours (Figure 2.5-14a). Although a northwest-trending grain is apparent in the basement, no known features correspond with the "Neosho Lineament" (Figure 2.5-14b). This lineament is not visible on the map of the Precambrian surface or on structure contour maps of the Arbuckle, Mississippian, Kansas City, and Lansing rocks (Reference 177, 175, 176, 45 and 270). Lineament Group No. 2 corresponds with geophysical anomalies and basement trends associated with the Central North American Rift System (Figures 2.5-14a and 2.5-14b). Lineament Group No. 3 appears to be associated with the Nemaha Uplift (Figures 2.5-14a and 2.5-14b). Lineaments 4, 5, and 6 correspond,

in part, to geophysical anomalies and trends in the basement surface. These lineaments are located near northwest-trending faults in the basement surface that crosscut the Nemaha Uplift (Figures 2.5-14a and 2.5-14b). Lineament No. 6 appears to overlie one of these faults. Lineaments No. 7 and No. 8 may be reflections of the Abilene Anticline.

Lineaments 9 through 12 correspond with either the Nemaha Uplift or CNARS. Northwest-trending Lineament No. 13 crosscuts the Nemaha trend and is the northeast boundary of a rectangular area of lower magnetic intensities and gentler gradients. This lineament corresponds to a structurally complex area on the map of the Precambrian surface and is located near deflections in contour lines at the base of the Kansas City Group (Figure 2.5-14a and Reference 270). Lineament No. 14 is the northeast-trending, northwestern boundary of the area discussed above (Figure 2.5-14a). Lineaments No. 15 through 21 appear to correspond with trends in the aeromagnetic intensity map. Lineament No. 17 may be related to a Precambrian intrusive (USAR Section 2.5.1.1.5.1.17). Curvilinears No. 22 and No. 23 are associated with Precambrian intrusives (USAR Section 2.5.1.1.5.1.17). Curvilinear No. 24 corresponds with an intense magnetic low circular anomaly within a broad east-west trending zone of low magnetic intensity.

Lineament No. 25 corresponds with a fracture zone or inferred fault that may be a northwestward continuation of the Chesapeake Fault Zone (Figure 2.5-14b; also see USAR Section 2.5.1.1.5.2). Northwest-trending Lineaments No. 26 through No. 29 appear to correspond with contour trends in the Precambrian surface (Figure 2.5-14b). Lineaments No. 30 through 33 appear to be related to the Nemaha Uplift (Figure 2.5-14b). Curvilinear No. 34 is located above a depression in the Precambrian surface (Figure 2.5-14b).

In summary, northeast-and northwest-trending lineaments are predominant in eastern Kansas. Most northeast-trending lineaments, which correspond with geophysical or Precambrian surface features, are related to the CNARS or Nemaha Uplift. Most north-west-trending features appear to be related to Precambrian basement terrane. Curvilinears 23 and 24 appear to correspond with younger Precambrian granites that have intruded older Precambrian terrane. Faulting in the vicinity of Lineaments No. 4, 5, and 6 is discussed in USAR Section 2.5.1.1.5.2 (Faults No. 24). On the basis of current data, the "Neosho Lineament" does not appear to be related to structure in the basement of overlying sedimentary rocks.

All of the lineaments shown in Coffey County on the LANDSAT lineament map of eastern Kansas (Reference 166) are discussed below. These lineaments are identified by number and shown on Figures

2.5-14c and 2.5-14d. The LANDSAT lineament map was compared with the following references:

- State geological map (Reference 125);
- Kansas state base map (Reference 263);
- Aeromagnetic map of eastern Kansas (Reference 284; Figure 2.5-9);
- Bouguer gravity map of southeastern Kansas (Reference 282);
- Configuration of the Precambrian surface (Reference 45);
- Gelogic map of the Precambrian basement (Reference 15);
- Figure 2.5-15 - Regional Fold Map; and
- Figure 2.5-16 - Regionl Fault Map.

On the basis of this comparative analysis, all of the LANDSAT lineaments in Coffey County appear to be geomorphic in origin. Whereas this analysis has determined that these lineaments do not correspond with the location of documented folds or faults; anomalously straight segments of stream channels may be controlled by a locally well-developed joint system. Closely-spaced joints often result in preferential erosion of a linear stream segment.

As discussed in USAR Section 2.5.1.1.5.1.18, Lineament No. 1 is a portion of the "Neosho Lineament" (Reference 272). A 29-mile long segment, southeast of the site in northeastern Woodson County, appears to coincide with trends in magnetic intensity contours (Figure 2.5-14a). Lineament No. 1A is a portion of the Neosho Lineament extending from Emporia, Kansas to John Redmond Reservoir, west of the site. This lineament is defined by the channel of the Neosho River and has no signature on the aeromagnetic map. Part of Lineament No. 1A coincides with an intense gravity low west of the site, but the lineament also cross-cuts the Bouguer gravity contour lines. This gravity low does not coincide with the aeromagnetic contours, and geophysical evidence for basement control of this lineament is not convincing. As noted, the "Neosho Lineament" is not visible on the map of the Precambrian surface on structure contour maps of overlying marker beds. The "Neosho Lineament", therefore, appears to be geomorphically, rather than structurally, controlled.

As noted, portions of Lineaments No. 1 and No. 26 in Woodson County appear to coincide with contour trends on the map of the Precambrian surface. This trend appears to be partly coincident with the southwestern and northeastern flanks of the Neosho Falls

Dome. Lineament No. 26 is a relatively straight segment of the Neosho River channel between the confluence of Turkey Creek, the South Fork, and the Neosho River, southwest of LeRoy, and the town of Iola. It is conceivable that parts of these lineaments are controlled by closely spaced joints. Structure contour maps of overlying sediments show no evidence of faulting.

Lineament No. 35 corresponds with a southeast flowing tributary to the South Fork of the Neosho River. This stream cuts through upland terrace deposits of chert-gravel alluvium into bedrock. This lineament is geomorphic in origin. Parallelism with aeromagnetic contours appears to be fortuitous.

Lineament No. 36, in south-central Coffey County, corresponds with the northeast flowing South Fork of the Neosho River. According to the geologic map of Kansas, the northwest bank of the stream appears to be composed of more resistant limestone in one area and chert-gravel alluvium in another segment.

The portion of Lineament No. 37 in Anderson County appears to coincide with a drainage divide between Kenoma and Elm Creeks, northwest of Harris, Kansas. This drainage divide appears to project northwestward into Coffey and Osage Counties.

Lineament No. 38 coincides with a northwest-to-southeast flowing tributary to Pottawatomie Creek.

Lineament No. 39 trends northeast-southwest. The southwestern portion, west of Sharpe, corresponds with southward flowing Long Creek. The stream is flowing parallel to the strike of rocks belonging to the Shawnee Group. Northeast of Williamsburg, the stream is located adjacent to a cuesta formed by the more resistant Toronto Limestone Member of the Shawnee Group.

Lineament No. 40 corresponds, partly, with northeastward flowing Long Creek and, partly, with a tributary to Long Creek. A steep stream bank is underlain by relatively more resistant Lecompton Limestone (Reference 204).

Lineament No. 41 corresponds with Long Creek and an eastern tributary to Long Creek, west of Burlington, Kansas. At this location, the stream is flowing at the base of a cuesta underlain by Toronto Limestone. This erosional scarp marks the contact between the Shawnee and underlying Douglas Groups.

Lineament No. 42 corresponds with Turkey Creek, which is a northeast flowing tributary to the Neosho River. This lineament also appears to be geomorphically controlled.

Lineaments No. 43 and No. 44 appear to be erosional in nature and partly controlled by streams flowing along the base of limestone supported banks. Lineament No. 45 appears to correspond with a linear drainage divide northeast of Ottumwa. Curvilinear No. 46 can be divided into three sections. The southwest portion corresponds with Long Creek, west of Burlington, Kansas. The southern portion is formed by the Neosho River near the town of LeRoy. The eastern portion is formed by Indian Creek.

The preceding section addressed the occurrence and origin of LANDSAT lineaments within Coffey County (the site county), Kansas. Nine lineaments discussed in USAR Section 2.5.1.1.5.1.18 appear to be structurally controlled (two folds, seven faults). In addition, several other lineaments appear to correspond with folds and faults shown on Figures 2.5-15 and 2.5-16. These lineaments are identified on Figures 2.5-14c and 2.5-14d.

Lineaments No. 2 and No. 9 correspond with the Abilene Anticline (Fold No. 6 - Figure 2.5-15 and Table 2.5-3). The Abilene Anticline is located above a topographically high area on the Precambrian surface close to the geophysical maxima reflecting the Midcontinent Geophysical Anomaly.

Lineament No. 5 corresponds with Fold No. 33 and Fault No. 24 (Figure 2.5-15, Table 2.5-3; Figure 2.5-16, Table 2.5-10). The northwest trending Cedar Creek syncline overlies a graben in the Precambrian surface (see USAR Section 2.5.1.1.5.2, page 2.5-34).

Lineaments No. 3 and No. 10 correspond with segments of the Humboldt fault zone (Fault No. 2 - Figure 2.5-16, Table 2.5-10). Lineament No. 3 corresponds with a steep slope on the Precambrian surface (eastern margin of Nemaha Uplift).

Lineament No. 10 corresponds with a trend on the aeromagnetic map. Lineament No. 32 corresponds with Faults 25 and 30 (Figure 2.5-16, Table 2.5-10) and reflects part of the Humboldt fault zone.

Lineament No. 55 may reflect Fault No. 16 (Figure 2.5-16, Table 2.5-10), part of the Nemaha Uplift system of faults (see USAR Sections 2.5.1.1.5.1.9 and 2.5.1.1.5.2).

Lineament No. 31A, in Wabaunsee County, corresponds with Fault No. 20 in the Precambrian surface (Figure 2.5-16, Table 2.5-10), which trends northwest across the Humboldt fault zone.

Lineament No. 28 corresponds partly with a depression in the Precambrian surface and is located close to a possible northwestward projection of the Eldorado Springs North fault zone (Fault No. 69 - Figure 2.5-16, Table 2.5-10; and USAR Section 2.5.1.1.5.2.

Lineament No. 28 corresponds partly with a depression in the Precambrian surface and is located close to a possible northwestward projection of the Eldorado Springs North fault zone (Fault No. 69 - Figure 2.5-16, Table 2.5-10; and USAR Section 2.5.1.1.5.2, page 2.5-34). Lineaments Nos. 47 and 48 may correspond to the axis of the Brownville Syncline, the deepest portion of the Forest City Basin (Fold No. 5 - Figure 2.5-15, Table 2.5-3). Lineament No. 49 corresponds with Fold No. 21 and Fault No. 22 (Figure 2.5-15, Table 2.5-3; Figure 2.5-16, Table 2.5-10). This lineament reflects the northeast trending John Creek Anticline, which is part of the faulted east flank of the Alma Anticline. Lineaments Nos. 50, 51, 52, and 53 may be related to the northeast trending Reese, Beaumont, Countryman, and Winfield anticlines, respectively (Folds Nos. 44, 45, 63, and 57, respectively - Figure 2.5-15, Table 25-3). These folds occur in sedimentary rock above the basement, have been mapped at the surface, and mapped in the subsurface using structure contours.

Curvilinear 54 coincides with the location of the northwest trending Florence-Urshel anticline in Marion County (Fold No. 29 - Figure 2.5-15, Table 2.5-3). Curvilinear 56 appears to be related to unnamed faults shown on structure contour maps of Silurian- Devonian "Hunton" rocks (Reference 175) and on top of Mississippian rocks (Reference 332). These faults, however, are not visible on the structural contour map of the base at the upper Pennsylvanian Kansas City Group (Reference 270). (Also see Figure 2.5-16, Table 2.5-10).

The 1867 MMI VII Manhattan, Kansas earthquake may have occurred along a fault in the basement beneath, or adjacent to, the Abilene Anticline (see Figure 2.5-64 and USAR Sections 2.5.1.1.5.1.15 and 2.5.2.1). There is no evidence to relate this earthquake to either Lineament No. 2 or No. 9. In fact, Reference 85 has relocated the epicenter of this event eastward to the vicinity of Wamego (see USAR Section 2.5.2.1).

Most of the significant earthquakes within 200 miles of the site can be associated with the Nemaha Uplift or the adjacent Central North American Rift System (USAR Section 2.5.2.3). Figures 2.5-64 and 2.5-75 indicate that many of these earthquakes are associated with the east or west flanks of the Nemaha Uplift. Although these zones appear to be seismogenic, there is no evidence, to date, relating epicentral locations to any particular lineament. Other earthquake epicenters shown on Figure 2.5-64 cannot be related with any degree of certainty to a particular LANDSAT lineament.

2.5.1.1.5.1.19 Recent Studies

References 281 and 246 document the results of investigations performed to define more precisely geological and geophysical characteristics of the buried Precambrian basement of Kansas.

These publications strongly support the Applicant's earlier interpretations, presented in this document, of several features within the basement and, therefore, do not affect the previous conclusions regarding site safety.

Both of these publications have been referred to in USAR Sections 2.5.1.1.5.1.17 and 2.5.1.1.5.1.18. Reference 281 discusses the aeromagnetic survey and the resulting aeromagnetic anomaly map. The aeromagnetic map of eastern Kansas, available from the Kansas Geological Survey, were reproduced as Figure 2.5-9 and is referred to in Section 2.5.1. The three major features described by Reference 281 are the Central North American Rift System (CNARS), a large east-west trending negative anomaly and the group of strongly positive, circular aeromagnetic anomalies in the Forest City Basin.

The buried CNARS is reflected by northeast-trending positive aeromagnetic anomalies and closely spaced contour lines in the north central portion of Figure 2.5-9 (see USAR Section 2.5.1.1.5.1.17). Several lineaments visible on LANDSAT imagery appear to correspond with features on the aeromagnetic and basement surface maps that are apparently associated with the CNARS (Lineament Group No. 2 - Figures 2.5-14a and 2.5-14b). Lineament Group No. 3 appears to be associated with the Nemaha Uplift (USAR Section 2.5.1.1.5.1.18, Figures 2.5-14a and 2.5-14b).

Reference 281 confirms interpretations stated in Sections 2.5.1 and 2.5.2 that the CNARS appears to extend southward into southern Kansas and Oklahoma and that mafic volcanics did not reach the Proterozoic surface in southern Kansas. In southern Kansas, the CNARS appears to be represented by prominent magnetic lineaments. Reference 281 indicates that the rift in southern Kansas may not have progressed beyond the stage of block faulting and possibly dike intrusion. Reference 281 also supports the hypotheses inferred in Section 2.5.2.2 that the Nemaha block and bounding faults might be related to the formation of the CNARS (i.e., the Nemaha block was topographically higher and not involved in subsequent foundering). These data do not alter interpretations presented in Section 2.5.2.

The second major feature, an east-west trending aeromagnetic low centered about Wichita, may, according to Reference 281, reflect a crustal boundary between a northern 1,625 million-year-old (m.y.) mesozonal granitic terrane and a southern 1,400 m.y. epizonal granite and rhyolite terrane. Precambrian basement lithologies are discussed in USAR Section 2.5.1.1.4.1. This anomaly had previously been discussed by Reference 325 and by Reference 272. Structure contour maps on the top of Cambro-Ordovician Arbuckle rocks, Silurian-Devonian "Hunton" rocks, Mississippian rocks, the Upper Pennsylvanian Lansing Group and on the base of the Upper

Pennsylvanian Kansas City Group do not indicate a geologic structure associated with this large negative anomaly (References 176, 175, 177, 270 and 332). In addition, this large negative magnetic anomaly is not marked by a concentration of historic macro- or microearthquake epicenters. Although the source of these magnetic lows is not clear, this basement feature does not appear to be significant to site safety.

The third major geophysical feature discussed by Reference 281 and 246 is the group of circular, strongly positive magnetic anomalies in the Forest City Basin (see USAR Section 2.5.1.1.5.1.17). These features and the aeromagnetic survey of Kansas were also discussed at a meeting in the NRC offices (Docket No. 50-482, April 20, 1976). Earlier interpretations which indicated that these features are the results of density-magnetic (i.e., lithologic) contrasts within the Precambrian basement were confirmed by two deep borings (References 246). These circular, strongly-positive, magnetic anomalies appear to result from Precambrian granitic intrusives (containing approximately 2 percent magnetite) which intruded older Precambrian granitic crust (see USAR Section 2.5.1.1.5.1.17 and Figure 2.5-14a; References 246 and 281). These data provide further confirmation that the magnetic highs do not represent upfaulted basement blocks. These anomalies, therefore, are not significant to site safety.

References 282, 247 and 248 were also reviewed and are discussed below as inter-related data.

The Bouguer gravity maps of northeastern and southeastern Kansas (References 282 and 283) were spliced together to produce the composite in Figure 2.5-8a. The most striking feature on Figure 2.5-8a is the large, northeast trending, positive gravity anomaly located in the northwestern portion of the map. This positive gravity anomaly reflects mafic intrusives or lava flows related to the buried Central North American Rift System (CNARS) (See USAR Section 2.5.1.1.5.1.17 and Figures 2.5-7 to 2.5-10). The flanking gravity lows reflect the presence of Precambrian clastic deposits associated with this ancient rift (See USAR Section 2.5.1.1.5.1.17 and Figures 2.5-13 and 2.5-14; and Reference 248).

A relatively steep north-trending gravity gradient located just east of N40.0° - E96.0° appears to be related to the Humboldt fault zone. The gradient curves toward the west about 20 km south of the Nebraska border. This curvature may reflect either a branch of the Humboldt fault zone or an indirect relationship between the gravity gradient and fault zone (Reference 248). The origin of the gravity low in the Forest City Basin (northeastern part of Figure 2.5-8a) is not known (Reference 248).

A comparison between aeromagnetic and gravity anomaly maps (Figures 2.5-8a and 2.5-9) shows that, in general, the circular pos-

itive aeromagnetic anomalies in the Forest City Basin are not associated with positive gravity anomalies. The origin of these aeromagnetic anomalies (younger Precambrian granites intruded into older Precambrian granite terrane) has been discussed elsewhere and accounts for the absence of corresponding positive gravity anomalies (USAR Section 2.5.1.1.5.1.17).

An almost circular gravity low (-65 to -67 mgal) in Osage County, approximately 15 miles due north of the site corresponds with a circular positive aeromagnetic anomaly (1000 to 2000). The coincidence of a magnetic high and gravity low may indicate that the underlying crust contains an intrusion different in composition from the Miami and Douglas County Precambrian granites (Reference 246).

Reference 248 discusses the closely spaced aeromagnetic contours in Osage County (north of Coffey Co.) that curve sharply from a northwest to a northeast trend, the "Osage elbow". The reference infers that this feature reflects block faulting in the crystalline basement that may have effected overlying sediments during the Pennsylvanian. There is no directly comparable feature on the Bouguer gravity anomaly map.

A gravity low at approximately 37° 42'N, 96° 26'W lies within the Wichita aeromagnetic low (Figure 2.5-8a; and Reference 281). The shapes of these lows are not coincident and the origin of the Wichita low is not known. An area of relatively high Bouguer gravity values is located in extreme southeastern Kansas (Figure 2.5-8a). This gravity high encompasses an area containing isolated positive aeromagnetic highs. The region of high gravity values may represent Precambrian felsic volcanic terrane whereas coincidence with aeromagnetic highs may reflect undiscovered mafic intrusions (Reference 15).

It is interesting to note that contour trends visible on the 1964 Bouguer gravity map of the United States (Figure 2.5-8) have been defined in greater detail on Figure 2.5-8a. This observation can be corroborated by following the -60 mgal contour at the site on Figure 2.5-8 and comparing it with the -60 mgal contour on Figure 2.5-8a. This comparison indicates that the major northeast and northwest trends visible on Figure 2.5-8 have been defined in greater detail by recent surveys.

The Bouguer gravity map of southeastern Kansas shows that there are no closely spaced contours indicating sharp gravity gradients in Coffey County (Reference 283). Detailed analysis of the Bouguer gravity map, other geophysical data and subsurface data will add to our knowledge of crust and mantle structure beneath eastern Kansas. On the basis of these data, there are no indications of crustal features that may represent a hazard to site safety.

Reference 247 lists all microearthquakes recorded by the Kansas Geological Survey's microearthquake network between 1977 and May 1, 1981. Maps showing these epicentral locations show no new trends that have not been discussed elsewhere (Reference 247; and USAR Section 2.5.2). Microearthquakes in Nemaha and Wabaunsee counties and in southern Cowley County appear to have occurred along segments of the Humboldt fault zone. Two epicenters are located in the vicinity of a northwest trending fault on the Precambrian surface, northeast of lineament No. 6 (Figure 2.5-8a; Fault No. 24 - Figure 2.5-16, Table 2.5-10). Other microearthquake epicenters occur along the northwest margin of the CNARS. As discussed in USAR Section 2.5.2.3, this microearthquake activity indicates that portions of the Humboldt fault zone and margins of the CNARS appear to be seismogenic.

According to Reference 247, a sensitivity analysis of the Kansas microearthquake network indicates that magnitude 1.5 earthquakes will be detected within 200 miles of the site toward the northwest, north and northeast. Magnitude 1.5 earthquakes occurring within 140 miles toward the southeast will be detected. The microearthquake network will detect all magnitude 2.0 quakes within 200 miles of the site, except for parts of northwestern Arkansas and southcentral Missouri. The network will detect all earthquakes as small as magnitude 2.2 within 200 miles of the site.

The data summarized above are significant to site safety in that seismicity appears to occur along segments of the Humboldt fault zone, Nemaha Uplift faults and CNARS border faults, consistent with conclusions stated in USAR Section 2.5.2. In addition, no microearthquake trends have appeared in the site vicinity or along previously unknown structures.

Reference 248 discusses the structure and tectonic history of the Salina and Forest City basins and the intervening Nemaha ridge and anticline. Seismic reflection data confirm statements presented in this document. In summary, Reference 248 states:

- The Nemaha Uplift basement consists of cataclastically deformed granite;

- The Humboldt fault zone is an approximately 200 m wide zone of complex deformation rather than a single, continuous fault;

- Folding and faulting of Pennsylvanian sediments indicates that continuous or sporadic uplift of the Nemaha ridge occurred contemporaneously with Pennsylvania sedimentation;

- Faulting along the Humboldt fault zone in northern Nemaha County affects Permain rocks but based on the interpretation of seismic reflection records, displacement may be on the order of 12 m, rather than 50-75 m (Reference 84);

- The pattern of microearthquake epicenters indicates that many faults along the Nemaha Uplift have been experiencing slight adjustments at depth. Earthquakes have been occurring within a wide zone of deformation rather than along one continuous fault; and

- Microearthquakes in Washington, Republic and Cloud counties appear to be related to faulting within the CNARS. Epicenters in Barber County are probably related to basement faults associated with a southeastward extension of the CNARS.

Reference 248 hypothesizes that petroleum and mineral deposits in the Forest City Basin may be more widespread than previously believed and may have formed due to the passage of a mantle hot spot beneath Kansas during the Cretaceous. If this hypothesis proves to be correct, there will be no adverse impact on the site because the Applicant controls all mineral rights within the site boundaries.

The publications discussed above are significant in that they contribute further to our knowledge of geology and seismology in the site region. The data contained within these publications supports statements contained within this document concerning geologic structures, tectonic history, geophysical anomalies, and seismicity. There are no data within these publications that indicate the existence of a feature that would represent a hazard to site safety

2.5.1.1.5.2 Regional Faulting

The distribution of faults within the area of investigation is shown in Figures 2.5-16 and 2.5-17; their characteristics are detailed state by state in Tables 2.5-8 through 2.5-13.

The attitude of faults clusters about three general trends within the region; N20° E, N50° W, and N65° E. The faults tend to be high angle displacements of the Precambrian surface and range from inferred fracture zones with no known displacement to over 3,000 feet. Faults exposed at the surface are mainly the result of tectonic adjustments. Other faults are the result of block slumping, landslides, or penecontemporaneous subsidence resulting from differential consolidation of sediments. No major faults have been confirmed within 15 miles of the plant site.

The age of the faulting is established by determining the age of the oldest stratum which overlies the fault and is not cut by the fault. In those cases where the faulting occurs at the earth's surface, the age of faulting is based on the interpretation of the tectonic history as related to the geologic history.

The N20°E trending Humboldt fault zone in eastern Kansas and Nebraska, the Chesapeake Fault Zone in southeastern Kansas and southwestern Missouri, and the Thurman-Wilson Fault in southeastern Nebraska and southwestern Iowa represent the longest fault zones within the region. The N20°E trending Humboldt fault zone is discontinuous, but traceable, and extends from Oklahoma through Kansas into Nebraska. This feature is apparently the result of crustal adjustments along the eastern side of the Nemaha Anticline. These faults are considered to be Paleozoic in age.

The Humboldt fault zone is a discontinuous series of faults along the eastern margin of the Nemaha Uplift (Section 2.5.1.1.5.1.9). This zone can be traced to approximately 50 miles west of the site at its closest approach (USAR Section 2.5.1.1.5.1.9 and Figure 2.5-7). Examination of the east-west regional geologic cross section indicates that strata younger than Mississippian are not displaced along the Humboldt fault zone 50 miles west of the site (Figure 2.5-6). Structure contour maps of the top of the Mississipian (Reference 332), the base of the Upper Pennsylvanian Kansas City Group (Reference 270), and the top of the overlying Lansing Group (Reference 177) indicate no fault offset of beds along the trace of the Humboldt fault zone west of the site. Deformation along the Humboldt fault zone is no younger than post-Mississippian, pre-Middle Pennsylvanian at its closest approach to the site.

Recent mapping in northeastern Kansas and southeastern Nebraska suggests that deformation has occurred along northern portions of the Humboldt fault zone in post-Permian time (Reference 29, p. 8-9; 84, p. 16-17; and 249, p. 136-137 - also see USAR Section 2.5.1.1.5.1.9). Fault displacement appears to decrease southwestward (Reference 272, p. 21). In Pottawatomie County, Kansas, faulting has resulted in vertical displacement of Late Silurian or Early Devonian through Mississippian rocks. In the northeastern part of the county, faulting was inferred to have offset the base of the Kansas City Group (Upper Pennsylvanian). This marker and Upper Pennsylvanian through Lower Permian rocks appear to be folded or draped across the trace of the Humboldt fault zone in the southern part of the county (Reference 272, p. 21; and 270). It appears, therefore, that only in northern Kansas and southern Nebraska has post-Upper Pennsylvanian faulting occurred along the Humboldt fault zone.

During a recent detailed investigation, Reference 84 did not directly observe faulting in Quaternary sediments along the trace of the Humboldt fault zone. It inferred, from geomorphic data, that faulting may have altered the drainage pattern in Kansan-age glacial till. Reference 84, p. 28) states: "The absence of bedrock exposures and the nature of unstratified material make it difficult to establish faulting as the cause . . ." of the lineament formed by two streams.

The Kansas Geological Survey has continued to investigate the lineament described by Reference 84) near Baileyville in Nemaha County, Kansas. A seismic profile was run at approximately right angles to, and across, the trend of the two streams discussed above, which are incised in unconsolidated soil and underlying Kansan-age glacial till. The processed data indicate that shallow subsurface marker beds are offset 30 to 50 feet, down to the west, across an inferred N15° W-trending fault located beneath the creeks. This up on the east, down on the west displacement along a N15°W-trending fault may have occurred in response to right lateral wrench faulting along the southeastern margin of the Central North American Rift System or other subparallel northeast-trending faults in the crystalline basement during the Cretaceous (Table 2.5-16; also see USAR Section 2.5.2.2). Reference 312, written communication - Table 2.5-16) has interpreted the geomorphic features at the Baileyville site (i.e., the stream divide west of the creeks is approximately 40 feet higher than that on the east and asymmetric tributary development to the west of the streams) as a result of displacement along a preexisting fault due to differential movement resulting from glacial rebound. Although the precise age of the inferred glacial rebound has not been rigorously proven, it is assumed to be post-Kansan, possibly Recent (Holocene) (Reference 312).

Excluding the Humboldt fault zone, twelve faults occur 50 miles or closer to the site. The Chesapeake fault zone (Fault No. 1, 36 miles east of the site, Figure 2.5-16 and Table 2.5-10) does not occur at the surface in Kansas (Reference 291). This fault was originally mapped along a 25-mile segment from Lawrence to southern Dade counties, Missouri. In this segment, where the fault can be proven to exist, it is dated as pre-Pennsylvanian, because it is overlain by Pennsylvanian-age channel sandstone (Reference 168, p. 19). Control for extending this structure further westward into Dade county and Kansas is extremely sparse (Figure 2.5-18). Because of insufficient data to define a fault, Reference 43 extension of the structure into eastern Kansas was inferred and was intended to reflect a northwestward continuation of the fault as a fracture zone (Reference 291).

Fault Numbers 69 and 70 (Figure 2.5-16 and Table 2.5-10), which had not been shown on previous maps of the Precambrian surface, appear on a recent map (References 43 and 45). Fault Number 69 appears to be a possible extension of the Eldorado Springs North (Bolivar-Mansfield) trend northwest from Missouri. The extension of this zone into Kansas is based on very sparse data. This zone had previously been interpreted as a valley on the basement surface (Reference 43). Fault Number 70 is based on sparse control and had also been interpreted previously as a bedrock valley. An extension of the latter fault is not mapped to the southeast in Missouri (Reference 5; and 168, Plate 1). Both faults are not shown on the structure contour or isopach maps of the Arbuckle Group. Therefore, if they exist, they would be pre-Middle Ordovician (Reference 44, Plate 1; 174, p. 204).

Merriam's (Reference 332) structural contour map on the top of the Mississippian shows no offset which indicates that Fault Number 7 (Figure 2.5-16 and Table 2.5-10) is also pre-Pennsylvanian. Faulting cannot be proven along the trend of Fault Number 7 because of lack of control (References 43 and 291) but was inferred from estimates of depth to the Precambrian surface (Reference 45).

Faults Number 24 (approximately 50 miles west of the site) appears to represent a graben in the Precambrian surface (Reference 45). An inferred fault offsetting the base of the Kansas City Group is in the same area as Faults Number 24 (Figure 2.5-6). This fault, if it exists, would be pre-Late Pennsylvanian because it does not appear to offset the top of the overlying Lansing Group (Reference 177).

The band of faults trending northeast to the north of the site (Faults 8, 9, 10, 11, and 12 on Figure 2.5-16) and Fault Number 5 to the southeast of the site appear to be associated with disturbance during Pennsylvanian deposition. These faults do not extend below the Stanton Limestone and are considered to be nontectonic (Figure 2.5-12 and Table 2.5-10). These faults appear to have resulted from differential compaction along the edges of channel-deposited sandstones. These faults appear to have developed after deposition of the Stanton Formation and prior to deposition of the Kanwaka Formation (Reference 203, p. 62-69; Reference 308, Reference 204, p. 19-20; Reference 330, p. 20; Reference 8).

Fault Number 6, southwest of the site, is associated with emplacement of the Silver City Dome, and therefore is Cretaceous in age (References 285 and 266).

Faulting in those portions of Nebraska which lie within 200 miles of the site is associated with the Forest City Basin and the Nemaha Anticline. According to Reference 287),

> "interpretation of the geologic history suggests that these features started to develop during the Ordovician and were fully developed by Pennsylvanian time. Based on the structural development of these features, [it is inferred] the major faulting is Late Mississippian in age. [Recent mapping indicates that some faulting occurred in post mid-Permian time (Reference 29, p. 8)]. Undisturbed Pleistocene deposits overlie faults throughout the area."

Therefore, surface faulting is interpreted to be pre-Pleistocene in age.

Reference 309 considers "all faulting to be pre-Quaternary in age because of the undisturbed Pleistocene age deposits which overlie the faults throughout the area." The faults are associated with the Thurman-Redfield structural zone. It also states that

> "interpretation of its geologic history suggests that these features started to develop during the Precambrian and apparently were fully developed by the close of Pennsylvanian time. Based on the structural development of these features, [it is inferred] faulting is pre-Cretaceous in age".

In western and southern Missouri, faulting is reported to have occurred during the Precambrian, Cambrian, Early Ordovician (pre-St. Peter), Late Missisippian (pre-Pennsylvanian), and Pennsylvanian. The Missouri Geological Survey reports that there are no faults younger than 35,000 years in that part of Missouri within 200 miles of the site (Reference 296).

In northern Arkansas (Reference 35, p. 10), the faults are generally high-angle, normal faults with small vertical displacements. There are some faults which have horizontal displacements. The normal faults tend to be downthrown on the south or east. The faulting is considered to have occurred from Middle Mississippian through the end of Pennsylvanian time.

Surface faulting in northeastern and north-central Oklahoma is believed to be Pennsylvanian and Permian in age. Movement along these faults is thought to have ceased before the Triassic, because the major structures in the area were fully developed prior to the Triassic. The Oklahoma Geologic Survey (Reference 303) considers "all the faulting to be pre-Quaternary in age, because undisturbed Quaternary deposits overlie the faults in many places."

The Quaternary deposits which overlie the faults consist of both Recent alluvial deposits and pre-Recent, Pleistocene terrace deposits. While a high-level terrace in north central Oklahoma contains a Pearlette ash, which has been dated as late Kansan in

age, the age and relationship of other terraces is not accurately known and, therefore, may be only dated as Wisconsinan or older, or approximately 10,000 years before the present.

Many small en-echelon faults have been mapped in northeastern Oklahoma, and the number of faults known is much greater than in adjacent southeastern Kansas. There are three possible explanations for this phenomenon:

1. The majority of faulting is thought to have occurred during the Ouachita Uplift. Therefore, forces would dissipate outward and the faulting frequency would decrease with distance;

2. The fault occurrences generally become less numerous and well-defined as the surface formations become more shaley to the north;

3. The area of Oklahoma with numerous faults has been more extensively mapped. There have been numerous investigations in this area and the results of these have been incorporated into the state geologic map.

A more accurate explanation probably falls somewhere among the three theories. The fault map of Oklahoma, shown on Figure 2.5-17, indicates that fault frequency does decrease northward and westward from the Ouachita Mountains. However, there is no reason to assume that faulting ceases at the state line; therefore, small faults which have not been identified possibly exist in Kansas.

Reference 268 shows a close correlation between the joint pattern in south-central Kansas and pattern of joints and en-echelon faults in Oklahoma. These were also studied and described by Reference 333 as radiating outward from the Ouachita Mountains. Therefore, the major reason for less faults being mapped in Kansas is that less faults occur. The tectonic forces apparently dissipated outward from the Ouachita Mountains during the initial Ouachita Uplift, resulting in the formation of joints beyond the area of faulting.

Reference 268 states that the belief that the faulting in south-central Kansas is older than jointing and that jointing and regional tilting are closely related and may be contemporaneous products of the same deformational period. The joints are defined as probably between post-Early Permian and pre-Early Cretaceous in age and may have formed as a result of northwest, horizontal, compressive forces generated by wrench tectonics during the initial Ouachita Mountain Uplift; therefore, faulting in his study area (in south-central Kansas) has a minimum age of pre-Early Cretaceous.

Reference 25 in a study of The Stockdale Kimberlite pipe in Riley County, Kansas, believe the intrusion was apparently emplaced between 120 and 100 m.y. (Reference 25 and 24). Emplacement occurred along a preexisting fault or joint planes associated with the Abilene Anticline. Reference 38 interpreted the same general relationship between tension cracks from strike-slip faulting and the emplacement of the Kimberlite plugs in the Manhattan, Kansas, area and also states that some of the thrust faults and folds may have been formed by release of energy when the intrusions were emplaced. Reference 38 did not state the exact age of high-angle faulting, but the high-angle faults, such as the one along the Tuttle Creek Reservoir, are sometimes masked by unconsolidated deposits that are partly Pleistocene glacial deposits. Where masked, the faults are older than the unconsolidated deposits. These faults are, therefore, preglacial.

Based upon geomorphic evidence discussed above and presented in Table 2.5-14a, the Kansas Geological Survey has inferred the presence of post-Kansan faulting in Nemaha County, Kansas. However, there is no rigorous proof that known surface faults have moved at or near the earth's surface once in the last 35,000 years or more than once in the last 500,000 years (Table 2.5-14).

The youngest age of faulting in the area as interpreted by the various state surveys is summarized in Table 2.5-15.

2.5.1.1.5.3 Regional Jointing

Joint systems are well-developed in Kansas and are best exposed in the limestone units. Even though the origin of joints is highly speculative, Reference 268, p. 3-22) shows that eastern Kansas and northern Oklahoma are characterized by two dominant joint sets. These sets have a mean strike of N60°E and N35°W and were interpreted to have developed between post-Early Permian and pre-Early Cretaceous time by compressional forces generated during the initial Ouachita Mountain uplift. These joint sets show a close correlation with the en-echelon faults in Oklahoma and probably formed during the same period of deformation. The joint sets in Wilson County (approximately 30 miles south of the site area) have trends of N55°E and N35°W (Reference 174, p. 254) that correspond well to the regional trends identified by Reference 268. Franklin County, approximately 15 miles to the northeast of the site area, is characterized by joint trends of N58°W, N20°W, and N23°E (Reference 268, p. 254).

On the basis of field measurements and airphoto evaluation, joint patterns in the site area correspond well to the regional trends in the study by Ward. The site area contains one trend which strikes N60°E, another which strikes N30°W, and a third set which strikes N15°E.

2.5.1.1.5.4 Regional Stability

2.5.1.1.5.4.1 Natural Features (Karst)

2.5.1.1.5.4.1.1 Surface

No solution features have been observed in Coffey County. The closest known sinkholes are approximately 40 miles northwest of the site in southern Douglas County. These sinkholes have developed in the Plattsmouth Limestone and are associated with the Worden Fault (Reference 203, p. 41).

In northern Lyon County, approximately 40 miles northwest of the site, a reeflike expansion in the Permian Red Eagle Limestone locally exhibits sinkhole development (Reference 268, p. 187). Approximately 45 miles to the west of the site in Chase County, sinkholes have developed in the Fort Riley Limestone and along an outcrop band extending generally north and south (Reference 268, p. 187). Other solution features in eastern Kansas are associated with outcrop patterns of thick, water-soluble rock; local reeflike buildups of carbonates; faulting; or stream channel diversions.

No solution features have been reported in Coffey County. The stratigraphy, structure, and geologic history of the site area is not conducive to the development of solution features. The near-surface rocks have low permeabilities and a low carbonate percentage. No faulting is known, no reef development has been observed, and no stream channel changes are known. Therefore, the possibility of instability due to sinkhole or cavern development is considered minimal (see USAR Section 2.5.1.2.5.3).

2.5.1.1.5.4.1.2 Subsurface

Between Arbuckle Group deposition and Simpson Group deposition, the carbonates of the Arbuckle Group were subjected to solutioning, and a karst topography was developed. The sinkholes that developed were filled with Simpson Group clastic sedimentary rocks. Two sinks in the Arbuckle Group have been located by deep drilling in Coffey County. The Cram No. 1 Allen well located in Section 13, Township 21 South, Range 15 East and the Herbel and Tyrell No. 1 Henning well located in Section 22, Township 21 South, Range 16 East both penetrated anomalously thick sections of Simpson Group rocks (Reference 174, p. 147). The Cram No. 1 Allen well penetrated 288 feet of Simpson Group Rock at a depth of 1,934 feet. These karst features are inactive and deeply buried; therefore, these solution features are not considered significant to stability of the site.

2.5.1.1.5.4.2 Man's Activities

Figure 2.5-19 shows the location of oil and gas fields in and near Coffey County. Oil was first discovered in 1903 near LeRoy in the south-central part of the county. Historically, oil production has been confined to the southern and southwestern parts of the county (Reference 124 p. 159). The majority of this production and exploration has been confined to Pennsylvanian and Mississippian strata (Reference 124, p. 159-165; and 11, p. 20-21). Total production recorded in Coffey County to the end of 1971 was 3,685,263 barrels of oil.

In the past, natural gas has been produced in the southwestern portions of Coffey County, but the records of the State Corporation Commission of Kansas (Reference 289) show no present gas production in the county.

The regulation of all phases of oil and gas production is under the jurisdiction of the State Corporation Commission of Kansas; the Corporation Commission regulations are presented in General Rules and Regulations for the Conservation of Crude Oil and Natural Gas (Reference 106). Regulations regarding casing are in Corporation Commission Rule 82-2-123 and State Statutes 55-115, 55-136, and 55-137. The regulations require:

a. Surface pipe or casing shall be set to a depth not less than 25 feet below the bottom of the formation supplying water to the deepest water well in use for domestic purposes within a radius of one mile from the proposed drill site, or the deepest well supplying water to a municipality within three miles of the drill site, whichever is deeper.

b. At all drill sites where Tertiary and younger deposits (including so-called unconsolidated deposits) are present, surface pipe shall be set to a depth of not less than 25 feet below the base of such deposits.

c. The operator shall set not less than 20 feet of surface pipe in any well. The owner or operator shall not commence the drilling operation until after he has received notice of the amount of surface pipe or casing necessary to be set from the State Corporation Commission.

d. In Coffey County, in addition to the above rules, in Townships 21, 22, and 23 South, Ranges 15, 16, and 17 East, a minimum of 200 feet of casing will be set; in all other areas of Coffey County, a minimum of 150 feet will be set.

e. The owner or operator of any well put down for the purpose of exploring for and producing oil or gas shall, before drilling into the oil or gas-bearing rock, incase the well with good and sufficient wrought iron oil-well casing, and in such manner as to exclude all surface or fresh water from the lower part of such well, and from penetrating the oil or gas-bearing rock. Should any well be put down through the first into a lower oil or gas-bearing rock, the same shall be cased in such manner as will exclude all fresh or salt water from both upper and lower oil or gas-bearing rocks penetrated.

f. The casing of any well shall be subject to inspection by the State Corporation Commission and shall be of proper weight and of good quality.

Exploratory drilling during 1972-1973 in the deeper Viola-Simpson horizons has resulted in the discovery of several small oil fields (Figure 2.5-19). Approximately 7 miles west of the site in Sections 8, 9, 10, and 11, Township 21 South, Range 14 East, the Lake Shore, Thompson, and Pierett fields have been brought into production (Figure 2.5-19). Initial production figures for the discovery wells for these fields were as follows: Lake Shore Field, 35 barrels of oil per day (Reference 213, p. 8);Thompson Field, 50 barrels of oil per day; Pierett Field, 50 barrels of oil per day (Reference 212, p. Oklahoma-Kansas 26). Approximately 5.5 miles southeast of the site, the Avon Field shown on Figure 2.5-19, recorded initial production of the discovery well as 25 barrels of oil per day (Reference 215, p. 30). The Ottumwa Field is located approximately 7 miles northwest of the site (Figure 2.5-19). The discovery well for this field was from Mississippian horizons, and 12.5 barrels of oil per day was recorded (Reference 214, p. Kansas Completions 2).

The Lake Shore-Thompson-Pierett Complex is an elongated anticlinal structure approximately 2.5 miles long in the northeast-southwest direction and 1.5 miles long in the northwest-southeast direction. It has a structural closure of less than 20 feet. The pay zone is less than 10 feet thick and appears to be controlled by the overlying barrier of the Chatanooga Shale. Production is from the first unit below this shale, the Viola, when it has not been removed by erosion, or in its absence, the stratigraphically lower Simpson sand. This field is fairly well defined with over 50 test wells drilled and approximately 30 producing wells. Maximum bottom hole pressure on record for this complex at the Kansas State Corporation Commission is 565 psi. No gas is produced from this complex.

The Avon Field is stratigraphically and structurally similar to the Lake Shore Field. The Avon Field is smaller in areal extent. Seventeen wells have been drilled to date and its exact dimensions are becoming well defined. Maximum bottom hole pressure on record for this field with the Kansas State Corporation Commission is 696 psi. No gas is produced from this field.

The Ottumwa Field produces from the Mississippian. Only three wells have been drilled to date and very little information has been released. The field appears to be controlled by a highly porous zone in the Mississippian that is located on a small anticline. Maximum bottom hole pressure on record for this field with the Kansas State Corporation Commission is 590 psi. No gas is produced from this field.

The files of the Kansas State Corporation Commission, Kansas State Geological Survey, and independent operations show 80 wells have been drilled within Township 20 South, Ranges 15 and 16 East; Township 21 South, Ranges 15 and 16 East; and Sections 1 through 18, Township 22 South, Ranges 15 and 16 East as of May 11, 1981. The location of these wells is shown on Figure 2.5-20, and the information about these wells is tabulated in Table 2.5-16.

No drilling incidents or accidents related to high bottom hole pressure are known within this area or within the Lake Shore-Thompson-Pierett Complex, or the Ottumwa Field. As indicated by Table 2.5-20, no production has been recorded within 5 miles of the site, and the closest producing field is the Avon.

The Lake Shore-Thompson-Pierett Complex and the Ottumwa Field, located 7.5 miles away, are the next closest production fields to the plant site. Drilling permits are presently being issued for this area, and wells drilled outside the property boundary are shown on Figure 2.1-2. Within the property boundary, no permits are pending, no permits will be issued, and no oil and/or gas exploration wells will be drilled. Although oil and/or gas may be present at depth within 5 miles of the site, the wells which have been drilled within 5 miles of the site have not indicated the porosity, permeability, or structure necessary for oil or gas production.

The Pennsylvanian cyclic sequence does not lend itself to geophysical mapping as the records tend to be distorted and washed out. Therefore, this technique has not been used for delineating the deeper structures.

Within the property lines, the Licensees control all mineral rights (Figure 2.1-3). No oil and gas explorations are allowed within the property boundary.

No subsidence has ever been reported in eastern Kansas due to removal of oil, gas or water from deep reservoirs, and no uplift has occurred during repressurization and secondary recovery operation processes in deep reservoirs (Table 2.5-17) (Reference 311 and 290). Instability of surface materials due to removal of oil, gas, or water is not considered a problem at the site.

Large salt deposits are located in western Kansas, but salt is not present in the Coffey County area. Instability of subsurface materials due to removal of salt is, therefore, not a possibility.

Coal resources are negligible in Coffey County (Brady and others, 1976). In the area of the site, only one coal seam of extent is present, the Williamsburg Coal. Throughout the site, this coal ranges in thickness from 0.1 to 0.8 feet and is present in the subsurface at the plant site at a depth of about 104 feet [(Elevation 1002) USAR Section 2.5.1.2.2.2.1.1.2.1.1].

From approximately 1890 to 1916, five small mines operated in the area, with the coal used for home use and threshing operations. These mines were located in Section 21, Township 20 South, Range 17 East (approximately 9 miles northeast of the plant site); Section 29, Township 20 South, Range 17 East (approximately 7.5 miles northeast of the plant site); Section 14, Township 21 South, Range 16 East (approximately 4 miles east of the plant site); Section 28, Township 21 South, Range 16 East (approximately 3.5 miles south-southeast of the plant site); and Section 33, Township 21 south, Range 16 East (approximately 4.5 miles southeast of the site) (Reference 19, p. 64-65 and 74).

No mines have been in operation since approximately 1916, and no mines are proposed in the immediate vicinity of the site. It is presently not economically feasible to remove a seam as thin and as deep as the one under the site. All mineral rights within the site property boundary are controlled by the Licensees. Mining of the coal seam within the site boundary will not be allowed; therefore, the coal seam will have no effect on the safety-related stability of subsurface materials at Category I facilities.

Several sand and gravel quarries are present near the site. Because these are surface workings, subsurface subsidence need not be considered. Some stripping of Tertiary gravels has occurred on the upland portions between Wolf Creek and the Neosho River. These operations are far enough removed from the plant site and will have no effect on the stability of subsurface materials at Category I structures.

Although Kansas has produced large quantities of lead and zinc, these deposits are restricted to the southeast corner of the state. No other mineral deposits are known in the Coffey County

area. No potential hazards to the power plant facilities exist due to the extraction of subsurface minerals.

2.5.1.1.5.4.3 Regional Warping

Although minor and local structural movement may have occurred during the Cenozoic, the major structural features show no evidence of movement (Reference 268, p. 221).

The majority of earthquakes in the region appear to be spatially related to the Nemaha Anticline. No surface displacement has been noted and the earthquakes are thought to be the result of deep-seated minor adjustments. No potential instability due to regional warping is known to exist at the site.

2.5.1.1.6 Regional Ground Water

A detailed treatment of ground-water and surface-water hydrology is presented in USAR Section 2.4.

Minor quantities of ground water for domestic livestock and municipal use are available in the region. The regional aquifers consist of three types. They are the alluvial deposits in river valleys, weathered bedrock, and the deep bedrock.

Yields as high as 100 gpm per well can be expected from alluvial deposits in the river valleys (Reference 10). The municipalities of New Strawn and Hartford obtain their water supply from this source. A description of the wells at these locations is given in Table 2.4-30. No other municipalities within 20 miles of the site obtain water from wells in alluvial deposits.

Yields as high as 10 gpm per well can be expected from the weathered bedrock in the region (Reference 10). This source is commonly used for private domestic and livestock supply within 5 miles of the plant site. A description of the wells in the region is given in Table 2.4-30. No municipalities within 20 miles of the site obtain water from this source.

Yields as high as 100 gpm per well can be expected from the deep bedrock in the region about 5 to 15 miles east, northeast, and southeast of the site (Reference 10). This source is limited almost exclusively to the Tonganoxie Sandstone aquifer from which the towns of Melvern, Waverly and Williamsburg obtain their municipal water supply. Yield from this aquifer at these sites is about 10 gpm based on drilling records from the wells. A description of the wells at these locations is given in Table 2.4-30. No other municipalities within 20 miles of the site obtain water from deep bedrock aquifers. Field investigations indicate that only very limited yields can be expected from the Tonganoxie Sandstone Member at the site.

The shallow ground-water flow pattern in the weathered bedrock reflects the topographic expression in the region. Recharge occurs into this zone by infiltration of precipitation. The gradient in the deeper bedrock varies from 10 to 50 feet per mile, dipping from the west-southwest to northwest. Recharge into the water-bearing formations occurs primarily as direct infiltration in outcrop areas. The numerous shale and siltstone rock units in the region with characteristic low permeabilities restrict the vertical infiltration into the underlying formations. These low permeability aquicludes commonly cause artesian pressures in the deep bedrock water-bearing horizons. Piezometric data confirming the presence of artesian pressures in the bedrock in the site area are presented in USAR Section 2.4.13.

No ground-water conditions in the region were found that have an adverse affect on the WCGS facilities.

2.5.1.2 Site Geology

Comprehensive geologic investigations were performed within a 20-square mile area that included the entire site boundary. The basic purpose of these investigations was to determine the subsurface conditions throughout the site in sufficient detail and to depths adequate for evaluating the acceptability of the site for the safe construction and operation of Category I facilities. Areas of the site at the locations of Category I facilities were investigated in sufficient detail to provide criteria for design. The geologic investigations consisted of the following:

a. A review of all available literature related to the site. The Bibliography of North American Geology was examined for a listing of reference material pertinent to the site. Recent publications were surveyed to determine the existence of pertinent information not listed in the bibliography. Publications from state and federal agencies in the area were examined. A list of geologic theses of the Kansas universities was examined and the pertinent manuscripts obtained.

b. Interviews were conducted with the state, and federal agencies in the region, such as the various state geological surveys, the Soil Conservation Service, the U.S. Corps of Engineers, and the Kansas State Corporation Commission, were contacted for information. These agencies provided unpublished information such as well logs, unpublished reports, and local geologic maps. In addition to opinions on geological conditions not documented in the literature, experts from the various state geological surveys supplied letters which documented the most current geological interpretations concerning the

age of faulting and folding within their state. Kansas State Geological Survey personnel visited the site several times to confirm stratigraphic and structural interpretations.

Private organizations and individuals, when cooperative, supplied additional unpublished information, such as drilling logs, structure contour maps, and other geological information based on their experience in the area.

c. Large-scale, black and white and infrared aerial photographs of the site area were obtained and examined.

d. A boring program was initiated. This program included 21 widely spaced borings in the vicinity of the site and 94 borings in the Category I area to ascertain the details of the stratigraphy, structure, ground-water, and foundation conditions in the site area. These borings are sufficient to provide the needed design recommendations for the plant, ultimate heat sink (UHS), UHS (Category I) dam, and the essential service water system (ESWS) pipelines, pumphouse, and discharge structure. An additional 40 borings in the category I area were performed to ascertain the details of the stratigraphy, structure, ground-water, and foundation conditions for the replacement ESWS pipelines.

2.5.1.2.2 Site Stratigraphy

Results of boring programs in the areas of non-Category I structures were evaluated for geological suitability of the site and to provide design criteria. These geotechnical investigations were conducted along the circulating water system, main dam and spillways, saddle dams, preliminary and alternate baffle dikes, Routes 1 and 8 with causeways, the railroad spur, bridges, switchyard, and the make-up water system. Additional borings were drilled in the lake, borrow pit, and quarry areas.

e. A field mapping program was completed. All outcrops, quarries, and road cuts were examined. Geologic maps of excavation surfaces were included in interim or supplemental reports to the applicants by Dames & Moore.

f. A soil survey of the site area was performed by the Soil Conservation Service.

g. Geophysical borehole logging was conducted in six boreholes to help define geological and engineering characteristics of the subsurface materials.

h. Surface and borehole geophysical surveys (refraction, surface wave, ambient, and crosshole) were conducted to further refine the geologic and engineering characteristics of the subsurface material in the Category I area.

i. The hydrological characteristics of the surface and subsurface materials were evaluated through borehole pressure testing, falling head and constant head permeameter testing, and installation and monitoring of piezometers.

j. Laboratory investigations were conducted. These investigations included static and dynamic strength testing of rock and soil; compaction, consolidation, dispersive, and permeability testing of soil; index property tests of soil and rock; swell load tests on soil; and mineralogical, swelling, and slaking testing of shales.

Geologic investigations were conducted to assess the lithologic, stratigraphic, and structural geologic conditions of the site. This section presents the physical characteristics and geologic history of each lithologic unit encountered at the site. Figure 2.5-21 shows surficial geology and the distribution of the Quaternary and Tertiary age alluvium within the site area. Bedrock geology is shown on Figures 2.5-22 and 2.5-23, and Figures 2.5-24, 2.5-25, and 2.5-26 illustrate the topographic configuration of the bedrock surface in the site area. The geologic conditions at the site are evaluated as suitable for the safe design, construction, and operation of the Category I facilities. Surface-water and ground-water conditions at the site are discussed in USAR Section 2.4. The ground-water conditions at the Category I area are also discussed in USAR Section 2.5.4.

2.5.1.2.1 Site Physiography

The site is located within the Osage Plains Section of the Central Lowlands Province (Reference 256, p. 250). The Osage Plains Section has been further subdivided into the Cherokee Lowland, the Chautauqua Hills, the Osage Cuestas and the Flint Hills Lowland (Reference 227, p. 275-277).

The site is located within the Osage Cuestas subdivision, an area that is characterized by a series of east-facing escarpments. The Osage Cuestas trend northeast-southwest between flat to gently rolling plains. Bedrock is present at or near the land surface and consists of alternating limestones, shales, and sandstones which dip gently to the west and northwest.

These cuestas result from differential erosion of the gently dipping bedrock strata. The crest of each escarpment is capped by resistant limestones in the southern portion and by resistant sandstones in the northern portion of the site.

The physiographic land forms that predominate in the site area are shown on Figure 2.5-27. The level to gently rolling uplands, which form the drainage divides, are capped generally by limestone or sandstone, although remnants of Tertiary alluvial gravel are found on some of the higher hills (Figure 2.5-21). The lowest topographic areas are the bottomlands and floodplains, which consist mainly of Recent alluvial deposits along the Neosho River and its tributaries. Between the bottomlands and the uplands are moderately to steeply sloping uplands and valley walls. Although the upland surfaces are controlled by the limestone and sandstone units, the valley slopes are developed largely in the shales, and the grade of the slopes is usually indicative of the slope lithology. The Neosho River and its tributaries have provided the controlling influence in the development of the slopes and land forms in the site area. The topographic relief of the site is variable, depending on the distance from the main streams and tributaries. A maximum relief of 80 feet can occur from the uplands to the valley floors within a distance of approximately 1 mile.

The Neosho River provides the major drainage within the site area, flowing northwest to southeast. Wolf Creek and Long Creek are the principal tributaries to the Neosho River and flow north to south. The smaller tributaries have formed a dendritic pattern with a predominant east-west trend (Figure 2.5-27).

2.5.1.2.2 Site Stratigraphy

Initially, 21 widely spaced borings were drilled in the site area to determine structural and stratigraphic relationships. Subsequently, 37 additional borings were completed at the plant site, and 57 borings were drilled in the area of the ESWS.

Soil and rock samples were obtained from these borings for laboratory testing. Figures 2.5-28, 2.5-29, 2.5-30 and 2.5-31 show the locations of the borings. The initial holes are designated as B-Series Borings, the plant site borings are the P-Series, the borings in the ultimate heat sink are the HS-Series, and the borings along the original ESWS pipeline and those at the ESWS pumphouse and original discharge structure are the ESW-Series. An additional 40 borings, the B-100- series, were drilled along the revised ESWS routing to support the replacement of the ESWS pipe due to corrosion. Eight exploratory borings were drilled with a rotary bit at the locations shown on Figure 2.5-30. These borings were used to help delineate the extent of a buried alluvial channel. Sixteen test pits were excavated in the area of the Category I structures to determine

the suitability of the near-surface material for construction purposes. The locations of these test pits, designated as TP-Series, are shown on Figures 2.5-30 and 2.5-31.

The information from the drilling program is shown on the boring logs. An explanation of the symbols used on the boring logs is included on Figures 2.5-32 and 2.5-33. The B-Series boring logs are presented in numerical order on Figures 2.5-34a through 2.5-34u; the logs of the P-Series borings are shown on Figures 2.5-35a through 2.5-35kk; the HS-, ESW- and B-100-Series borings are presented on figures 2.5-36a through 2.5-36zzzz and the test pit logs are shown on figures 2.5-37a through 2.5-37g.

2.5.1.2.2.2 Rock

Additional subsurface data were obtained during several supplementary geotechnical investigation of the Wolf Creek site. The results of these investigations were included in supplementary reports written by Dames & Moore for the Licensees (see List of References for Section 2.5). The area of investigation (number of completed borings in parentheses) include: circulating water system (15), main dam (90), saddle dams (51), original and alternate baffle dikes (76), lake (13), quarry (15), borrow areas (112), Routes 1 and 8 with causeways (45), railroad spur and bridges (53), and make-up water system (15). Boring logs and laboratory test data are included in appendices to the appropriate reports. Boring locations are shown on Figures 2.5-28, 2.5-29, 2.5-30,and 2.5-31.

2.5.1.2.2.1 Overburden

Overburden deposits present within the site area include Quaternary and Tertiary age deposits and residual soil developed on bedrock. All overburden was classified using the Unified Soil Classification System (Figure 2.5-33). Soil thickness maps are shown on Figure 2.5-38 for the area of Category I facilities and on Figure 2.5-39 for the plant site.

2.5.1.2.2.1.1 Quaternary Deposits

Pleistocene glaciations did not extend as far south as the site area (USAR Section 2.5.1.1.3.4.2), but Recent and pre-Recent Pleistocene alluvial deposits are present in the Wolf Creek Valley (Figure 2.5-21). This alluvium consists of silty clays which vary in thickness across Wolf Creek Valley. Thickness increases to 35 feet at Boring D-72 (Figure 2.5-29; Reference 60, p. 41 and Plate A-2-57) and approximately 36 feet as mapped in the Main Dam foundation excavation on the eastern side of Wolf Creek Valley (Reference 71, Figure 10-N). The variation in thickness of alluvial soils generally reflects bedrock topography. As noted in previous reports (Reference 60, p. 41-42; and 71, p. 8 and Figures 10-L and 10-N), the thickest deposits of Quaternary alluvium are

located in Wolf Creek Valley where silty clay with occasional basal chert gravel fills the bedrock valley and a buried stream channel. Alluvial deposits are present along the small tributaries to Wolf Creek. In the area of the UHS Category I dam, the channel of a pre-existing tributary has been buried by alluvial deposits. The configuration of this buried channel, which generally parallels the existing stream, is delineated by the bedrock contours shown on Figure 2.5-25 and on the soil thickness map (Figure 2.5-38). Field reconnaissance, shallow roller-bit borings, and the geophysical refraction survey were used to delineate the extent of the buried alluvial material.

Compaction tests were performed in accordance with ASTM D 698-70 on a bulk sample of alluvium from TP-1, a mottled brown and gray silty clay (CL). Optimum moisture content was 15.0 percent with a maximum dry density of 108.2 pcf. Atterberg limits were determined for two samples of alluvium. The liquid limit ranged from 41 to 47 percent in TP-1 and Boring B-1, respectively, and the plastic limit ranged from 19 percent in TP-1 to 22.8 percent in Boring B-1. The range of the plasticity index was from 22 percent in TP-1 to 24.2 percent in Boring B-1.

Unconfined compression tests on recompacted soil for two samples of alluvial soil from Boring B-1 resulted in a minimum shear strength of 2,100 psf with a degree of compaction of 92.8 percent and a maximum shear strength of 4,080 psf with a degree of compaction of 97.5 percent (ASTM D 698-70).

Results from eight moisture and density tests on alluvial soil samples from two borings yielded a minimum moisture content of 8.5 percent in Boring HS-2 and a maximum moisture content of 25.4 percent in Boring B-1. Dry densities ranged from 97.6 pcf in Borings B-1 and HS-2 to 125.8 pcf in Boring HS-2.

Unconfined compression tests on two samples of alluvium from Boring B-1, a mottled gray and light brown silty clay (CL-CH), resulted in values that ranged from a minimum shear strength of 936 psf at a moisture content of 25.4 percent and a dry density of 97.6 pcf at 19 feet to a maximum shear strength of 5,980 psf at a moisture content of 22.1 percent and a dry density of 101.5 pcf at 7.5 feet.

Four samples from Boring HS-2, which penetrates the alluvium along the alignment of the Category I dam, were subjected to unconfined compression testing. One sample from the topsoil, a dark brown-gray silty clay (ML-OL), had a shear strength of 1,720 psf with a moisture content of 14.0 percent and a dry density of 97.6 pcf. Below the topsoil was a mottled brownish, light brown silty clay with some sand (CL). The strength of this material tended to decrease with depth as the clay content increased. The

sample from 2 feet had a shear strength of 2,340 psf at a moisture content of 8.5 percent and a dry density of 125.8 pcf, and the sample at 8 feet had a shear strength of 1,450 psf at a moisture content of 23.3 percent and a dry density of 99.1 pcf.

Recompacted samples of the alluvium from TP-1, a mottled brown and gray silty clay (CL), were tested by unconsolidated-undrained and consolidated-undrained triaxial compression testing. These samples were recompacted to 95 percent ASTM D 698-70.

The unconsolidated-undrained tests gave a shear strength of 450 psf at a 600-pound confining pressure. The consolidated-undrained tests gave an effective cohesion of 275 to 300 psf with an effective friction angle of 20.0 to 20.4 degrees.

Additional laboratory test data on properties of Quaternary alluvium are available in reports on several geotechnical investigations throughout the site (Reference 60).

2.5.1.2.2.1.2 Tertiary Deposits

Scattered high-level deposits of Tertiary gravels cap some of the higher hills in the site area (Figure 2.5-21). This material is reddish brown to gray, clayey, chert gravel to gravelly clay with some fine to coarse sand (Unified Soil Classification GC or CL). The percentage of clay versus gravel varies with depth and location. These gravels occur as dissected terrace deposits at elevations approximately 80 feet above the present stream drainage. During preliminary investigations, this material was found in the upper 2 feet of Boring B-14 and the upper 4.2 feet of Boring B-15. This gravel was penetrated by several borings drilled for geotechnical investigations of the site area (i.e. References 60 and 66). The most extensive deposit of Tertiary gravels is located west of Wolf Creek where the Main Dam alignment curves from east-west to northwest-southeast (Figure 2.5-21) and is locally up to 9 feet thick (Reference 58, p. 7, Plate 3, and Plate A-2-41).

No formal stratigraphic name has yet been applied to these gravels and their age is assumed to be Tertiary on the basis of chert provenence (Flint Hills, approximately 35 miles west of the site area) and regional geologic history (Reference 286, p. 58).

2.5.1.2.2.1.3 Residual Soil Developed on Pennsylvanian Bedrock

Residual soil deposits at the site developed in situ on the underlying Pennsylvanian strata. The character and thickness of the residual soil is variable and reflects the composition of the underlying bedrock. The soil ranges from a silty sand with traces of rock fragments (Unified Soil Classification SM) to a soft clay with a trace of sand (Unified Soil Classification CH).

The thickness of residual soil at the boring locations in the Category I area ranged from 0.3 feet at Boring HS-4 to 16.0 feet at Borings B-4 and HS-28. The variability in soil thickness in the site and Category I area reflects the lithology of the underlying bedrock with thick soil developed on the shales and thin soil developed on the sandstones and limestones. This is apparent in the plant area where soil developed on the Jackson Park Sandstone is 4 to 8 feet thick (Figures 2.5-23, 2.5-38, and 2.5-39). In Borings B-4 and B-5, the soil thickness increases on the opposite side of the Jackson Park-Heumader contact where soil is present to a depth of up to 16 feet. These borings contain 9.5 and 10 feet of residual Heumader, respectively. The soil cover thins downslope toward the UHS where erosion has removed the Heumader Shale Member and the Plattsmouth Limestone Member is closer to the surface (Figure 2.5-23)

The plasticity of the residual soil is highly variable. Shear strengths of the soil were determined by unconfined compression tests, direct shear tests, and unconsolidated-undrained triaxial compression tests. Test results are presented on the boring logs and are tabulated along with the testing procedures in Section 2.5.6.2 and appendices to supplemental geotechnical investigations referenced in USAR Section 2.5.

Atterberg limits were determined for 52 samples. The liquid limit ranged from 24.0 percent to 90.7 percent in Borings P-8 and HS-16, respectively, and the plastic limit ranged from 13.4 percent in Boring P-7 to 32.2 percent in Boring HS-16. The plasticity index ranged from 7 percent in TP-11 to 58.5 percent in Boring HS-16. The soils developed on shales and limestone are generally quite plastic (CL to CH); soils developed on the sandstones, such as within the Jackson Park Shale Member, have lower plasticity (CL, ML, SC and SM).

Results from 66 moisture and density tests on residual soil samples from 30 borings and test pits showed a minimum moisture content of 9.0 percent in Boring HS-1 and a maximum moisture content of 39.2 percent in Boring HS-16. Dry densities ranged from 82.6 pcf in Boring HS-16 to 127.3 pcf in Boring P-8.

Compaction tests on residual soils were performed in accordance with ASTM D 698-70 on five test pit samples. Minimum optimum moisture content was 16.3 percent in the TP-4/TP-6 combined sample, and maximum optimum moisture content was 23.1 percent in TP-5. Maximum dry density ranged from 86.3 pcf in TP-5 to 103.0 pcf in TP-2.

Direct shear testing on one sample of residual soil from Boring B-9 resulted in a peak shear strength of 520 psf and a yield shear strength of 346 psf at a moisture content of 28.4 percent and a dry density of 90.9 pcf, respectively.

Unconfined compression tests on 31 samples of residual soil from 22 borings showed shear strength values that ranged from a minimum of 420 psf at a moisture content of 25.7 percent in Boring B-8 to a maximum of 6,860 psf at a moisture content of 12.5 percent in Boring B-4.

Unconsolidated-undrained triaxial compression tests on undisturbed residual soil were performed on 15 samples from 13 borings. The minimum shear strength recorded from a reddish brown to light gray silty clay (CH) was 422 psf at a confining pressure of 346 psf and a moisture content of 27.7 percent from Boring P-11. The maximum shear strength obtained was from a mottled brown and gray silty clay (CL-ML) from Boring P-6. The shear strength of this sample was 8,160 psf at a confining pressure of 202 psf and a moisture content of 12.6 percent.

The results of consolidated-undrained triaxial compression testing of undisturbed soil samples ranged from an effective cohesion of 345 psf within an effective friction angle of 27.3 degrees for a gray-brown silty clay (CH) from Boring HS-21 to an effective cohesion of 1,290 psf with an effective friction angle of 14.3 degrees for a brown clay (CH) from Boring HS-15.

Unconsolidated-drained and consolidated-undrained triaxial compression tests were performed on samples recompacted to 95 percent ASTM D 698-70 and ASTM 1557-70. The results of the unconsolidated-undrained test ranged from a shear strength of 390 psf at a confining pressure of 600 psf for a light olive silty clay (CL) from TP-6 to a shear strength of 6,946 psf at a 2,160 psf confining pressure for a light olive-gray silty clay (CL) from TP-11.

Dynamic triaxial tests for soils were conducted on samples from three borings and the results are presented in USAR Section 2.5.6.2. Samples from four borings were subjected to resonant column testing, and those results are presented in USAR Section 2.5.6.2.

The variability of the test results is indicative of both the variation in the parent material (limestones versus sandstones versus shales) and of the degree of weathering, which is a function of the relative depth of the sample. It is extremely difficult to draw a definitive soil-rock contact, especially in the thick shale sequences, because the contact is not sharp but gradational.

A careful examination of the test results in USAR Section 2.5.6.2 indicates that the residual soil samples tend to increase in strength with depth. (With depth, there is less weathering; therefore, the sample is more like the parent material.) This is perhaps illustrated best in the results of unconfined compression testing of samples from Boring B-4. The three samples tested increased in strength from 4,880 psf at 7.5 feet to 6,860 psf at 13.5 feet, 2.5 feet above the soil-rock contact.

2.5.1.2.2.1.4 Soil Conservation Service Soil Survey

The Soil Conservation Service (SCS) of the United States Department of Agriculture conducted a soil survey of the site area. Six soil associations have been identified within the project area (Figure 2.5-40). These consist of various combinations of 11 different soil series (Reference 305 and 299). The soil descriptions, which include general engineering properties, are intended to characterize the various soil series throughout their geographic range, although they may not be completely representative of the unit in a specific location. The information from this survey was used to help determine boring and test pit locations to better evaluate the exact engineering characteristics of the soil throughout the site.

The Kenoma Series is typically a very dark, grayish brown silt loam and silty clay, which occurs on nearly level to sloping, convex, erosional uplands (mostly on narrow drainage divides). The soil exhibits very low permeability and is moderately well drained with a slow to medium rate of runoff, depending on the local slope gradients. The soil has a high shrink-swell potential under natural conditions.

The Olpe Series is typically a very dark, grayish brown and dark brown gravelly silt loam and gravelly clay that occurs on high terraces and uplands. The soil has very low to low permeabilities and is well drained with a medium to rapid rate of runoff.

The Woodson Series is typically a very dark, gray silt loam, silty clay, or silt that occurs on nearly level to gently sloping uplands. The soil is characterized by very low permeabilities and high shrink-swell potential.

The Summit Series is typically a black silty, clay loam occurring on uplands and foot-slopes. The soil has a low permeability and is poorly drained with a medium to rapid rate of runoff, depending on the slope gradient. The soil has a moderate shrink-swell potential.

The Eram Series is typically a very dark, grayish brown clay loam and clay that occurs on upland surfaces. For brief periods of time during the winter and spring months, a perched water table occurs locally within the Eram Series at a depth of 1 to 2 feet from the surface. The soil has low permeability and is moderately well drained with a medium to rapid rate of runoff. The soil exhibits moderate shrink-swell potential.

The Lula Series is typically a very dark, grayish brown silt loam and silty clay loam which occurs on nearly level and gently sloping uplands. The soil exhibits moderate permeabilities and is well drained with a slow to medium rate of runoff. The soil has a low to moderate shrink-swell potential.

The Dennis Series is typically a very dark, grayish brown silt loam and silty clay loam occurring on uplands. The soil has high permeabilities and is moderately well drained with a medium rate of runoff. The soil exhibits high shrink-swell potential.

The Bates Series is typically a very dark brown and dark, yellowish brown loam and clay loam which occurs on undulating to gently rolling uplands. The soil has moderate permeabilities and is well drained with a medium to rapid rate of runoff. The soil exhibits low to moderate shrink-swell potential.

The Mason Series is typically a dark brown silty loam or silty clay loam which occurs on low terraces, extending along the streams. The soil is characterized by low permeabilities and the runoff rate is slow to moderate. The soil exhibits low to moderate shrink-swell potential.

The Oakwood Series is typically a very dark, grayish brown silty clay loam which occurs on nearly level floodplains. The soil has low to moderate permeabilities and is poorly drained with slow surface runoff. The water table is at or near the surface during some periods of most years. The soil exhibits moderate shrink-swell potential.

The Verdigris Series is typically a very dark, grayish brown silt loam that occurs on nearly level floodplains. The soil has moderate permeability and is moderately well drained with slow to medium rates of runoff. The soil exhibits low to moderate shrink-swell potential.

The Osage Series is typically a black to very dark brown, silty clay. It occurs as the topsoil along major drainages or nearly level floodplains and is subject to occasional flooding. The soil has very low permeability and is generally poorly drained with slow to very slow runoff rates. The soil exhibits high to very high shrink-swell potential.

2.5.1.2.2.2 Rock

At the site, surface and subsurface bedrock deposits range in age from upper Pennsylvanian to Precambrian. Upper Pennsylvanian age rocks crop out at the surface and underlie the surficial soil deposits.

Initially, 21 geologic borings, the B-Series borings, ranging in depths from 124 to 453 feet, were drilled to identify the geologic conditions of the project area. Thirty-seven additional borings, the P-Series borings, were later drilled in the area of the plant site to depths ranging from 46 to 417 feet. During the fall of 1973 and the summer of 1974, a total of 33 exploratory borings were drilled to depths between 15.3 and 117.5 feet in the UHS area (Borings HS-1 through HS-31, HSA-1 and HSA-2, Figure 2.5-30). These borings were supplemented by eight shallow probe borings drilled to depths of 3.5 to 29.0 feet in order to define an alluvial-filled channel crossing the alignment of the UHS-Dam (Borings E-1 through E-8, Figure 2.5-30; Reference 59). Borings ESW-1 through ESW-26 were drilled during August and September, 1974 as part of the Essential Service Water System geotechnical investigation (Reference 69). Boring ESW-27 was drilled in April, 1975 and Borings ESW-28 to ESW-31 were completed between January 18 and January 20, 1977. The 31 ESW-Series borings range between 19.5 and 80.0 feet deep (see Figures 2.5-30 and 2.5-31 for location). Additional borings, the B-100-Series, were later drilled in support of replacing the ESWS piping. The 40 B-100-Series borings range between 3 and 45 feet deep (see figure 2.5-98 Sht. 2 for location).

In addition to the 99 borings referenced above, 15 borings ranging from 15.4 to 56.2 feet deep were drilled in the plant vicinity as part of the geotechnical investigation for the circulating water system (CWD-Series, CW-Series, and CWP-Series, Figures 2.5-28, 2.5-30, 2.5-31). The results of the circulating water system and other geotechnical investigations are included in reports written by Dames & Moore for the Applicants (see references for USAR Section 2.5). The areas of investigation (number of borings, series designation, and depth ranges in parentheses) include: main dam and service spillway foundations (90, D-Series, which range in depth from 6.7 to 76.5 feet); saddle dams I through V (51, D-dam number series, 13.5 to 76.9 feet); originally proposed baffle dikes A and B (43, DA- and DB-Series, 11.0 to 54.2 feet); alternate baffle dikes A and B (33, DA 100- and DB 100-Series, 4.5 to 21.5 feet); lake area (13, LK-Series, 52.3 to 154.8 feet); on-site rock quarry areas (15, Q-Series, 7.7 to 47.7 feet); soil borrow materials (112, BA-Series, 3.6 to 34.8 feet); Routes 1 and 8 and causeway (31, CR 100- and CL 100-Series, also BAL-Series, 0.2 to 31.5 feet); Route 8 causeway and bridge (14, CR-Series, 15.2 to 29.8 feet); railroad spur and bridges (53, RR-Series, 4.5 to 38.0 feet); switchyard (8, 54-Series, 18.8 to 21.8 feet); and make-up water system (26, PL-Series, 14.0 to 62.2 feet).

Detailed logs of the B-Series borings are presented in numerical order on Figures 2.5-34a through 2.5-34u, P-Series borings on Figures 2.5-35a through 2.5-35kk, and the HS-, ESW-and B-100-Series borings are presented on figures 2.5-36a through 2.5-36zzzz.

2.5.4.2.2.3 Materials underlying the Category I Pipelines

E-Series boring logs are presented in Table A-1 of Dames & Moore's ultimate heat sink report (Reference 59). An explanation of the symbols and conventions used in the boring logs is included on Figures 2.5-32 and 2.5-33. A detailed description of the soil and rock characteristics penetrated in the borings is presented on the logs of borings.

A detailed stratigraphic column (Figure 2.5-41) of the upper Pennsylvanian formations present at the site has been compiled from the boring logs. A generalized stratigraphic column (Figure 2.5-12) showing the entire stratigraphic section, including the Precambrian basement complex, was developed from a review of published and unpublished material, private communications, and boring data.

The following discussion of stratigraphy includes a composite, lithologic description of the rocks within the units that were penetrated by the borings and a brief summary of the depositional environment of the unit. A brief lithologic description of the anticipated stratigraphic conditions is presented for rock units below the depths penetrated by the borings. Estimated thicknesses and probable depths of units below the plant site are provided. The engineering properties of the units for which test data are available are discussed.

The engineering properties presented were determined by the methods discussed in USAR Section 2.5.4. The testing methods can be divided into four categories: (1) dynamic (in situ borehole logging), (2) dynamic (laboratory), (3) dynamic (site geophysics), and (4) static (laboratory).

Generally, the values for the elastic properties obtained with in situ methods are higher than those obtained by laboratory testing of core samples. Variation between the in situ and laboratory results occur because the laboratory tests cannot totally simulate the temperature and stress conditions of the natural rock environment. For instance, the in situ borehole logging method utilizes a sound pulse of very short duration and a very low stress level. The resulting compressional and shear wave velocities are, therefore, due entirely to elastic rock deformation. Static laboratory test results can be affected by plastic deformation or influenced by microfissures in the sample. The in situ methods are not affected significantly by microfissures especially if they are filled with water.

All shale at the site is clay shale, wholly or chiefly composed of argillaceous material that becomes clay during weathering. Zones and layers are found throughout the shale sections which completely or partially have reverted to clay by weathering and ground-water action. These zones and layers are described as clayey on the logs and in the following stratigraphic sections. The consistency of these layers in their natural state ranges from stiff to very stiff.

Core recovery and rock quality designation (RQD) values are provided for each unit penetrated by borings. Rock quality designation is a modified core recovery value in which only the summation of the lengths of all pieces of core greater than or equal to 4 inches are considered as a percentage of the total length of a run.

In massive rock, RQD values can be a good indication of in situ fracture frequency and competency of the rock. However, in shale units, which by definition are laminated or fissile, it is difficult to determine the true RQD values. This is due to the difficulty in determining whether horizontal separations represent in situ conditions, drilling breaks, or natural partings that separated as the shale was removed from the core barrel. In instances where high core loss and low RQD values were noted, there was no loss of drilling fluid. Examination of the core, geologic records, and geophysical borehole logs did not indicate the presence of voids or highly fractured zones. In addition, when such core losses occurred, such as in Boring HS-27 from 15 to 36 feet, either blockage of the core barrel was noted due to slight swelling of shales, or the shale core had slipped through the core catcher. Whenever the core slipped from the core catcher, effort to retrieve the core usually resulted in damage to it. During coring, the shale laminae and clayey zones were extremely sensitive to the slightest change in the drilling techniques. In several instances, such as in Boring P-10 from 62 to 70 feet and in Boring P-9 from 242 to 252 feet, core recovery was 100 percent and RQD was zero from breakage along these laminae.

To help visualize the character of the subsurface units, Figures 2.5-42a through 2.5-42k contain photographs of core obtained from Boring P-9 which is located directly under the Unit 1 reactor containment structure (Figure 2.5-31).

2.5.1.2.2.2.1 Pennsylvanian System

2.5.1.2.2.2.1.1 Virgilian Stage

The Upper Pennsylvanian rocks that were penetrated by the borings and are exposed at the surface in the project area belong to the

Virgilian Stage of the Pennsylvanian System. The Virgilian Stage is represented in descending order by the Shawnee Group and the Douglas Group.

2.5.1.2.2.2.1.1.1 Shawnee Group

The Shawnee Group consists of a sequence of shale and lime stone facies with some interbedded sandstones (Figures 2.5-12 and 2.5-41). Folding has resulted in a gentle northwesterly dip on these strata. Because of its surface exposure, the unit has been thinned and removed by erosion in the southern and southwest portions of the site. Most of the surface bedrock at this site belongs to the Shawnee Group. However, bedrock underlying the alluvium in major valleys and at out-crops along valley slopes in the southern portion of the site belongs to the Douglas Group (Figures 2.5-21 and 2.5-22).

The Shawnee Group is represented by the Lecompton Limestone, the Kanwaka Shale, and the Oread Limestone (Figure 2.5-41). All the younger formations of the Shawnee Group have been removed by erosion.

2.5.1.2.2.2.1.1.1.1 The Lecompton Limestone

The Lecompton Limestone is present only in the northern and western parts of the site (Figures 2.5-21 and 2.5-22). The total stratigraphic thickness of the Lecompton is not present in the site. Only the two basal members, the Doniphan Shale Member and the Spring Branch Limestone Member are present, the rest having been removed by erosion. The Spring Branch Limestone and Doniphan Shale members were penetrated by Borings B-20 and LK-13 (Figure 2.5-28).

2.5.1.2.2.2.1.1.1.1.1 The Doniphan Shale Member

The Doniphan Shale Member consists of medium gray to grayish orange sandstone that is laminated to medium bedded, fine to very fine grained, well cemented, slightly to highly calcareous, and locally shaley and micaceous. It is interbedded with grayish olive shales that are calcareous, clayey, and locally sandy. Occasional laminae of highly calcareous sandstone are present near the base of the Doniphan Shale Member.

The Doniphan Shale Member crops out in the northwestern portion of the site and was penetrated only by Borings B-20 and LK-13 (Figures 2.5-21 and 2.5-22). The thickness of the Doniphan Member encountered in the site ranged from 22 to 40 feet. At the plant site, it has been removed by erosion.

The Doniphan Shale Member most probably represents sedimentation of the continental margin stage of megacyclothem development (Reference 324, p. 567). It represents an area of shale deposition on the continental shelf where sand, plant remains, and other fossil fragments were intermittently introduced by spasmodic distal turbidity currents (Reference 87, p. 14-17).

In Boring B-20, the Doniphan Shale Member was characterized by an average core recovery of 91 percent and an average RQD value of 61 percent. In Boring LK-13, the mean weighted recovery was 64 percent with a mean weighted RQD value of 57 percent. One water pressure test of the Doniphan Shale Member in Boring LK-13 gave a permeability value of 1 x 10^{-4} cm/sec.

2.5.1.2.2.2.1.1.1.1.2 Spring Branch Limestone Member

The Spring Branch Limestone Member consists of medium-light gray limestone which is thin bedded, very fossiliferous, and shaley to very shaley. It is interbedded with medium-dark gray shale which is thinly laminated, very calcareous, fossiliferous, and contains numerous clayey shale laminae. The Spring Branch Limestone Member crops out in the north-western portion of the site and was penetrated by Borings B-20 and LK-13. The thickness of the Spring Branch Member ranges from 3.5 to 10 feet. At the plant site, it has been removed by erosion.

The Spring Branch Limestone Member represents the argillaceous, transgressive marine stage of a megacyclothem (Reference 324, p. 567). It resulted from deposition of silt and clay into a shallow marine environment where brachiopods, gastropods, and pelecypods flourished.

In Boring B-20, the Spring Branch Limestone Member is characterized by an average core recovery of 97 percent and an average RQD value of 61 percent. In Boring LK-13, the mean weighted recovery was 100 percent and the mean weighted RQD value was 81 percent. One water pressure test of the Spring Branch Limestone Member in Boring LK-13 gave a permeability of 1 x 10^{-4} cm/sec.

The bottom of the Spring Branch Limestone Member corresponds with the bottom of the Lecompton Limestone Formation and the top of the Kanwaka Shale Formation.

2.5.1.2.2.2.1.1.1.1.2 Kanwaka Shale

The Kanwaka Shale is subdivided into three members: the Stull Shale Member, the Clay Creek Limestone Member, and the Jackson Park Shale Member. The Kanwaka Shale crops out throughout the northern and northwestern portions of the site but has been re-

moved by erosion from the southern and eastern portions (Figures 2.5-21 and 2.5-22). A complete stratigraphic section of the Kanwaka Shale is depicted on Figure 2.5-41. Borings B-20 and LK-13 penetrated the entire section, while Borings B-6, B-13, B-14, B-19, B-21, borings in the lake area (LK-Series), borings along the saddle dam alignments, and PL-Series borings penetrated only the lower portions. The soil in Borings B-4 and B-5 was developed from residuum of the Jackson Park Shale Member, although no unweathered rock recognizable as the Jackson Park Shale Member was present in the borings. The P-Series borings, drilled at the plant site, either encountered the lower Jackson Park Shale Member in the upper few feet of the borings or residual soil derived from weathering of the Jackson Park. Several of the HS-Series borings near the plant site also penetrated the lower Jackson Park Shale Member or residual soil derived from weathering of the Jackson Park.

2.5.1.2.2.2.1.1.1.2.1 Stull Shale Member

The Stull Shale Member consists of medium dark to medium light gray shale that weathers to yellowish brown, is thinly laminated to thin bedded, calcareous to very calcareous, fossiliferous, and locally sandy. It is interbedded with light gray, laminated to thin-bedded, fine-grained, calcareous to very calcareous sandstone that weathers to yellowish or olive-brown and medium dark gray shaley siltstone, which is laminated to medium-bedded with plant fossils. Highly fossiliferous zones and clayey shale layers are present locally within the unit. The sandstone facies is locally cross-bedded. In the northwest portion of the site area, excluding the make-up water line, a 0.2-foot thick seam of black shaley coal occurs in a sandy shale facies in the middle of the unit (Figure 2.5-34t, Boring B-20; Dames & Moore, 1976i, Figures A-2-1 and A-2-5, Borings Dl-2 and Dl-9; Reference 62, Plate A-25; and Reference 326, Figure 17, Boring LK-13). The Stull Shale Member crops out extensively in the northwestern quarter of the site where the sandstone facies forms the cap rock on many of the upland surfaces (Figures 2.5-21 and 2.5-22). The entire thickness of the Stull Member was penetrated only in Boring B-20, where it is 51 feet thick. The Stull Shale Member was mapped in the excavation trench for the make-up water pipeline (Reference 326). In the western part of the site area, the Stull Member appears to consist of a shale-sandstone-shale facies sequence. The unit has been removed by erosion at the plant site.

The friable sandstone facies of the Stull Shale Member has been interpreted as the initial deposit of the Lecompton megacyclothem (Reference 184, p. 152). The Stull Shale Member was probably formed by the depostion of sand, silt, and organic debris on a deltaic plain prior to the transgression of the sea.

The Stull Shale Member is characterized by core recovery values that ranged from 88 to 99 percent and RQD values which ranged from 50 to 82 percent in Borings B-13 and B-20. In Boring LK-13, mean weighted core recovery was 97 percent and the mean weighted RQD value was 77 percent. Where this member is exposed to surface weathering (Boring B-13, borings for saddle dams I and II, and borings for the Route 8 causeway), average thickness has been decreased by erosion, the rock is of poorer quality, and mean weighted recovery and mean weighted RQD are correspondingly lower. At the Route 8 causeway, average thickness is 5.8 feet, weighted core recovery values ranged from 42 to 100 percent with a mean of 87 percent, and weighted RQD values ranged from 0 to 98 with a mean of 50. At saddle dams I and II, the average thickness is 12.4 feet, weighted core recovery values ranged from 62 to 100 percent with a mean of 84.7 percent, and weighted RQD values ranged from 19 to 96 percent with a mean of 52 percent.

Water pressure testing of the Stull Shale Member in Borings LK-13 and Dl-6 indicated an average permeability of 2.0×10^{-5}cm/sec with a range from 8×10^{-6} to 4.3×10^{-5} cm/sec.

2.5.1.2.2.2.1.1.1.2.2 Clay Creek Limestone Member

The Clay Creek Limestone Member is a light gray to medium gray limestone that weathers to orange-brown and is thin to medium bedded, fine grained, and fossiliferous. Burrow and possible algal structures are well developed in the basal section and are indicative of the unit. Locally, the limestone beds are separated by a 2- to 5-foot highly weathered bed of orange-brown, slightly sandy shale.

The Clay Creek Limestone Member is present on high divides in the eastern portion of the site (see Figures 2.5-21 and 2.5-22) and is present at the surface and in the subsurface in the western portion of the site. The basal section is visible on the west bank of the Neosho River, south of John Redmond Dam, and in the excavation for the make-up water screenhouse. The thickness ranges from 2 to 8 feet. The complete Clay Creek Limestone Member is present in Borings B-13, B-20, LK-13, D2-3, and CR-9. The upper portions of the Clay Creek Member are present in several borings for saddle dam I, saddle dam II, and the Route 8 causeway. The lower portions are present in Borings B-6, B-7, B-14, and B-19 in and several borings for saddle dam II and saddle dam III. It has been removed by erosion at the plant site.

The environment of deposition of the Clay Creek Limestone Member appears to have been a shallow, near-shore, clear-water environment. This interpretation is based on the fossils present and the general lack of clayey material within the unit. The Clay Creek

Limestone represents the upper, last stage of a megacyclothem beginning with the Ireland Sandstone Member of the Lawrence Formation. Moore (Reference 184, p. 150) supports this when he says that the Kanwaka Shale, of which the Clay Creek Limestone Member is a part, "comprises the terminal part of the Oread megacyclothem and the initial part of the Lecompton megacyclothem.

The Clay Creek Limestone Member is the uppermost bedrock unit encountered in Borings B-6, B-7, B-14, and B-19, and it is slightly to highly altered by surface weathering at the locations of those borings. At these borings, core recovery ranged from 40 to 100 percent, and RQD ranged from 0 to 88 percent. Where the unit is deeper and less weathered, core recovery was 100 percent, and RQD values ranged from 64 percent to 82 percent from Borings B-13 and B-20, respectively. At other locations where the Clay Creek Limestone Member is completely penetrated, RQD was relatively high (4.4 feet, 100 percent weighted recovery, 93 percent weighted RQD in Boring LK-13; 7.1 feet, 100 percent weighted recovery, 54 percent weighted RQD in Boring D2-3; and 3.4 feet, 100 percent weighted recovery and 34 percent weighted RQD in Boring CR-9). At saddle dams I, II, and III, the Clay Creek Limestone Member is either the uppermost bedrock unit or is overlain by a relatively thin section of Stull Shale. Therefore, average thickness is 4.3 feet, weighted recovery ranged from 67 to 100 percent with a mean of 84.7 percent, and RQD values ranged from 0 to 60 percent with a mean of 35.8 percent. At the Route 8 causeway, the Clay Creek is again relatively close to the surface and average thickness is 3.2 feet; mean recovery ranged from 94 to 100 percent with a mean of 98 percent; and RQD values ranged from 34 to 71 percent with a mean of 57.1 percent.

At a confining pressure of 4,003 psf, resonant column testing performed on one sample of the Clay Creek Limestone Member from Boring B-7 resulted in a shear wave velocity of 2,040 fps and a modulus of rigidity of 21.0 x 10^6 psf.

Three-dimensional, geophysical borehole logging of the Clay Creek Limestone Member in Borings B-6 and B-9 determined an average compressional wave velocity of 6,266 fps, a shear wave velocity of 2,680 fps, and an elastic modulus of 0.57 x 10^6 psi.

Water pressure testing of the Clay Creek Limestone Member at saddle dams I, II, and III gave an average permeability of 6.1 x 10^{-6} cm/sec with a range from 4.1 x 10^{-8} to 3.1 x 10^{-5} cm/sec.

2.5.1.2.2.2.1.1.1.2.3 Jackson Park Shale Member

The Jackson Park Member consists of three sedimentary facies. Each facies varies in thickness and may be locally absent, and vertical sequences are variable across the site area. In general,

a vertical sequence of Jackson Park consists of limestone, shale, sandstone, and limestone subunits in stratigraphically descending order. The upper limestone subunit was encountered in Borings B-13, B-20, PL-5, PL-12, PL-13, PL-14, PL-15, PL-17, PL-18, PL-19, and PL-23, is exposed on the east bank of the Neosho River south of John Redmond Dam, and was mapped in the excavations for the make-up water screenhouse and intake channel (References 58, Appendix A; and 326, Figure 17H). This limestone is light gray, thin to medium bedded, fine grained, and contains 0.02- to 0.4-foot layers of medium gray, dense, very calcareous shale.

The argillaceous facies of the Jackson Park Member consists of medium gray to dark gray, yellowish gray weathering, thinly laminated to thin-bedded, very calcareous, locally fossiliferous shale.

This shale facies is interbedded with 0.01- to 0.04-foot lenses of light gray, fine-grained, calcareous sandstone. Occasional 0.1-foot, medium brown, dolomitic concretions occur in the basal shale. A medium dark gray, thinly laminated, calcareous, shaley siltstone facies occurs at the base of this upper limestone at the make-up pipeline intake channel and screenhouse.

Post-PSAR geological mapping of excavations indicates that the dominant facies of the Jackson Park Member at the power block and lake area is a sandstone. This sandstone is light brown; weathers to light yellowish orange; is thin to medium bedded, fine to very fine grained, and silty; and contains some clay. Generally, this subunit is slightly to moderately weathered; however, it is locally highly weathered and clayey. Basal Jackson Park Sandstone, mapped in the saddle dam IV excavation, the yard startup transformer excavation, the ESWS excavation, and the circulating water discharge channel and observed in fire and sewer line excavations west of the turbine and control buildings, is calcareous and contains light gray, sandy limestone interbeds and lenses. This sandstone was mapped in interbedded contact with light gray, sandy limestone in the foundation of the yard start-up transformer and in the saddle dam IV keytrench excavation. This interbedded contact was also observed in the sewer/fire line trenches mentioned above. When observed in preliminary borings for the Applicants PSAR and subsequent foundation investigations, this lower limestone was interpreted, in some cases, as the Kereford Member of the Oread Formation (Reference 63, Plate A-2M). However, based upon observation of the interbedded contact, the sandy limestone at the base of the sandstone is interpreted as a facies of the Jackson Park Member. Therefore, the Kereford Limestone Member appears to be absent from the site area. Field mapping of several borings in previous investigations supports the interpretation of this limestone as a Jackson Park facies.

A light gray, medium-bedded, fine-grained limestone with some shale partings is located between the Jackson Park Shale and the underlying Heumader Shale in the area of the make-up water screenhouse and intake channel (References 63 and 326).

Limestone occupies the same stratigraphic interval in Boring D2-12 at saddle dam II (Reference 66, Plate A-2-14).

Limestone at this interval appears to be a lateral equivalent of limestone interbedded with the light brown Jackson Park Sandstone. However, sandstone is absent from the make-up water screenhouse section, and limestone at the screenhouse can be interpreted as a Jackson Park facies (a thicker limestone facies, no sandstone facies present). This lower limestone was previously identified as Kereford when encountered in a boring for the make-up water system geotechnical investigation (Reference 63, Boring PL-23). No continuity with limestone at the base of the sandstone has been observed either in outcrops, excavations, or borings. A unique interpretation of limestone at the base of the Jackson Park Sandstone or beneath Jackson Park Shale may not be possible without further investigations. Because of direct observation of the interbedded contact, the Jackson Park Limestone facies interpretation is favored.

The Jackson Park has been removed by erosion in the south-western portion of the site and is present as a continuous subsurface unit in northwestern areas of the site. Thicknesses of the Jackson Park Shale Member encountered in borings at the site range from 23 to 34 feet. Only the lower Jackson Park Shale Member is present at the plant site. Most of this member has been removed by erosion.

Some of the borings were drilled through a zone believed to be equivalent to the Jackson Park Shale Member. Because of deep, near-surface weathering, these borings penetrated residual soil derived from this member rather than rock recognizable as the Jackson Park Shale Member. At the plant site, as much as 11.5 feet of recognizable Jackson Park Shale Member was penetrated. Recovery ranged from 12 to 100 percent and RQD from 0 to 59 percent, which reflects the variability of the degree of weathering within the unit. As elevation and the corresponding thickness of this member increase, core recovery and RQD values also show a general increase.

The Jackson Park Shale Member was probably deposited in a shallow, near-shore environment that received an abundant supply of clay, silt, and sand from a nearby, low-lying land area. The limestone facies appears to represent detritus free environments. Evidence of this is based on the environment of deposition of the under-

lying Kereford Limestone Member (absent at the site), which Moore (Reference 324, p. 339) attributes to a near-shore area with a muddy bottom. The Jackson Park Shale Member probably represents the transition from this environment to the clear-water environment of the overlying Clay Creek Limestone Member.

Core recovery in the Jackson Park Shale Member in the B-Series borings ranged from 61 to 100 percent and averaged 92 percent. RQD values ranged from 35 to 95 percent and averaged 71 percent. Both core recovery and RQD were lower in near-surface, weathered zones.

In the cooling lake area, the Jackson Park Shale Member was completely penetrated by Borings LK-13, D2-3, D2-7, D2-8, D2-12 and D3-3. The average thickness of this member in these six borings is 19.4 feet. The mean weighted recovery in these borings ranged from 90 to 100 percent with a mean of 95.1 percent. Weighted RQD values ranged from 52 to 96 percent with a mean of 69.6 percent. Weighted core recovery of the Jackson Park Shale Member in the LK-Series borings ranges from 89 to 100 percent with a mean of 94.5 percent. Weighted RQD values ranged from 26 to 96 percent with a mean of 68.1 percent. Weighted core recovery in the saddle dam series borings ranged from 20 to 100 percent with a mean of 84 percent. Weighted RQD values ranged from 0 to 79 percent with a mean of 50 percent. Both core recovery and RQD were lower in near-surface weathered zones (for detail see boring logs in appendices to the Dames & Moore geotechnical reports for the saddle dams, Route 8 causeway, circulating water system, cooling lake, railroad spur and bridges and switchyards).

Rock previously recognized as the Kereford Limestone Member is characterized by an average core recovery of 98 percent and an average RQD value of 82 percent in the B-Series borings. Because this interval is considerably thinner than the length of a core run, core recovery and RQD values cannot be applied strictly to this member.

Unconfined compression testing of two samples in the Jackson Park Shale Member at the plant site gave values which ranged from 2,220 psi with a static modulus of elasticity of 0.382×10^6 psi in a sample from Boring P-6 to a compressive strength of 2,330 psi with a static modulus of elasticity of 0.323×10^6 in a sample from Boring P-9. These two samples have an average Poisson's ratio of approximately 0.32 and an average bulk modulus of approximately 0.31×10^6 psi.

Resonant column tests were performed on one sample of the Jackson Park Shale Member from Boring P-9. Results are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Results of three-dimensional geophysical borehole logging of the Jackson Park Shale Member indicated an average compressional wave velocity of 7,720 fps, a shear wave velocity of 3,320 fps, and an elastic modulus of 1.21 x 10^6 psi. Three-dimensional geophysical borehole logging provided an average compressional wave velocity of 9,600 fps, a shear wave velocity of 4,950 fps, and an elastic modulus of 2.27 x 10^6 psi for the lower limestone facies of the Jackson Park Shale Member.

Clay analyses of three shale samples of the Jackson Park Shale Member revealed no expandable clay minerals and indicated that the clay fraction is approximately 50 percent illite, 35 percent chlorite, and 15 percent kaolinite. The samples have low to medium-high slaking durabilities and swelling pressures up to 900 psf in a 1,500 minute test.

Water pressure testing of the B-Series borings gave an average permeability of 4.4 x 10^{-5} cm/sec with a range up to 4.7 x 10^{-5} cm/sec with some borings showing no water loss at the pressure used. At the plant site, values ranged up to 5.0 x 10^{-5} cm/sec with an average permeability of 1.3 x 10^{-5} cm/sec. Higher losses can be expected in the weathered Jackson Park Shale Member (USAR Section 2.4.13.2). Water pressure testing of the Jackson Park Shale Member in the cooling lake area gave an average permeability of 5.2 x 10^{-6} cm/sec with a range up to 2.7 x 10^{-5} cm/sec with some borings showing no water loss at the pressure used.

During pressure testing, the packer spacing was considerably greater than the thickness of the lower limestone facies of the Jackson Park Shale Member; therefore, water flow characteristics of the unit could not be delineated precisely. Analysis of test data reveals that the lower Jackson Park Limestone is characterized by an apparent average permeability of 1.9 x 10^{-5} cm/sec.

The bottom of the Jackson Park Shale Member corresponds with the bottom of the Kanwaka Shale Formation and the top of the Oread Limestone Formation.

2.5.1.2.2.2.1.1.1.3 Oread Limestone Formation

The Oread Limestone is present throughout the site, and in the southern and eastern portions, it crops out extensively (Figures 2.5-21 and 2.5-22). In the northern and western portions of the site, it crops out in the stream valleys or forms a continuous subsurface unit.

Members of the Oread Limestone Formation which are present at the site are, in order of increasing age, the Heumader Shale, Plattsmouth Limestone, Heebner Shale, Leavenworth Limestone, Snyderville

Shale, and Toronto Limestone. The Kereford Limestone Member, which is recognized in other parts of Kansas as the uppermost member of the Oread Formation, is absent from the site area. Limestone which had been identified as the Kereford Member during investigations for the PSAR and previous geotechnical investigations is now recognized as a facies within the Jackson Park Shale Member. This interpretation is based upon the occurrence of this limestone as lenses within the sandstone and on the interbedded relationship between the limestone and basal Jackson Park Sandstone in excavations for saddle dam IV, the ESWS, the circulating water discharge channel, the yard start-up transformer, and in sewer/fire line trenches west of the turbine and control buildings (for additional discussion see USAR Section 2.5.1.2.2.2.1.1.2.3).

2.5.1.2.2.2.1.1.1.3.1 Heumader Shale Member

The Heumader Shale Member consists of medium dark gray shale which weathers to pale or dark yellowish brown. It is thinly laminated to medium bedded, calcareous to very calcareous, fossiliferous, clayey, and locally sandy with occasional 0.01-foot lenses of light gray, fine-grained, calcareous sandstone. This shale also contains occasional, light brown, siltstone stringers and nodules. In its basal portions, the Heumader Shale Member is interbedded with 20 to 40 percent fossils and 0.01- to 1.5-foot beds of shaley limestone. This basal facies is a gray, thinly laminated to irregularly bedded, very calcareous, fossiliferous shale which is best developed in the northern portions of the site. Clayey layers and zones are common throughout the member.

The Heumader Shale Member crops out in a band running from the northeast quadrant of the site to the southwest quadrant (Figures 2.5-21 and 2.5-22). It is present in the subsurface in the northwestern quadrant of the site but is absent in the southeastern quadrant, due to removal by erosion.

The borings, drilled in the site area, indicated that the thickness of the Heumader Shale Member ranges from 18 to 34 feet. At the plant site, this member averages 27 feet in thickness and is present at an average depth of 13 feet (Elevation 1,092). In the LK-Series of borings, the Heumader Shale Member has an average thickness of 27.8 feet. The Heumader Shale Member crops out extensively in the area of the UHS (Figure 2.5-23). The Heumader Shale Member is a marine shale which was deposited in a shallow sea. It represents the transitional area between the near-shore and offshore.

In the 13 B-Series borings, which penetrated the Heumader Shale Member, core recovery averaged 90 percent and ranged from 68 to 100 percent. RQD values ranged from 0 to 88 percent with an average of 66 percent. Core recovery and RQD values were lower in

near-surface weathered areas. Of the borings in the plant site and in the UHS area, core recovery averaged 89 percent and RQD averaged 74 percent. In the cooling lake area, Borings LK-3, LK-3C, LK-3D, LK-4, LK-12, LK-13, D2-3, D2-7, D2-8, D2-12 and D3-3 completely penetrated the Heumader Shale Member with thicknesses ranging from 14.0 to 37.0 feet and averaging 24.6 feet. In these borings, weighted recovery ranged from 81 to 100 percent with a mean of 95.2 percent. Weighted RQD values ranged from 6 to 96 percent with a mean of 62.0 percent. Core recovery and RQD values were lower in weathered near-surface areas where the Heumader Shale Member has been partly removed due to erosion.

Unconfined compression testing of the Heumader Shale Member at the plant site provided results ranging from a compressive strength of 56 psi with a static modulus of 0.00104 x 10^6 psi in Boring P-4 to a compressive strength of 300 psi with an elastic modulus of 0.0343 x 10^6 psi in Boring B-4. The samples of the Heumader Shale Member tested by unconfined compression testing were characterized by an average Poisson's ratio of approximately 0.41 and an average bulk modulus of 0.0046 x 10^6 psi.

Resonant column tests were performed on five samples of the Heumader Shale Member from five borings. Results of these tests are discussed in USAR Section 2.5.4.2.1.4.1 and presented in accompanying tables.

Average values calculated from three-dimensional borehole logging of the in situ rock mass characterize the Heumader Shale Member as having a compressional wave velocity of 8,130 fps, a shear wave velocity of 4,160 fps, and an elastic modulus of 1.63 x 10^6 psi. In contrast to the results obtained in the unconfined compression and resonant column tests, the three-dimensional borehole logging suggests that the in situ Heumader is generally good quality shale. It can be concluded that the Heumader Shale Member contains rock with properties which vary with its composition, degree of weathering, and fracturing.

Geophysical investigations at the plant site measured average compressional wave velocities of 6,000 fps and shear wave velocities of 1,400 to 1,500 fps. In the area of the UHS, compressional wave velocities averaged 4,300 fps with shear wave velocity of 1,925 fps.

Clay analyses of three shale core samples from the Heumader Shale Member identified no expandable clay minerals. Its clay fraction consisted of 50 percent illite, 30 percent chlorite, and 20 percent kaolinite. The samples have low to medium slaking durabilities, and swelling pressures that ranged up to 900 psf in 2,520 minutes.

Wet density tests performed on seven Heumader Shale Member samples from six P-Series borings gave a minimum wet density of 137 pcf in Boring P-11 and a maximum wet density of 160 pcf in Boring P-2. No tests were run for HS-Series borings.

Water pressure testing of the B-Series borings provided an average permeability of 3.0 x 10^{-6} cm/sec with a range up to 1.3 x 10^{-5} cm/sec. At the plant site, values ranged up to 5.0-6x 10^{-5} cm/sec with an average permeability of 5.7 x 10^{-6} cm/sec. In the area of the UHS, values ranged up to 6.0 x 10^{-6} cm/sec with an average permeability of 3.18 x 10^{-6} cm/sec. Water pressure testing of the Heumader Shale Member borings in the cooling lake area gave an average permeability of 2.3 x 10^{-6} cm/sec with a range up to 1.2 x 10^{-5} cm/sec. Many of the tests indicated no water loss at an effective pressure equal to overburden pressure.

2.5.1.2.2.2.1.1.1.3.2 Plattsmouth Limestone Member

The Plattsmouth Limestone Member consists of light gray to medium gray limestone which weathers to yellowish brown and is thin to thick bedded, fine to very fine grained, and fossiliferous. It is interbedded with 0.02- to 0.7-foot partings or layers of medium gray, calcareous, locally clayey shale. Calcite-lined vugs occur in the basal section of the Plattsmouth Member in various locations in the lake area.

The Plattsmouth Limestone Member crops out in the southern half of the site and is present in the subsurface in the northern half (Figures 2.5-21 and 2.5-22). The borings at the site show that the thickness of the Plattsmouth Member ranges from 11 to 14 feet. The Plattsmouth Limestone Member is present in the subsurface at the plant site at a depth of about 40 feet (Elevation 1,065) and it crops out extensively throughout the area of the UHS (Figure 2.5-23).

The Plattsmouth Limestone Member, according to Moore, was deposited in clear, sunlit waters far from the closest shore (Reference 324, p. 318). Wagner stated that it was deposited during the normal regressive stage of the Oread cyclothem in an environment where sea level was dropping and the shoreline was retreating from its former positions (Reference 324, p. 584-585).

Core recovery from the borings in the Plattsmouth Limestone Member throughout the site averaged 91 percent, and RQD values averaged 70 percent. In near-surface weathered zones, core recovery ranged from 28 to 92 percent with an average of 69 percent, and RQD values ranged from 0 to 65 percent with an average of 31 percent. In deeper, unweathered areas core recovery ranged from 87 to 100 percent with an average of 98 percent, and RQD values ranged from

52 to 97 percent, with an average of 72 percent. At the plant site, core recovery averaged 98 percent and RQD averaged 85 percent, while at the UHS the recovery averaged 92 percent and RQD averaged 68 percent. These lower values in the UHS reflect the effect of exposure and weathering.

Twenty-two borings drilled during geotechnical investigations for the cooling lake, saddle dams, and main dam completely penetrated the Plattsmouth Limestone Member (References 62, 66 and 60). In the cooling lake area, the thickness of the Plattsmouth Limestone Member ranged from 10.1 to 14.6 feet with an average thickness of 11.8 feet. Weighted recovery in these 22 borings ranged from 54 to 100 percent with a mean of 90.3 percent. Weighted RQD values ranged from 15 to 100 percent with a mean of 52.2 percent. Generally, weighted recovery and RQD decreased in these 22 borings as thickness of overburden decreased. Lower recovery and RQD values reflect the effect of weathering and exposure.

Ten samples of the Plattsmouth Limestone Member were subjected to unconfined compression testing. The results ranged from a compressive strength of 4,040 psi with a modulus of elasticity of 4.00 x 10^6 psi in Boring ESW-25 to a strength of 16,400 psi with a modules of elasticity of 9.03 x 10^6 psi in Boring B-5. These samples had an average Poisson's ratio of 0.27 and an average bulk modulus of 4.36 x 10^6 psi.

Resonant column tests were performed on six samples of the Plattsmouth Limestone Member from six borings. Results of these tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Shockscope testing of three samples of the Plattsmouth Limestone Member gave an average compressional wave velocity of 17,900 fps, a modulus of elasticity of 8.0 x 10^6 psi, and a modulus of rigidity of 3.1 x 10^6 psi.

Average values from three-dimensional borehole logging show that the Plattsmouth Limestone Member is characterized by a compressional wave velocity of 13,100 fps, a shear wave velocity of 6,280 fps, and an elastic modulus of 4.13 x 10^6 psi.

Seismic refraction surveys at the plant site gave a compressional wave velocity for the Plattsmouth Limestone Member which averages 14,300 fps. Geophysical shear wave surveys resulted in a shear wave velocity of about 6,200 fps for the member. In the UHS, the compressional and shear wave velocities were 12,000 and 6,000 fps, respectively.

Water pressure testing of the B-Series borings gave an average permeability of 2.3 x 10^{-6} cm/sec with a range up to 1.3 x 10^{-5} cm/sec. At the plant site, the test results ranged up to 0.1 x 10^{-5} cm/sec with an average permeability of 1.3 x 10^{-6} cm/sec. At the UHS, values ranged up to 1.4 x 10^{-5} cm/sec with an average permeability of 4.6 x 10^{-6} cm/sec. In the cooling lake area, water pressure testing gave an average permeability of 8.1 x 10^{-6} cm/sec with a range up to 1.3 x 10^{-4} cm/sec. The unit is typically dense with widely spaced, tight fractures, and in many of the borings, no water was lost during pressure testing. However, where exposed close to the surface in excavations for the main dam, the Plattsmouth Member contained many more closely spaced joints, and some were open.

2.5.1.2.2.2.1.1.1.3.3 Heebner Shale Member

The Heebner Shale Member consists of dark gray to grayish black carbonaceous shale which is thinly laminated, fissile, and locally fossiliferous at the top. It is interbedded with layers and lenses containing 5 to 10 percent medium gray to pale yellowish brown calcareous siltstone. A thin carbonaceous seam was observed on the east wall of the Main Dam keytrench excavation at Station 13+65, (Figure 2.5-29), but was not laterally traceable (Reference 326). Additional carbonaceous laminae were observed in the Heebner Shale Member at the service spillway area south of the main dam. The Heebner Shale Member has been removed by erosion in the valley areas and southern portions of the site. It crops out in the southern and central portions and is present in the subsurface in the northern portions (Figures 2.5-21 and 2.5-22). The borings indicate that the thickness of the Heebner Shale Member ranges from 2.5 to 4.2 feet at the site. The Heebner Shale Member is present in the subsurface at the plant site at a depth of about 52 feet (Elevation 1,053) and crops out in the area of the UHS (Figure 2.5-23). In the cooling lake area, the Heebner Shale Member has an average thickness of 3.6 feet.

Wagner attributes deposition of the Heebner Shale Member to an environment of the stagnant-water, marine stage and describes it as a shallow sea, far from the shoreline with little circulation and an oxygen-poor environment (Reference 324, p. 583). The sea floor was a relatively flat plain upon which tidal or current movement was minimal. Moore, in his study of faunal assemblages, agrees with this interpretation (Reference 324, p. 345).

Core recovery in the Heebner Shale Member throughout the site ranged from 24 to 100 percent with an average of 92 percent, and RQD values ranged from 0 to 100 percent with an average of 68 percent. In general, near-surface weathered areas had lower

recovery and RQD values. In the area of the plant site, recovery averaged 97 percent and RQD 88 percent; while in the area of the UHS, recovery averaged 93 percent and RQD 73 percent.

Four borings for the circulating water system contained complete sections of the Heebner Shale Member. Weighted recovery ranged from 93 to 100 percent with a mean of 98.3 percent. Weighted RQD values ranged from 40 to 70 percent with a mean of 54 percent. In the cooling lake area, 39 borings penetrated complete sections of the Heebner Shale Member. Weighted recovery ranged from 6 to 100 percent with a mean of 82.5 percent. Weighted RQD values ranged from 0 to 95 percent with a mean of 49.9 percent. Most lower values along the main dam alignment show the effects of weathering and relatively thin overburden.

Five samples of the Heebner Shale Member were subjected to unconfined compression testing. The results ranged from an unconfined compressive strength of 710 psi with a modulus of elasticity of 0.77×10^6 psi in Boring ESW-23 to a compressive strength of 2,520 psi with a modulus of elasticity of 2.35×10^6 psi in Boring ESW-25. The samples tested had an average Poisson's ratio of 0.34.

Resonant column tests of the Heebner Shale Member were performed on one sample from a B-Series boring and one sample from an HS-Series boring. Results of these tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Three-dimensional velocity logging gave an average compressional wave velocity of 9,270 fps, a shear wave velocity of 4,710 fps, and an elastic modulus of 1.92×10^6 psi.

Because of the thickness of the Heebner Shale Member, Leavenworth Limestone Member, Snyderville Shale Member and their stratigraphic position between the Plattsmouth Limestone Member and Toronto Limestone Member, it is not feasible to separate these three members by a geophysical seismic refraction survey or a shear wave survey. The values obtained for this zone correlate closely with Birdwell values and characterized this zone as having an average compressional wave velocity from 6,000 to 7,000 fps with a shear wave velocity of approximately 3,500 fps.

Shale analyses performed on two core samples from the Heebner Shale Member show that the unit contained no expandable clay minerals. Its clay fraction consisted of 70 percent illite, 20 percent chlorite, and 10 percent kaolinite. The samples were characterized by a high slaking durability. Swelling pressure tests on two samples gave swelling pressures up to 835 psf in a 2,460 minute test.

Wet density tests performed on two Heebner Shale Member samples from Boring P-10 gave a minimum wet density of 137 and a maximum wet density of 139 pcf. No tests were run for HS-Series borings.

During pressure testing, the packer spacing was considerably larger than the thickness of the Heebner Shale Member. Most water losses occurred along the upper and lower contacts of the unit.

Water pressure testing of the B-Series borings gave an average permeability of 1.0×10^{-6} cm/sec with a range up to 1.8×10^{-5} cm/sec. At the plant site, the range was up to 2.5×10^{-5} cm/sec with an average of 2.5×10^{-6} cm/sec. In the UHS area, values ranged up to 2.9×10^{-5} cm/sec with an average of 9.15×10^{-6} cm/sec. Water pressure testing of the Heebner Shale Member in the cooling lake area indicated an average permeability of 2.4×10^{-6} cm/sec with a range up to 1.0×10^{-5} cm/sec. In many borings, no water loss was recorded when tested at overburden pressure.

2.5.1.2.2.2.1.1.1.3.4 Leavenworth Limestone Member

The Leavenworth Limestone Member consists of light bluish gray to medium gray limestone which is thin to medium bedded, fine grained, fossiliferous, and shaley at its top and base. At the plant site, the Leavenworth Limestone Member contains a basal facies of shaley, calcarenitic limestone with a maximum thickness of 1.1 feet.

The Leavenworth Limestone Member is continuous throughout the project area, except in valley areas and in the southernmost portions where it has been removed by erosion. It crops out in the southern and central portions of the project area and is present in the subsurface in the northern portion (Figures 2.5-21 and 2.5-22). The average thickness of the Leavenworth Limestone Member is 1.0 foot throughout the site. It occurs in the subsurface at the plant site at a depth of about 55 feet (Elevation 1,050). At the plant site, the Leavenworth Limestone Member is better developed than in most areas of the project area as the average thickness is 2.0 feet. The Leavenworth Member is stratigraphically the lowest unit which crops out in the UHS area and is the uppermost rock unit where the overlying Heebner Shale has been removed by erosion (Reference 59). The average thickness of the Leavenworth in the UHS area is 1.2 feet. In a section of the main dam keytrench west of Wolf Creek, this limestone has been partly replaced by reddish brown clay that appears to be a product of intense weathering along zones of closely spaced joints (Reference 326, p. 14-15). Remnant blocks of limestone have a highly weathered brownish rind and a moderately to slightly weathered core.

Wagner attributes the Leavenworth Limestone Member to an environment where current action oscillated fossil fragments back and forth, breaking them into small grains (Reference 324, p. 580-582). Calcium-rich waters then cemented the small grains into a cryptocrystalline, calcareous precipitate.

The thickness of the Leavenworth Limestone Member is considerably less than that of a core run; therefore, core recovery and RQD computations are not restricted to this unit. Core recovery data throughout the site suggest that the limestone unit is characterized by an average core recovery of 95 percent and an average RQD value of 64 percent. In the plant area, RQD averaged 88 percent and recovery averaged 97 percent, while in the area of the UHS, recovery averaged 91 percent and RQD averaged 71 percent.

Two borings for the circulating water pumphouse (CWP-2 and CWP-3) completely penetrated the Leavenworth Limestone, which has an average thickness of 1.0 foot. Weighted recovery ranged from 92 to 100 percent with a mean of 96 percent. Weighted RQD values ranged from 59 to 70 percent in the borings which penetrated the Leavenworth Limestone Member in the cooling lake area. The average thickness of this member is 0.8 foot in the lake area. Weighted recovery ranged from 0 to 100 percent with a mean of 82.8 percent. Weighted RQD values ranged from 0 to 95 percent with a mean of 57.7 percent.

Unconfined compression testing of six samples of the Leavenworth Limestone Member gave results ranging from an unconfined compression strength of 6,800 psi with a modulus of elasticity of 7.55×10^6 psi in Boring P-12 to an unconfined compression strength of 14,700 psi with a modulus of elasticity of 11.5×10^6 psi in Boring ESW-25. The samples tested had an average Poisson's ratio of 0.24 and an average bulk modulus of 4.63×10^6 psi.

Averaged results from three-dimensional borehole logging indicated that the Leavenworth Limestone Member is characterized by a compressional wave velocity of 8,930 fps, a shear wave velocity of 4,530 fps, and an elastic modulus of 1.80×10^6 psi.

Resonant column tests of the Leavenworth Limestone Member were performed for samples from three P-Series borings and one HS-Series boring. Results of these tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Shockscope testing of the Leavenworth Limestone Member indicated an average compressional wave velocity of 16,700 fps, a modulus of elasticity of 7.0×10^6 psi, and a modulus of rigidity of 2.6×10^6 psi.

Because the packer spacing is considerably greater than the thickness of the unit, water pressure testing could not be confined to the Leavenworth Member. Water pressure testing of the B-Series borings indicated an average permeability of 3.7×10^{-7} cm/sec. At the plant site, the average permeability was 2.9×10^{-6} cm/sec. In the area of the UHS, the average was 6.99×10^{-6} cm/sec. In the cooling lake area, the average permeability was 2.3×10^{-6} cm/sec with a range up to 2.0×10^{-5} cm/sec. Many borings showed no water loss when tested at overburden pressure.

2.5.1.2.2.2.1.1.1.3.5 Snyderville Shale Member

The Snyderville Shale Member consists of light gray to dark greenish or olive-gray shale that is thinly laminated to medium bedded, very calcareous, clayey, and locally fossiliferous. It contains occasional 0.1- to 0.3-foot lenses of limestone. The limestone lenses are light gray to dark greenish gray, fine grained, and locally shaley and fossiliferous. Numerous 0.5- to 0.7-foot clayey shale zones occur throughout the unit. The Snyderville Shale Member often contains numerous fractures which dip from 20 to 60 degrees, many of which are slickensided. When observed in excavations, some of the carbonate content appears to be the result of caliche development.

The Snyderville Shale Member crops out in the southern and central portions of the project area and is present in the subsurface in the northern portion (Figures 2.5-21 and 2.5-22). The Snyderville Shale Member occurs at a depth of about 57 feet (Elevation 1,048) at the plant site. In the UHS area, this member crops out in the southern and western portions and is present in the subsurface below the UHS dam (Figure 2.5-23). The Snyderville Shale Member has an average thickness of 10.5 feet. In the cooling lake area, the thickness of this shale varies from 3.2 to 14.4 feet with an average thickness of 7.6 feet.

Both Wagner and Moore ascribe deposition of the Snyderville Shale Member to a near-shore, shallow-water environment (Reference 324, p. 579 and 311). This is what Wagner typifies as the continental margin (Reference 324, p. 578).

Throughout the site, core recovery for the Snyderville Shale Member averaged 94 percent and ranged from 83 to 100 percent, and RQD values ranged from 23 to 93 percent with an average of 64 percent. At the plant site and in the UHS area, core recovery averaged 97 percent and RQD values averaged 75 percent.

Thirty-six borings completely penetrated the Snyderville Shale Member in the cooling lake area. Weighted recovery ranged from 23 to 100 percent with a mean of 82.2 percent. Weighted RQD values ranged from 6.0 to 100 percent with a mean of 61.2 percent.

Unconfined compression testing of six samples of the Snyderville Shale Member gave results ranging from an unconfined compressive strength of 90 psi with a modulus of elasticity of 0.0036 x 10^6 psi in Boring P-9 to an unconfined compressive strength of 1,330 psi with a modulus of elasticity of 0.323 x 10^6 psi in Boring B-5. The samples had an average Poisson's ratio of 0.35 and an average bulk modulus of 0.0044 x 10^6 psi.

Average values from three-dimensional borehole logging indicated that the Snyderville Shale Member is characterized by a compressional wave velocity of 7,290 fps, a shear wave velocity of 3,690 fps, and an elastic modulus of 1.15 x 10^6 psi.

Resonant column testing was performed on a sample of Snyderville Shale Member from Boring P-11. Results of this test are discussed in USAR Section 2.5.4.2.1.4.1 and tabulated in accompanying tables.

Shale analyses performed on three core samples from the Snyderville Shale Member showed that the unit contains no expandable clay minerals. Its clay fraction consists of 80 percent illite, 10 percent chlorite, and 10 percent kaolinite. The samples had very low slaking durabilities. Swelling pressures ranged up to 1,600 psf in a 4,320 minute test. Shale density analyses on samples of the Snyderville Shale Member from Boring P-10 gave a density of 141 pcf.

Water pressure testing in the Snyderville Shale Member indicated that water losses are low. Testing of the B-Series borings gave an average permeability of 1.1 x 10^{-6} cm/sec with a range up to 5.5 x 10^{-6} cm/sec. At the plant site, values ranged up to 2.5 x 10^{-5} cm/sec with an average permeability of 1.5 x 10^{-6} cm/sec. In the UHS area, the average permeability was 9.48 x 10^{-6} cm/sec and values ranged up to 4.8 x 10^{-5} cm/sec. At the cooling lake area, the average permeability was 3.7 x 10^{-6} cm/sec with a range up to 3 x 10^{-5} cm/sec. Many of the borings had no water loss when tested at an effective pressure equal to overburden pressure.

2.5.1.2.2.2.1.1.1.3.6 Toronto Limestone Member

The Toronto Limestone Member consists of light gray to very light gray limestone that weathers to a grayish orange or dark yellowish brown. It is thin to thick bedded, fine grained, and fossiliferous with fossil fragment beds. Five to 15 percent, pinpoint-sized, isolated vugs are developed locally. This member is interbedded with 0.001- to 0.3-foot layers of greenish gray, calcareous clayey shale. This limestone can be recognized in the field by its characteristic grayish orange to dark yellowish brown weathering and abundant fusulinids.

The Toronto Limestone Member crops out in the southern portion of the site and is present in the subsurface in the central and northern portions (Figures 2.5-21 and 2.5-22). In the project area, the borings indicate that the thickness of the Toronto Limestone Member ranges from 13 to 19 feet. This member is present in the subsurface at the plant site with an average thickness of 16.3 feet and at a depth of about 68 feet (Elevation 1,037). It is also present in the subsurface in the area of the UHS at depths ranging from approximately 20 to 40 feet. In the lake area, the Toronto Limestone has an average thickness of 15.4 feet.

The Toronto Limestone Member was deposited in a near-shore, shallow-water environment, rich in calcium carbonate, and subjected to periodic influxes of clay and silt. Wagner characterizes this as the argillaceous, transgressive marine stage of megacyclothem development (Reference 324, p. 578).

At the site, core recovery in the Toronto Limestone Member ranged from 88 to 100 percent with an average of 98 percent, and RQD values averaged 72 percent and ranged from 33 to 93 percent. At the plant site, recovery averaged 98 percent and RQD values 86.5 percent. Values were slightly lower in the UHS area where recovery averaged 95 percent and RQD averaged 62 percent.

Thirty-three borings completely penetrated the Toronto Limestone Member in the cooling lake area. Weighted core recovery ranged from 74 to 100 percent with a mean of 93.6 percent. Weighted RQD values ranged from 34 to 100 percent with a mean of 63.1 percent.

Unconfined compression testing of eight samples of the Toronto Limestone Member gave results ranging from an unconfined compressive strength of 2,430 psi with a modulus of elasticity of 0.526×10^6 psi in Boring P-12 to an unconfined compressive strength of 17,260 psi with a modulus of elasticity of 0.952×10^6 psi in Boring B-4.

The samples tested had an average Poisson's ratio of 0.29 and a bulk modulus that ranged from 0.49×10^6 psi in Boring P-12 to 4.6×10^6 psi in Boring P-6.

Resonant column tests were performed on five samples of the Toronto Limestone Member from five borings. Results of these tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Three-dimensional borehole logging within the Toronto Limestone Member indicated an average compressional wave velocity of 12,700 fps, a shear wave velocity of 6,580 fps, and an elastic modulus of 4.16×10^6 psi.

Uphole velocity surveys and shear wave velocity surveys in the Toronto Limestone Member indicated a compressional wave velocity of 11,600 to 11,700 fps and a shear wave velocity of 6,000 to 6,200 fps.

Water pressure testing in the Toronto Limestone Member indicated very low flows. Water pressure testing of the B-Series borings gave an average permeability of 1.2 x 10^{-6} cm/sec with a range up to 2.3 x 10^{-5} cm/sec. At the plant site, the average permeabilty was 2.4 x 10^{-6} cm/sec with a range up to 4.9 x 10^{5} cm/sec. In the area of the UHS, the values ranged up to 1.0 x 10^{-4} cm/sec with an average permeability of 2.57 x 10^{-5} cm/sec. In the cooling lake area, the values ranged up to 9.0 x 10^{-5} cm/sec with an average permeability of 1.6 x 10^{-5} cm/sec. Many of the borings had no water loss when tested at an effective pressure equal to overburden pressure.

The base of the Toronto Limestone Member marks the base of the Oread Limestone Formation and of the Shawnee Group, and it conformably overlies the older Douglas Group (Figure 2.5-41).

2.5.1.2.2.2.1.1.2 Douglas Group

At the site, the Douglas Group consists of facies of sandstone, siltstone, and shale that are usually intermixed and separated by gradational contacts between the members. A few thin facies of limestone and coal are interbedded throughout the group (Figure 2.5-41).

The uppermost part of the Douglas Group, the Lawrence Formation, is present in the subsurface throughout the site, except in the southern portion where it crops out along the stream valleys (Figures 2.5-21 and 2.5-22). The lower part of the Douglas Group is present in the subsurface throughout the site. The complete stratigraphic section of the group was penetrated by numerous borings within the project area. This group is divided into the Lawrence Shale and the underlying Stranger Formations.

2.5.1.2.2.2.1.1.2.1 Lawrence Formation

The Lawrence Formation is present throughout the site in the subsurface. Along the Neosho River, Long Creek, and the southernmost segment of Wolf Creek, the Lawrence forms the bedrock along the valleys and beneath the river alluvium (Figures 2.5-21 and 2.5-22).

All recognized members of the Lawrence Formation are present within the project area. In order of increasing age, they are the Unnamed Lawrence Shale Member, which contains the Williamsburg

Coal Bed, and the Amazonia Limestone, Ireland Sandstone, Robbins Shale, and Haskell Limestone Members.

2.5.1.2.2.2.1.1.2.1.1 Unnamed Lawrence Member

The portion of the Lawrence Formation between the bottom of the Oread Limestone and the top of the Amazonia Limestone Member is an unnamed member. The member consists mainly of medium gray to dark gray shale that is laminated and locally calcareous, carbonaceous, and fossiliferous. The shale is interbedded with light to medium gray, thinly laminated to medium-bedded, fine- to very fine-grained, calcareous sandstone and medium dark gray, laminated to thin-bedded, micaceous siltstone. The upper part of the Unnamed Lawrence Shale Member is generally free of sandstone lenses or laminae. This sandstone-free unit overlies a deeper zone consisting of approximately equal portions of shale, siltstone, and sandstone. The shale, siltstone, and sandstone zone comprises the major part of the Unnamed Lawrence and rests on the Williamsburg Coal Bed. Locally, a 0.5- to 1.0-foot very carbonaceous shale layer occurs directly above or below the coal bed. The basal zone of the Unnamed Lawrence Shale Member occurs between the Williamsburg Coal Bed and the Amazonia Limestone Member and consists of medium gray to dark greenish gray, very calcareous shale. Locally, this basal, calcareous shale has numerous, well-developed, slickensided fractures oriented at 20 degrees to the horizontal. These fractures were not observed offsetting the Williamsburg Coal Bed or the underlying Amazonia Member in the low-level outlet tunnel excavation (Reference 73). Clayey shale layers and broken zones occur throughout the member.

The borings taken at the site indicate that the thickness of this member ranges from 18 to 30 feet. At the plant site and in the UHS area, the Unnamed Lawrence Shale Member averages about 24 feet in thickness. The unit is present in the subsurface at a depth of about 85 feet at the plant site (Elevation 1,020). The Unnamed Lawrence Shale Member is continuous throughout the subsurface of the site except where it crops out along the valleys in the southern portion (Figure 2.5-22). In the area of the cooling lake, the Unnamed Lawrence Shale Member has an average thickness of 24.4 feet.

The Williamsburg Coal Bed occurs near the base of the Unnamed Lawrence Shale Member. It is a black, thinly laminated to medium-bedded, shaley coal which occurs within the Unnamed Lawrence Shale Member. It occurs in the subsurface throughout the project area. The borings taken in the project area indicate that the thickness of the bed ranges from 0.1 to 0.8 foot. The Williamsburg Coal is present in the subsurface at the plant site at a depth of about 104 feet (Elevation 1,002).

The environment of deposition of the Unnamed Lawrence Shale Member is complex. According to Wagner, the upper shale portion falls into the argillaceous, transgressive marine stage during which deposition occurred in a shallow sea very near the shore (Merriam, 1964, p. 576). The remainder of the unit, including the Williamsburg Coal Bed, is the product of a transitional environment described by Wagner as the continental to marine transitional stage (Reference 324, p. 574). Moore states that this member was deposited in an environment of shallow water lagoons, swamps, and low-gradient, sluggish streams (Reference 324, p. 574). The lithologies present at the site represent the final stages of a prograding deltaic environment; Wagner describes the prograding deltaic environment as a complex of several environments (Reference 324, p. 573). The section between the Amazonia Limestone Member and the upper shale facies of the Unnamed Lawrence Shale Member resulted from deposition of silt, sand, and carbonaceous material on a nearly level, flooded, delta plain. The gradation to the upper shale facies began with the transgression of the sea over the delta plain and continued with deposition in the near-shore, shallow sea environment.

Throughout the site, the Unnamed Lawrence Shale Member is characterized by core recovery values which ranged from 83 to 100 percent with an average of 96 percent. RQD values averaged 49 percent and ranged from 8 to 82 percent. The clayey shale layers commonly observed are a major contributing factor to this unit's relatively low RQD values. At the plant site and in the UHS area, recovery averaged 98 percent and RQD averaged 78 percent.

Thirteen borings completely penetrated the Unnamed Lawrence Shale Member in the area of the cooling lake. Weighted recovery in the cooling lake area ranged from 73 to 100 percent with a mean of 92 percent. Weighted RQD values ranged from 27 to 98 percent with a mean of 50.2 percent.

Unconfined compression testing of four samples of the Unnamed Lawrence Shale Member gave results ranging from an unconfined compressive strength of 125 psi with a modulus of elasticity of 0.069×10^6 psi in Boring ESW-25 to an unconfined compressive strength of 1,780 psi with a modulus of elasticity of 1.17×10^6 psi in Boring B-7. The samples tested had an average Poisson's ratio of 0.39.

Wet density tests performed on two Unnamed Lawrence Shale Member samples from two P-Series borings indicated a minimum wet density of 144 pcf in Boring P-10 and a maximum wet density of 156 pcf in Boring P-9.

Three-dimensional borehole logging of the Unnamed Lawrence Shale Member indicated an average compressional wave velocity of 7,870 fps, a shear wave velocity of 4,050 fps, and an elastic modulus of 1.48 x 10^6 psi.

The site geophysical shear wave and compressional wave studies agree closely with these values; they indicated an average compressional wave velocity of 7,500 to 7,800 fps and an average shear wave velocity of 3,950 to 4,000 fps for the Unnamed Lawrence-Amazonia-Ireland-Robbins interval.

Resonant column testing was performed on one sample of the Unnamed Lawrence Shale Member. Results of the test are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Clay mineral analyses performed on three shale core samples from the Unnamed Lawrence Shale Member showed that the unit contains no expandable clay minerals. Its clay fraction consists of 45 percent illite, 35 percent chlorite, and 20 percent kaolinite. The samples are characterized by slaking durabilities that ranged from very low to medium high, and swelling pressures ranging up to 1,150 psf in a 3,960 minute test.

Water pressure testing of the Unnamed Lawrence Shale Member indicated low water losses even though the unit contains lenses of fine-grained sandstone. Water pressure testing of the B-Series borings gave an average permeability of 1.8 x 10^{-6} cm/sec with a range up to 2.3 x 10^{-5} cm/sec. At the plant site, the average permeability was 7.0 x 10^{-7} cm/sec with a range up to 7.0 x 10^{-7} cm/sec. In the cooling lake area, the average permeability was 1.5 x 10^{-5} cm/sec with a range up to 9.7 x 10^{-5} cm/sec. Many of the tests showed no water loss when tested at overburden pressure.

2.5.1.2.2.2.1.1.2.1.2 Amazonia Limestone Member

The Amazonia Limestone Member contains light to dark greenish gray shale which is thinly laminated and very calcareous. The Amazonia Limestone Member contains 5 to 50 percent, light green or greenish gray limestone nodules, lenses, and shaley fossiliferous limestone layers. At the site, the member grades laterally from a sequence of very shaley limestone in the northern portion of the area to a thickened sequence of interbedded, very calcareous, clayey shales, limestones, and shaley limestones in the central portion of the area. Along the southern boundary of the site, the member thins to a greenish gray, thin- to medium-bedded, very calcareous, fossiliferous shale above a greenish gray, thin- to medium-bedded, fossiliferous limestone.

The Amazonia Limestone Member is continuous throughout the subsurface at the site, except in the lower reaches of Wolf Creek and in the Neosho River Valley where it has been removed by erosion. The borings taken in the project area indicate that the thickness of the Amazonia Limestone Member ranges from 2 to 18 feet. The member is present in the subsurface at the plant site as interbedded limestone and calcareous shale at a depth of about 108 feet (Elevation 997). In the cooling lake area, the thickness of the Amazonia Limestone Member ranges from 2.9 to 9.2 feet with an average thickness of 6.1 feet.

The Amazonia Limestone Member is similar to the overlying Unnamed Lawrence Shale Member and the upper part of the underlying Ireland Sandstone Member as it is a product of the complex interaction of marine and nonmarine environments. The Amazonia Limestone Member represents a near-shore, shallow, carbonate-rich environment.

Throughout the site, core recovery in the Amazonia Limestone Member ranged from 88 to 100 percent with an average of 97 percent. RQD values averaged 54 percent and ranged from 21 to 86 percent. At the plant site and in the UHS area, core recovery averaged 99 percent and RQD averaged 80 percent.

Fourteen borings in the LK- and D-Series completely penetrate the Amazonia Member in the cooling lake area. Weighted recovery ranged from 52 to 100 percent with a mean of 92.9 percent. Weighted RQD values ranged from 35 to 100 percent with a mean of 59.7 percent. Lower recovery and RQD values appear to reflect the decreased thickness of rock overlying the Amazonia Limestone in the vicinity of the main dam and Wolf Creek Valley.

Unconfined compression testing was performed on two samples of the Amazonia Limestone Member. The sample tested from Boring P-9 had an unconfined compressive strength of 4,410 psi, a modulus of elasticity of 3.15×10^6 psi, and a Poisson's ratio of 0.30. The similar values for the sample from Boring ESW-25 were 2,750 psi, 2.1×10^6 psi, and 0.35, respectively.

A sample of the shaley portion of the Amazonia Limestone Member from Boring ESW-25 had an unconfined compression strength of 118 psi, a modulus of elasticity of 0.064×10^6 psi, and a Poisson's ratio of 0.44.

Three-dimensional borehole logging within the Amazonia Limestone Member showed an average compressional wave velocity of 8,640 fps, a shear wave velocity of 4,520 fps, and an elastic modulus of 1.67×10^6 psi.

Resonant column tests were performed on two samples of the Amazonia Limestone Member from two HS-Series borings. Test results are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Water pressure testing of the B-Series borings gave an average permeability of 1.0 x 10^{-7} cm/sec. In the cooling lake area, the average permeability was 2.8 x 10^{-6} cm/sec with a range up to 2.2 x 10^{-5} cm/sec. Many of the tests showed no water was lost during pressure testing. No permeability tests were run on HS-Series borings.

2.5.1.2.2.2.1.1.2.1.3 Ireland Sandstone Member

The Ireland Sandstone Member consists of medium dark gray, thinly laminated, locally carbonaceous, clayey shale. It is interbedded with light gray, laminated to medium-bedded, crossbedded and locally contorted, fine- to very fine-grained, micaceous, and locally calcareous sandstone. It is also interbedded with medium gray, laminated to medium-bedded, carbonaceous, micaceous siltstone. Three different zones are recognizable within the Ireland Sandstone Member. The upper zone is predominantly shale with 10 percent or less interbedded sandstone lenses. This zone grades downward to a middle zone of approximately equal amounts of sandstone, siltstone, and shale with localized zones of contorted sandstone. A 0.6- to 0.9-foot seam of black, shaley coal that overlies a layer of soft, clayey shale is included in the middle zone. The sandstone percentage of the middle zone decreases downward, and the zone grades into the basal zone of the Ireland Sandstone Member that is a shaley siltstone directly overlying the Robbins Shale Member.

Throughout this member are clayey shale layers and laminae, 30-degree to vertical fractures, and occasional 30- to 60-degree slickensided fractures. Borings indicate that the thickness of the Ireland Sandstone Member at the site ranges from 39.5 to 117.1 feet. In the cooling lake area, the thickness ranges from 51.8 to 83.6 feet.

The Ireland Sandstone Member does not crop out in the site, but is a continuous subsurface unit. It is present at the plant site at a depth of about 115 feet (approximate Elevation 990).

At the site, the Ireland Sandstone and Robbins Shale members are apparently the result of a prograding deltaic environment. In this type of environment, sloping foreset beds were developed along the front of the delta that was overloaded by a continued influx of material. This overloading caused slumping and mass movements which probably caused the local, distorted bedding features apparent in the borings.

The variations in the thickness of the Ireland Sandstone Member at the site are due both to differential compaction and the environment of deposition. Minor changes in depositional environment, such as channel location, water depth, and current velocity resulted in local differences in the deposited sediment as well as the rate of sedimentation. These local differences resulted in the subtle lithologic differences that separate the Ireland from the underlying Robbins Shale Member.

Core recovery in the Ireland Sandstone Member averaged 97 percent with a range from 88 to 100 percent. RQD values, however, reflect the commonly occurring soft shaley layers within the Ireland Sandstone Member and ranged from 0 to 100 percent with an average of 54 percent.

Three borings completely penetrate the Ireland Sandstone Member in the cooling lake area. Weighted recovery ranged from 89 to 100 percent with a mean of 96.4 percent. Weighted RQD values ranged from 47 to 59 percent with a mean of 62.7 percent.

Unconfined compression testing of five samples of the Ireland Sandstone Member gave results ranging from an unconfined compressive strength of 169 psi with a modulus of elasticity of 0.1 x 10^6 psi in Boring ESW-25 to an unconfined compressive strength of 2,190 psi with a modulus of elasticity of 1.46 x 10^6 psi in Boring B-7. A sample from Boring P-9 had a Poisson's ratio of 0.36 and a bulk modulus of 0.0074 x 10^6 psi. The sample from Boring ESW-25 had a Poisson's ratio of 0.43, while that from B-7 was not recorded.

Resonant column testing was performed on three samples of the Ireland Sandstone Member. Results of the tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Three-dimensional borehole logging within the Ireland Sandstone Member indicated an average compressional wave velocity of 8,560 fps, a shear wave velocity of 4,350 fps, and an elastic modulus of 1.72 x 10^6 psi.

Wet density tests performed on five Ireland Sandstone Member samples from two borings gave a minimum wet density of 147 pcf in Boring P-10 and a maximum wet density of 156 pcf in Boring P-9.

Clay mineral analyses performed on three shale core samples from the Ireland Sandstone Member showed that it contains no expandable clay minerals. Its clay fraction consists of 50 percent illite, 30 percent chlorite, and 20 percent kaolinite. The samples are characterized by a medium slaking durability and swelling pressures ranging up to 1,425 psf in a 2,760 minute test.

Water pressure tests were conducted selectively throughout the Ireland Sandstone Member; both the upper sandy zone and the lower silty shale zone were tested. Water pressure testing of the B-Series borings gave an average permeability of 3.3 x 10^{-6} cm/sec and ranged up to 2.5 x 10^{-5} cm/sec. At the plant site, the average permeability was 7.7 x 10^{-7} cm/sec with a range up to 4.0 x 10^{-6} cm/sec. In the cooling lake area, the average permeability was 8.9 x 10^{-6} cm/sec with a range up to 5.0 x 10^{-5} cm/sec. Many of the borings showed no water loss.

2.5.1.2.2.2.1.1.2.1.4 Robbins Shale Member

The Robbins Shale Member is a medium dark to dark gray shale that is thinly laminated to medium bedded, slightly carbonaceous, and locally micaceous. Numerous 0.05- to 0.1-foot medium gray, clayey shale zones, layers, and laminae occur throughout the member. Occasional 10- to 70-degree fractures, vertical to 45-degree clay-lined fractures, and 55-degree slickensided fractures are present throughout the Robbins Shale Member. At the site, the Robbins exhibits four additional distinct facies below the upper shale zone: two limestones (or very calcareous shales); a basal carbonaceous shale; and a shale with occasional, well-developed, dolomitic concretions (Figure 2.5-41).

The Robbins Shale Member does not crop out in the project area but forms a continuous subsurface unit. The borings taken at the site indicate that the thickness of the Robbins Shale Member ranges from 14 to 90 feet. The member is present in the subsurface at the plant site at a depth of about 198 feet (Elevation 908).

The fossils, calcareous shales, limestones, and black carbonaceous shale indicate that the Robbins Shale was deposited in a marine environment. The Robbins Shale Member, as present in the project area, represents what Wagner refers to as the normal, regressive marine stage (Reference 324, p. 584). The very carbonaceous shale facies is representative of Wagner's stagnant water marine stage (Reference 324, p. 583). The depositional environment was in shallow water, far from the shore, with little or no water movement.

In some parts of Kansas, such as Wilson County, the upper limits of the Robbins Shale Member mark the ending of a period of marine transgression. Following deposition of the Robbins Shale, the sea receded in these areas and this member was exposed to subaerial erosion. Following the period of erosion, the area was inundated by another marine transgression and the Ireland Sandstone Member was deposited disconformably over the Robbins Shale Member. However, this sequence of events does not appear to have occurred at the site. The gradational nature of the contact between the

Ireland Sandstone and the Robbins Shale Member observed in core samples and excavations suggests that during the regression, the sediments of the Robbins Shale Member were not exposed to erosion in the project area. Instead, the sediment in the Robbins Shale Member and Ireland Sandstone Member sequence was deposited continuously. The gradational change in lithology between those two members marks a gradual change from a shallow marine environment to a prograding deltaic environment.

Core recovery in the Robbins Shale Member ranged from 78 to 100 percent with an average of 95 percent. RQD values ranged from 8 to 99 percent with an average of 60 percent. RQD values were much lower in boreholes that contained numerous clayey layers within the unit.

Three additional borings, (LK-7, LK-9, LK-10), drilled in the cooling lake area did not completely penetrate the Robbins Shale Member. Weighted recovery ranged from 68 to 100 percent with a mean of 89 percent. Weighted RQD values ranged from 35 to 79 percent with a mean of 54 percent.

Unconfined compression testing of three samples of the Robbins Shale Member gave results ranging from an unconfined compressive strength of 407 psi with a modulus of elasticity of 0.0225 x 10^6 psi in Boring P-9 to an unconfined compressive strength of 1,950 psi with a modulus of elasticity of 1.31 x 10^6 psi in Boring B-11.

The sample from Boring P-9 had a Poisson's ratio of 0.33 and a bulk modulus of 0.022 x 10^6 psi.

Resonant column testing was performed on one sample of the Robbins Shale Member. Results of the tests are presented in USAR Section 2.5.4.2.1.4.1 and provided in accompanying tables.

Three-dimensional borehole logging within the Robbins Shale Member gave an average compressional wave velocity of 8,050 fps, a shear wave velocity of 4,170 fps, and an elastic modulus of 1.58 x 10^6 psi.

Wet density tests performed on three Robbins Shale Member samples from two borings indicated a minimum wet density of 138 pcf and a maximum wet density of 157 pcf.

Clay mineral analyses performed on a shale core sample from the Robbins Shale Member showed that the shale contains no expandable clay minerals. Its clay fraction consists of 40 percent illite, 40 percent chlorite, and 20 percent kaolinite. Laboratory tests indicated a medium slaking durability and swelling pressures that reach 3,725 psf in 6,720 minutes.

Water pressure testing of the Robbins Shale Member showed negligible water losses. Water pressure testing of the B-Series borings gave an average permeability of 2.6 x 10^{-7} cm/sec with a range up to 5.0 x 10^{-7} cm/sec. At the plant site, the average permeability was 3.9 x 10^{-7} cm/sec, and values ranged up to 5.4 x 10^{-7} cm/sec. Many borings showed no water loss during testing.

2.5.1.2.2.2.1.1.2.1.5 Haskell Limestone Member

The Haskell Limestone Member consists of light gray to medium light gray limestone that is thin to thick bedded, fine grained, and fossiliferous (10 to 20 percent fusulinid fossils). It is locally shaley in its basal section with occasional dark gray shale partings.

This unit does not crop out at the site, but forms a continuous subsurface unit. The borings taken at the site indicated that the thickness of the Haskell Limestone Member ranged from 1 to 5.3 feet. The unit is present at a depth of about 260 feet (Elevation 844) at the plant site. The base of the Haskell Limestone Member marks the base of the Lawrence Formation and the top of the Stranger Formation.

According to Ball and Wagner, the Haskell Limestone Member is believed to have been deposited in marine, relatively near-shore, shallow areas (Reference 7, p. 271; Reference 324, p. 580).

The length of a core run was considerably greater than the thickness of the Haskell Limestone Member; therefore, core recovery and RQD computations were not restricted to the unit. Core recovery data suggest that the Haskell Limestone Member is characterized by an average core recovery of 98 percent and an average RQD value of 72 percent.

Unconfined compression testing of one sample of the Haskell Limestone Member from Boring P-9 gave an unconfined compressive strength of 12,430 psi with a modulus of elasticity of 13.0 x 10^6 psi. The sample had a Poisson's ratio of 0.21 and a bulk modulus of 7.5 x 10^6 psi. The sample tested from Boring P-9 has a Poisson's ratio of 0.21 and a bulk modulus of 7.5 x 10^6 psi.

Resonant column testing was performed on one sample of the Haskell Limestone Member. Results of the tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Three-dimensional borehole logging within the Haskell Limestone Member indicated an average compressional wave velocity of 12,100 fps, a shear wave velocity of 6,250 fps, and an elastic modulus of 3.66 x 10^6 psi.

During water pressure testing, the packer spacing was greater than the thickness of the Haskell Limestone Member; consequently, flows could not be restricted to this unit. Water pressure testing of the Haskell Member in the B-Series borings gave an average permeability of 2.1 x 10^{-7} cm/sec. At the plant site, the average permeability was 3 x 10^{-7} cm/sec, and the range was 7.0 x 10^{-7} to 7.5 x 10^{-7} cm/sec.

2.5.1.2.2.2.1.1.2.2 Stranger Formation

The Stranger Formation is present throughout the project area as a continuous subsurface unit. The complete stratigraphic section of the Stranger Formation was penetrated by numerous borings at the site. The recognized members of the Stranger Formation are, in order of increasing age, the Vinland Shale, Westphalia Limestone, Tonganoxie Sandstone, and the Weston Shale members (Figure 2.5-41).

2.5.1.2.2.2.1.1.2.2.1 Vinland Shale Member

The Vinland Shale Member is extremely variable with respect to lithology and thickness throughout the site. This member consists of a greenish gray to dark gray, clayey shale that is thinly laminated to thin bedded, calcareous, slightly carbonaceous, and locally fossiliferous and includes two locally well-developed layers of black shaley coal. It includes the only recognized channel-deposited sequence in the project area (Figure 2.5-43). This channel-deposited material consists of a complex sequence of greenish gray to dark gray shale that is thinly laminated to medium bedded, slightly to very calcareous, locally fossiliferous, slightly carbonaceous, and locally silty. The channel sequence is interbedded with medium gray siltstone that is thin bedded, micaceous and calcareous, and light-gray to medium-gray sandstone. The sandstone is thinly laminated to thick bedded with occasional, contorted bedding; is fine grained, locally well cemented, calcareous, and micaceous; and has occasional dark gray shale partings. The Vinland Shale Member is present throughout the subsurface at the site. The borings taken at the site indicate that the thickness of the member ranges from 1 foot at the southeastern margin at the channel to 72 feet in midchannel (Figure 2.5-43). This member is present at a depth of about 266 feet (Elevation 839) at the plant site. Data from Borings B-2, B-3, B-4, B-5, B-11, B-18, P-9, and P-10 indicate that the current in the channel had locally eroded the Westphalia Member. At these locations, the Vinland Shale Member lies unconformably on the Tonganoxie Sandstone Member. Where channeling has locally removed the Westphalia Limestone Member, the basal facies of the Vinland Shale Member usually contains lenses and layers of light olive-gray, fusulinid limestone that is thin to medium bedded, shaley, and sandy with occasional pebble-sized limestone fragments.

The environment of deposition of the Vinland Shale Member is difficult to determine. The calcareous, channel-deposited shale facies of the Vinland Shale Member with its marine fossils is most probably the result of deposition in submarine channels. This would indicate that a shallow, gently sloping, sea-floor environment predominated during the deposition of the Westphalia Limestone and the Vinland Shale Members. This hypothesis is based on a lateral variation within the channel deposits from a shale facies to the siltstone-sandstone facies. After the infilling of the submarine channels, the sea level rose and the vertical gradation to the shale facies was completed throughout the member.

Core recovery in the Vinland Shale Member ranged from 81 to 100 percent with an average of 98 percent. RQD values averaged 67 percent and ranged from 4 to 97 percent.

Unconfined compression testing of two samples of the Vinland Shale Member indicated an unconfined compressive strength ranging from 2,170 psi with a modulus of elasticity of 0.428 x 10^6 psi in Boring P-9 to an unconfined compressive strength of 2,980 psi with a modulus of elasticity of 1.017 x 10^6 psi in Boring B-9. The sample from Boring P-9 had a Poisson's ratio of 0.32 and a bulk modulus of 0.40 x 10^6 psi.

Resonant column testing was performed on one sample of the Vinland Shale Member. Test results are presented in USAR Section 2.5.4.2.1.4.1 and tabulated in accompanying tables.

Three-dimensional borehole logging within the Vinland Shale Member gave an average compressional wave velocity of 10,100 fps, a shear wave velocity of 5,220 fps, and an elastic modulus of 2.46 x 10^6 psi.

Wet density tests performed on two Vinland Shale Member samples from Boring P-10 gave a minimum wet density of 151 pcf and a maximum wet density of 153 pcf. Shale density analyses of two samples of the Vinland Shale Member from Boring P-10 provided an average density of 152 pcf.

Pressure testing data indicated a relatively low permeablity for the Vinland Shale Member. In water pressure testing of the B-Series borings, an average permeability of 3.0 x 10^{-6} cm/sec with a range up to 2.2 x 10^{-5} cm/sec was obtained. At the plant site, the average permeability was 4.0 x 10^{-7} cm/sec with a range of 1.1 x 10^{-7} to 7.5 x 10^{-7} cm/sec.

2.5.1.2.2.2.1.1.2.2.2. Westphalia Limestone Member

The Westphalia Limestone Member consists of light gray or light olive-gray, fusulinid limestone that is thin to thick bedded. This member contains numerous limestone pebbles. The composition of the Westphalia is variable and may contain 10 to 30 percent greenish gray shale partings or layers. The environment of deposition of the Westphalia Limestone Member was most probably shallow marine (Reference 7, p. 271).

The borings taken at the site indicate that the thickness of the Westphalia Limestone Member ranges from 0 to 13 feet. The Westphalia Limestone Member is not present in the subsurface at the plant site where a thicker section of the Vinland Shale Member occupies this stratigraphic interval (Figure 2.5-44). In the site area, this member is continuous, except where it has been removed during deposition of the Vinland Shale Member.

Core recovery in the Westphalia Limestone Member ranged from 98 percent to 100 percent with an average of almost 100 percent. RQD values averaged 75 percent and range from 51 percent to 98 percent.

Three-dimensional borehole logging within the Westphalia Limestone Member resulted in an average compressional wave velocity of 13,500 fps, a shear wave velocity of 6,820 fps, and an elastic modulus of 4.43×10^6 psi.

Water pressure testing of the B-Series borings gave an average permeability of 4.8×10^{-7} cm/sec with a range up to 3.9×10^{-6} cm/sec. At the plant site, the average permeability was 3.8×10^{-7} cm/sec and ranged up to 4.0×10^{-7} cm/sec. Many borings showed no water loss.

2.5.1.2.2.2.1.1.2.2.3 Tonganoxie Sandstone Member

The Tonganoxie Sandstone Member consists of predominately medium dark gray shale that is thinly laminated to thin bedded, locally very clayey, and slightly carbonaceous. The shale is interbedded with light gray sandstone that is laminated to thick bedded, locally crossbedded with distorted bedding, fine to very fine grained, locally calcareous, and silty. This member also contains light gray to medium dark gray, laminated to thick-bedded, micaceous and sandy siltstone. Numerous clayey layers, pale yellowish brown concretions, occasional calcareous sandstone layers and thinly laminated, grayish black carbonaceous shale layers occur locally within the Tonganoxie Member. Highly fractured zones with numerous high- and low-angle fractures, slickensided fractures, and clay-lined fractures occur locally throughout the unit. The

Tonganoxie Sandstone Member consists of an upper facies of sandstone, siltstone, and shale which grades into a lower shaley siltstone facies.

The Tonganoxie Sandstone Member does not crop out in the project area but forms a continuous subsurface unit. The borings taken at the site indicated that the thickness of the Tonganoxie Sandstone Member ranges from 42 to 142 feet. The unit is present in the subsurface at the plant site at a depth of about 295 feet (Elevation 810).

The environment of deposition of the Tonganoxie Sandstone Member is similar to that of the Ireland Sandstone Member of the Lawrence Formation (Reference 7, p. 310; Reference 324, p. 572; Reference 155, p. 117). Both members represent the initial stages of megacyclothem development. As with the Ireland Sandstone Member, the subaerial channel sands commonly associated with the Tonganoxie Sandstone Member are absent within the project area (USAR Section 2.5.1.2.2.2.1.1.2.1.4). The gradational nature of the contact between the Tonganoxie Sandstone and Weston Shale members indicates that deposition was not interrupted. The sea became shallower and the shoreline advanced closer, which caused coarser detritus to be deposited at the site.

The deformational sedimentary structures observed in the Tonganoxie Sandstone Member formed penecontemporaneously with deposition. Saturated, weak sediments of the foreset beds at the delta front were overloaded by newly arrived sediment; subsequently, slumping occurred to establish equilibrium, and sediment disturbance resulted.

Core recovery in the Tonganoxie Sandstone Member ranged from 77 to 100 percent with an average of 97 percent. RQD values averaged 67 percent and ranged from 0 to 98 percent. RQD values are greatly reduced in areas that contained numerous clayey layers.

Unconfined compression testing of four samples of the Tonganoxie Sandstone Member provided results ranging from an unconfined compressive strength of 1,260 psi with a modulus of elasticity of 0.357 x 10^6 psi in Boring B-17 at Elevation 881.7 feet to an unconfined compressive strength of 3,130 psi with a modulus of elasticity of 0.968 x 10^6 psi in Boring B-17 at Elevation 799.9 feet.

Resonant column testing was performed on two samples from two B-Series borings. Results of these tests are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Three-dimensional borehole logging within the Tonganoxie Sandstone Member indicated an average compressional wave velocity of 9,300 fps, a shear wave velocity of 4,850 fps, and an elastic modulus of 2.13 x 10^6 psi. The three-dimensional logging showed that the compressional wave velocity, shear wave velocity, and elastic modulus increase in the upper, more sandy facies of the Tonganoxie Sandstone Member.

Wet density tests performed on three Tonganoxie Sandstone Member samples indicated a minimum wet density of 154 pcf in Boring P-10 and a maximum wet density of 156 pcf in both Borings P-10 and P-9.

Pressure testing of the Tonganoxie Sandstone Member was concentrated in the upper, more sandy facies of the unit. Water pressure testing of the B-Series borings gave an average permeability of 2.8 x 10^{-6} cm/sec with a range up to 3.7 x 10^{-5} cm/sec. At the plant site, the average permeability was 1.7 x 10^{-7} cm/sec with a range up to 2.1 x 10^{-7} cm/sec. Many borings had no water loss when tested at an effective pressure equal to overburden pressure.

2.5.1.2.2.2.1.1.2.2.4 Weston Shale Member

The Weston Shale Member consists of medium gray to dark gray shale that is thinly laminated, slightly carbonaceous, and, locally, contains plant fossils. Occasional, soft clayey shale layers; carbonaceous shale layers; and pyrite nodules are present throughout the member. Occasional low-angle fractures, low-angle slickensided fractures, and vertical or near-vertical, open fractures occur locally within the unit.

The member does not crop out at the site but forms a continuous subsurface unit. The borings taken at the site indicate that the thickness of the Weston Shale Member ranges from 31 to 109 feet. The Weston Shale Member is present in the subsurface at the plant site at a depth of about 370 feet (Elevation 735).

According to Wagner, the Weston Shale Member represents the end of the regressive stage of a megacyclothem (Reference 324, p. 588). The Weston Shale Member was deposited in a shallow, near-shore, marine environment similar to that of the Robbins Shale Member of the Lawrence Formation (USAR Section 2.5.1.2.2.2.1.1.2.1.4).

Core recovery in the Weston Shale Member ranged from 48 to 100 percent with an average of 95 percent. RQD values averaged 67 percent and range from 0 to 100 percent. RQD values were greatly reduced in areas that contain numerous clayey shale layers.

Unconfined compression testing of one sample of the Weston Shale Member gave an unconfined compressive strength of 1,250 psi with a modulus of elasticity of 0.555 X 10^6 psi in Boring B-4.

Resonant column testing was performed on one sample from Boring B-4. Test results are presented in USAR Section 2.5.4.2.1.4.1 and accompanying tables.

Three-dimensional borehole logging within the Weston Shale Member indicated an average compressional wave velocity of 8,550 fps, a shear wave velocity of 4,470 fps, and an elastic modulus of 1.80 x 10^6 psi.

Wet density tests performed on three Weston Shale Member samples provided a minimum wet density of 150 pcf in Boring P-10 and a maximum wet density of 160 pcf in Boring P-9.

Water pressure testing of the B-Series borings gave an average permeability of 9.2 x 10^{-8} cm/sec with a range up to 1.7 x 10^{-7} cm/sec. Water was not lost in many borings during pressure testing of the Weston Member.

2.5.1.2.2.2.1.2 Missourian Stage

The oldest upper Pennsylvanian rocks penetrated by borings in the project area are those of the Missourian Stage. Only the upper part of this stage, the Stanton Limestone of the Lansing Group, was penetrated by the borings.

2.5.1.2.2.2.1.2.1 Lansing Group

Rocks of the Lansing Group and the underlying Kansas City Group are similar in Coffey and adjacent counties. The combined thickness of these groups is about 430 feet in Coffey County (Reference 124, p. 161). The Lansing Group is conformable with the underlying Kansas City Group (Reference 174, p. 117). An isopach map indicates that the Lansing Group has a thickness of approximately 75 feet in the site area (Reference 174, p. 119). This group contains, in descending order, the Stanton Limestone, the Vilas Shale, and the Plattsburg Limestone.

2.5.1.2.2.2.1.2.1.1 Stanton Limestone

The Stanton Limestone Formation contains three limestone members that are separated by two shale members. Northward from Anderson County, directly east of Coffey County, the Stanton Limestone Formation is rather uniform in thickness and character. However, in Anderson County and southward, the formation has many facies variations (Reference 286, p. 33; and 109, p. 45-47).

The Stanton Limestone is present throughout the subsurface in the project area. The three uppermost members were penetrated by borings; these are the South Bend Limestone Member, the Rock Lake Shale Member, and the Stoner Limestone Member. The borings did not extend below the Stoner Limestone Member of the Stanton Limestone Formation; therefore, the Eudora Shale Member, the Captain Creek Limestone Member, and the basal Benedict bed, if present beneath the site, were not penetrated. Information about the characteristics of the deeper units has been obtained from published and unpublished literature and written communications with various sources. Information was also obtained from examination of material on file at Benson Mineral Group, Inc., Independence, Kansas, and the Cornish Oil Well Service, Chanute, Kansas.

Core recovery in the Stanton Limestone Formation ranged from 92 to 100 percent with an average of 98 percent. RQD values averaged 89 percent and ranged from 52 to 100 percent.

Three-dimensional borehole logging within the Stanton Formation resulted in an average compressional wave velocity of 14,800 fps, a shear wave velocity of 8,060 fps, and an elastic modulus of 6.08×10^6 psi.

Water pressure testing of the B-Series borings gave an average permeability of 3.8×10^{-8} cm/sec with a range of 3.6×10^{-8} cm/sec to 3.9×10^{-8} cm/sec.

2.5.1.2.2.2.1.2.1.1.1 South Bend Limestone Member

The South Bend Limestone Member was penetrated by 11 borings in the project area. It consists of light gray to medium light gray limestone that is thin to thick bedded, fine grained, and fossiliferous. It is sandy in its basal 0.5 to 1.5 feet and has occasional brownish gray shale partings. Vertical, calcite-healed fractures were commonly encountered in the unit. Boring B-16, taken in the southern part of the area, identified a basal unit of light gray, thin- to medium-bedded, fine-grained, sandy limestone. The South Bend Limestone Member does not crop out within the project area, but forms a continuous subsurface unit. The borings indicated a thickness of 4 to 6 feet in the project area.

According to Wagner, the South Bend Limestone Member was deposited in a shallow, clear-water sea where conditions for precipitation of calcium carbonate were apparently near optimum (Reference 324, p. 588). Due to the nearness of the shoreline, fine-grained quartz sands and occasional clayey muds also were deposited. The sand was generally incorporated into the limestone, and the shale formed thin layers upon which carbonate deposition took place. A five-foot section of the South Bend Member exposed in a quarry

west of Altoona in Wilson County, Kansas, appears to represent channel fill that was reworked by a subsequent transgression (Reference 109, p. 35). West of the Elk City Dam in Montgomery County, Kansas, basal oolitic, cross-bedded quartz sandstone appears to represent the beginning of carbonate deposition in a shallow agitated marine environment. Higher units in the South Bend Member record further transgression with deposition in an environment further offshore (Reference 109, p. 40-41).

2.5.1.2.2.2.1.2.1.1.2 Rock Lake Shale Member

The Rock Lake Shale Member was penetrated by 11 borings in the project area. It consists of medium dark gray shale that is thinly laminated, calcareous, and sandy. It is interbedded with irregular layers and lenses of light gray, locally sandy, slightly fossiliferous limestone and occasional beds of medium light gray sandstone that is thin to thick bedded, fine to medium grained, and slightly calcareous. Occasional 70-degree to vertical, open fractures are developed locally in the member.

The Rock Lake Shale Member forms a continuous subsurface unit throughout the project area. Borings taken in the project area indicate that the thickness of the member ranged from 4 to 15 feet.

The member was deposited in a near-shore area covered by a shallow sea where abundant clay and silt were supplied.

According to Wagner, local depressions were filled in with lenticular limestone deposits, and thin sandy beds were distributed throughout the area (Reference 324, p. 587). During this time, the sea was continuing its regression; Wagner assigns the Rock Lake Shale Member to a near-shore, argillaceous marine stage (Reference 324, p. 586). The Rock Lake Shale Member is a laterally heterogeneous near shore shale that contains many fossil tracks, trails and burrows, with locally occurring clams. Land plants and brackish water invertebrates were found east of the site near Garnett. In northern Nebraska, however, lithology and fossils in the Rock Lake Member appear to reflect the beginning of the succeeding marine transgression. Heckel interprets this member as the basal transgressive unit of the South Bend cyclothem (Reference 101, p. 40-41).

2.5.1.2.2.2.1.2.1.1.3 Stoner Limestone Member

The Stoner Limestone Member was penetrated by seven borings in the project area, although none of them passed completely through the unit. The Stoner Limestone Member consists of very light gray to medium gray limestone that is thin to thick bedded and fine to

medium grained with local pale bluish gray shale partings. Numerous stylolites are present locally as well as occasional fusulinid fossils.

The member forms a continuous subsurface unit throughout the project area. The borings taken in the project area indicated that the minimum thickness of the member ranged from 2 to 10 feet. Measurements at outcrops or on core samples indicate that the Stoner Limestone Member is more than 10 feet thick in Wilson and Montgomery counties (Reference 101, p. 29).

Wagner (Reference 324, p. 585) describes the environment of deposition of the Stoner Limestone Member as a shallow sea, relatively far from shore, whose depth during sedimentation was first increasing, then decreasing. It represents a normal regressive stage in megacyclothem development. In southeastern Kansas, the upper Stoner Member contains algal mound facies and is also found as channel fill (Reference 101, p. 54-55).

Below the Stoner Limestone Member, the Eudora Shale Member and Captain Creek Limestone Member complete the Stanton Limestone.

2.5.1.2.2.2.1.2.1.2 Vilas Shale

The Vilas Shale is a sandy, silty, and carbonaceous gray shale that locally contains beds of sandstone and fossiliferous, sandy limestone (Reference 286, p. 33). Heckel interprets the Vilas Shale as the basal transgressive unit of the Stanton cyclothem (Reference 101, p. 40).

2.5.1.2.2.2.1.2.1.3 Plattsburg Limestone

The Plattsburg Limestone consists of two limestone members separated by a shale member (Reference 286, p. 32). The upper limestone, the Spring Hill Member, is the regressive limestone of the Plattsburg cyclothem and contains a complex mound facies (Reference 101, p. 36).

2.5.1.2.2.2.1.2.2 Kansas City Group

The Kansas City Group conformably underlies the Lansing Group and conformably overlies the Pleasanton Group (Figure 2.5-12). This group contains 12 formations and 27 named members of alternating marine and nonmarine units (Reference 174, p. 125). Lithologically, the Kansas City Group contains interbedded limestones, shales, occasional sandstones, and a few thin coal beds (Reference 286, p. 28-31).

The combined thickness of the Lansing and Kansas City groups in Coffey County is about 430 feet (Reference 124, p. 161). The thickness of the Kansas City Group, therefore, is on the order of 335 to 355 feet in Coffey County. The top of this group is at an approximate depth of 475 feet at the plant site. A structural contour map indicates, based on geophysical well log control, that the base of the Kansas City Group beneath the plant site is at an Elevation of 290 to 300 feet above Mean Sea Level (Reference 270).

2.5.1.2.2.2.1.2.3 Pleasanton Group

The Pleasanton Group disconformably overlies the Marmaton Group (Reference 286, p. 27), and because of the irregular surface on which it was deposited, the thickness of the Pleasanton Group in Coffey County ranges from 100 to 150 feet (Reference 124, p. 161). The top of this group is estimated to be at a depth of 810 feet below the plant site (Reference 270). Three formations are recognized in the Pleasanton Group in Kansas. Lithologically, the group consists primarily of shales and sandstones with occasional thin limestone beds (Reference 286, p. 25-27).

2.5.1.2.2.2.1.2.4 Marmaton Group

The Marmaton Group disconformably underlies the Pleasanton Group (Reference 174, p. 129). Eight formations within the Marmaton Group are recognized in Kansas (Reference 286, p. 25). Lithologically, the group consists primarily of shales and limestones with occasional, discontinuous sandstone members.

In Coffey County, this group ranges in thickness from about 150 to 200 feet (Reference 124, p. 161). The top of this group is estimated to be at a depth of 955 feet below the plant site.

2.5.1.2.2.2.1.2.5 Cherokee Group

The Cherokee Group, found between the base of the Marmaton Group (Fort Scott Limestone) and the top of the Mississippian, contains both marine and nonmarine strata. Surface mapping subdivides the group into two formations, the Krebs and the Cabaniss (Reference 286, p. 23). The main lithologies of the Cherokee Group are sandstone and sandy shale with some limestone. The most important coal beds in the state are present in this group (Reference 286, p. 23).

The thickness of the Cherokee Group in Coffey County is about 375 feet (Reference 124, p. 161). The top of this group is at an approximate depth of 1,115 feet below the site.

The Cabaniss Formation is principally shale, but contains some sandstone, limestone, and coal. It contains the Weir-Pittsburgh Coal Bed, the most important commercial coal bed in Kansas, which is about 3.6 feet thick. The Weir-Pittsburgh Bed is probably the thickest coal which could occur beneath the site.

2.5.1.2.2.2.2 Mississippian System

The Mississippian "Lime" is approximately 300 to 350 feet thick in Coffey County. The top of the Mississippian System is at an approximate depth of 1,490 feet below the site.

2.5.1.2.2.2.2.1 Upper Mississippian Series - Meramecian Stage

The Upper Mississippian Series in Kansas consists primarily of beds of limestone and dolomite, with interspersed beds of sandstone and shale, and minor amounts of chert (Reference 286, p. 20). In Coffey County, these rocks disconformably underlie the Pennsylvanian Cherokee Group and disconformably overlie Mississippian Osagian age rocks. There are four recognized formations in the Upper Mississippian in eastern Kansas. From youngest to oldest, these formations are the St. Genevieve Limestone, the St. Louis Limestone, the Salem Limestone, and the Warsaw Limestone. The St. Louis Limestone is the youngest Meramecian unit in Coffey County (Reference 255, p. 4-7). The thickness of the Meramecian strata in the area of the site is about 80 feet.

2.5.1.2.2.2.2.2 Lower Mississippian Series - Osagian Stage

The lithologies of the Osagian Stage consist of dolomite, limestone, chert, and cherty dolomite. In descending order, two formations that are recognized in Kansas are the Burlington-Keokuk Limestone (undifferentiated) and the Fern Glen Limestone (Reference 286, p. 19). Examination of well logs indicates that the rocks of the Osagian Stage are about 90 feet thick in Coffey County.

2.5.1.2.2.2.2.3 Kinderhookian Stage

Rocks of the Kinderhookian Stage are predominantly cherty dolomite with beds of limestone and shale. An angular unconformity separates rocks of the Kinderhookian Stage from overlying Osagian rocks (Reference 286, p. 18). An examination of well logs indicates that the thickness of Kinderhookian strata is about 100 feet.

2.5.1.2.2.2.3 Undifferentiated Upper Devonian-Lower Mississippian

2.5.1.2.2.2.3.1 Boice Shale

The Boice Shale is a light or dark greenish-gray, silty or dolomitic shale with basal beds of red shale or ferruginous oolite. These beds lie disconformably on the Chattanooga Shale (Reference 286, p. 17). The term "Boice" is normally restricted to shales disconformably overlying the Chattanooga Shale. Since there is no evidence for such a disconformity in the Coffey County area, the shale sequence between the Kinderhookian and the Hunton or Viola is considered to be Chattanooga (Reference 295).

2.5.1.2.2.2.3.2 Chattanooga Shale

The Chattanooga Shale is a silty, pyritiferrous, dark gray to black shale (Reference 174, p. 139). It overlies limestone, the Hunton or Viola, in the northwest part of Coffey County. Further south and east, the Chattanooga Shale unconformably overlies the Arbuckle Group. In Coffey County, the Chattanooga is approximately 50 feet thick, and the middle part is somewhat sandy (Reference 124, p. 162). The top of this sequence is approximately 1,840 feet below ground surface at the plant site.

2.5.1.2.2.2.4 Undifferentiated Devonian-Silurian-Middle Ordovician

2.5.1.2.2.2.4.1 Hunton Group or Viola Limestone

In the northern part of Coffey County, a 50-foot thick, limestone unit is present below the Chattanooga. The unit thins southeastward and is absent in the southern part of the county. This unit is called either the Hunton Group or the Viola Limestone (References 290 and 24, p. 162). Whereas some subsurface maps indicate this limestone may be Viola (Reference 174, p. 145-146), others indicate the Viola is absent beneath the site and, therefore, the limestone would be Hunton (Reference 74, Plate 3). At present, the correct stratigraphic nomenclature of this unit has not been determined.

In parts of the state where the units are distinct, the Hunton Group consists of a light gray to buff, fine to medium crystalline dolomite, which is locally vuggy and porous. Chert is also present in various amounts (Reference 174, p. 145).

The Viola Limestone consists of gray, buff, and brown, medium to coarsely crystalline dolomite, which is vuggy and contains various amounts of gray, white, opaque, and generally spicular chert (Reference 174, p. 146). This unit is approximately 10 feet thick in the area of the site and lies 1,890 feet below the site.

2.5.1.2.2.2.4.2 Simpson Group - St. Peter Formation

In Coffey County, the Simpson Group ranges from zero to slightly more than 100 feet in thickness and unconformably overlies the Arbuckle Group (Reference 174, p. 147). An abnormally thick sequence of the Simpson Group has been reported in eastern Kansas and is thought to represent filled sinkholes which developed in the underlying Arbuckle rocks (Reference 174, p. 147-149; and 290, Plate 2).

The Simpson Group is represented at the site by the St. Peter Formation. In Kansas, the St. Peter Formation consists of three zones: an upper and lower zone of sandstone and a middle zone of green clay shale (Reference 147, p. 10-12). At the site, this formation is believed to be approximately 50 feet thick. The top of this formation lies 1,950 feet below the site.

2.5.1.2.2.2.5 Lower Ordovician - Upper Cambrian

2.5.1.2.2.2.5.1 Arbuckle Group

The Arbuckle Group consists of Upper Cambrian and Lower Ordovician deposits and includes the Eminence Dolomite, Gasconade Dolomite, Roubidoux Formation, Jefferson City Dolomite, and Cotter Dolomite (Reference, 286, p. 13). Rock types of the Arbuckle Group consist mainly of white to brown, finely crystalline to cryptocrystalline dolomite with large amounts of various types of chert in its upper parts. Some beds are sandy and contain minor amounts of glauconite and pyrite (Reference 174, p. 150). The average thickness of this group in Coffey County is about 450 to 500 feet (Reference 124, p. 162). The Arbuckle Group is present about 2,000 feet below the site.

2.5.1.2.2.2.5.2 Bonneterre Dolomite

The Bonneterre Dolomite represents the lower part of the Upper Cambrian Series. It is a glauconitic, noncherty dolomite that is dark gray to brown in eastern Kansas. It includes sandy and silty dolomite and locally, near the top, dolomitic shale beds (Reference 286, p. 12). In Coffey County, the estimated thickness of the Bonneterre Dolomite is 50 to 100 feet, and it rests unconformably on the underlying beds (Reference 124, p. 162). The top of this formation lies about 2,450 feet below the site.

2.5.1.2.2.2.6 Undifferentiated Upper Cambrian-Precambrian

Cole (Reference 45) indicates that the Precambrian surface occurs at a depth of approximately 2,750 feet beneath the site. The lithologic nature of this surface is open to debate since no wells

have been drilled below the Bonneterre Formation in Coffey County. Based on interpretation of geophysical data from a well in Woodson County, 20 miles from the site, coarse-to-medium-grained clastic rocks were encountered at a depth of 2,750 feet. This well was drilled through 140 feet of clastic material before reaching a crystalline granitic basement at a depth of 2,890 feet (Reference 293). This particular well is located on the thinner, southern margin of a postulated belt of undifferentiated clastics, metasediments, igneous and metamorphia rock, and granite wash, which on the basis of well records from surrounding counties appears to thicken toward the site (USAR Sections 2.5.1.1.3.1, 2.5.1.1.4.1). These data support the existence of clastic material between the Bonneterre Dolomite and granitic crystalline basement beneath the site. However, the precise thickness of this clastic material at the site is still open to question.

Where the undifferentiated clastics/"granite wash" is overlain by the Lamotte (or Reagan) Sandstone, the basal Cambrian unit in the midcontinent, it is classified as Precambrian in age (Reference 268, p. 9). In Coffey County, where no Lamotte Sandstone is thought to be present, the sedimentary rock unit overlying the igneous and metamorphic rocks is classified as Precambrian to Upper Cambrian.

2.5.1.2.2.2.7 Precambrian Crystalline Complex

The exact depth of the Precambrian crystalline complex beneath the site is not known. A recent geologic map of the Precambrian basement does not show the wide band of Precambrian sediments crossing eastern Kansas, but does show several isolated areas containing metasediments (USAR Sections 2.5.1.1.3.1 and 2.5.1.1.4.1; References, 15, and 279, p. 10). Due to the absence of deep wells, this map shows no data for Coffey, Anderson, and Linn counties. However, based on available data from adjacent counties, the Precambrian crystalline complex beneath the site appears to consist of either granitic to quartz monzonitic rock emplaced at medium crustal depths or granitic rock emplaced at shallow crustal depths (References 15; 272, p. 10; and 174, p. 158). The former rock types range in age from 1,750 to 1,450 m.y. and the latter averages 1,380 m.y. (USAR Sections 2.5.1.1.3.1 and 2.5.1.1.4.1). From the total thickness of overlying material in adjacent counties, the estimated depth to the Precambrian crystalline complex is approximately 2,900 to 4,000 feet.

2.5.1.2.3 Site Geologic History

The broad aspects of the geologic history of the site are the same as those described in USAR Section 2.5.1.1.3. More specific details on the environment of deposition of the units at the site are described in USAR Section 2.5.1.2.2, and details of minor structural movements are described in USAR Section 2.5.1.2.4.

Earthquake history for the site is described in USAR Section 2.5.2.1, and the effects of prior earthquakes are described in USAR Section 2.5.2.4.

2.5.1.2.4 Site Structural Geology

The geologic structure at the site consists of a sequence of sedimentary strata dipping gently to the northwest with minor folds superimposed on this regional trend. Three prominent jointing patterns are present within the project area; one is a northwesterly trending pattern, and the other two trend to the northeast (Figure 2.5-52). These trends are indicated prominently on aerial photographs of the site at many outcrop locations and in excavations mapped during the construction phase of Unit No. 1. No evidence of faulting or shearing had been observed in outcrop or borings during investigation for the PSAR. However, during the construction phase, several shear zones and faults were mapped within the Heumader Shale Member of the Oread Formation and one normal fault was mapped in the Unnamed Member of the Lawrence Formation. These faults are not capable as defined by Appendix A to 10 CFR 100 (see USAR Section 2.5.1.2.4.1). There are no known zones of unrelieved residual stress in the bedrock. The minor folding and jointing of the bedrock at the site are structural features which are considered in design and construction to preclude any adverse effect on the operation of safety-related structures.

2.5.1.2.4.1 Site Faulting

Faulting at the site has not been identified in the literature. The results of the PSAR site investigation (field reconnaissance and detailed geological mapping, examination of outcrops, quarries and road cuts, aerial photo interpretation, and examination of cores from the boring programs) did not indicate any offset of beds or cataclastic zones indicative of faulting.

During the construction phase of the WCGS, several shear zones (up to approximately one foot wide), shear planes, and faults within the Heumader Shale Member of the Oread Formation have been mapped in the excavations for the power block (south and north slopes of fuel building, east slope of diesel generator building, east slope at reactor building, and north-east slopes of turbine building),

ESWS, circulating water system, main dam, and saddle dam IV. These features have been discussed in previous reports (References 70, 325, 326, 72 and 354).

Shear zones, as described in these investigations, consist of closely spaced fractures or a single-fracture plane across which relative movement has occurred, but sense and amount of displacement is unknown. In contrast, faults are fractures across which relative movement has occurred and the sense of relative movement is known. In all cases, displacement is on the order of tenths of a foot or less or is not measurable because marker beds have not been offset. Several faults that have an apparently dominant reverse sense of movement and dip at high to low angles are associated with asymmetric, inclined folds, minor shear planes within the cores of these folds, and bedding plane shears. Orientation of faults and shear zones is varied, but sense of displacement, when known, is consistently reverse (Reference 326, Figures 6-M, 6-U, 8-AA, 8-C, 10-C, 10-F, 12-B, and 12-E; Reference 72, Figures 5-D, 5-E, 6-D, 6-FF, 6-GG, 6-KK, 6-PP, 6-RR, 6-DDD, 6-FFF, 6-HHH, 7-B, and 7-C).

Faulting and folding are generally confined within the upper Heumader Member, but one fault in the cooling lake area offsets the upper Heumader/lower Heumader contact with an apparent reverse sense of displacement (Reference 326, Figure 12-E). This fault does not extend to the keytrench floor (saddle dam IV), and degree of deformation decreases to bedding plane slip within the upper few feet of lower Heumader. Nine mapped faults that offset the upper Heumader/lower Heumader contact in the original ESWS excavations are either overlain by undisturbed marker beds, soil profiles, or undeformed rock that does not contain distinctive marker beds (Reference 72, Figures 6-GG and 6-AA, Figures 6-KK and 6-CC, Figures 6-PP and 6-W, Figures 6-RR and 6-FF, and Figure 6-DDD, Figure 6-FFF, Figure 6-HHH, and Figures 7-B, 7-C, and 7-D) or underlain by undeformed Plattsmouth Limestone (Reference 72, Figure 7-C). Generally, faults within the upper Heumader are overlain by either undeformed Heumader, undeformed Jackson Park Sandstone, or a gentle rise in the Jackson Park/Heumader contact overlain by undeformed Jackson Park (Reference 70; Reference 325, Figures 3-E, 9-I, 9-Q, 9-V, 9-W, 9-DD, 10-F, 10-G, 10-I, 11-K, and 11-M; and Reference 326, Figures 6-A, 6-C, 6-M, 6-N, 8-H, and 10-A; and 72, Figures 5-E, 5-H, 6-FF, and 6-RR, and 6-HHH).

These data indicate that faulting occurred prior to consolidation of the Heumader and lowermost Jackson Park Members and was penecontemporaneous with deposition of uppermost, lower Heumader, upper Heumader, and lower Jackson Park Sandstone. These deformational features, therefore, are noncapable as defined by Appendix A to 10 CFR 100 (Reference 70, 71 and 72).

The following figures were prepared as index maps for locating, by number, the noncapable deformation features described in this section.

- Figure 2.5-62a: Location of Deformation Zones Beyond Plant Area - Heumader Shale Member;
- Figure 2.5-62b: Location of Deformation Zones - Power Block - Heumader Shale Member;
- Figure 2.5-62c: Location of Deformation Zones - Circulating Water System and Northwest Part of Essential Service Water System - Heumader Shale Member; and
- Figure 2.5-62d: Location of Deformation Zones - Southeast Part of Essential Service Water System - Heumader Shale Member.

Table 2.5-15a and 2.5-15b identifies these zones of deformation by number, the location of each feature, and the appropriate Dames & Moore report containing detailed geologic maps and descriptions.

Several noncapable faults or shear zones that deform geologic units other than the Heumader Shale Member were mapped during the excavation of the main dam foundations. One fault was observed in the east wall of the low-level outlet tunnel excavation and was mapped on a scale of 1 inch to 1 foot (1:12). Deformation is confined to the Unnamed Member of the Lawrence Formation. The fault strikes N5 W and dips 50° to 70° NE. Slickensides rake 80 to the north. Stratigraphic displacement of the Williamsburg Coal Bed and overlying and underlying shales, bedding plane drag, and slickenside rake indicate that movement along the fault was dominantly normal (Reference 326, Figure 10-V; see Reference 72, Figure A-1 for a revised Figure 10-V).

Apparent maximum displacement of 0.5 foot occurs near the base of the excavation. The fault branches into two distinct splays approximately 3 feet above the tunnel floor. Displacement was observed to decrease progressively upward along these splays, and displacement and faulting are not observed approximately 0.5 feet above the tunnel floor. Therefore, three observations are relevant:

a. No trace of the fault was observed in the floor of the excavation;

b. The main fault and its splays terminate within an interval of 5 feet above the Williamsburg Coal; and

c. The fault is overlain by a least 4 feet of apparently undisturbed shale.

Movement along this fault appears to have occurred prior to deposition of the uppermost Lawrence Formation and overlying Toronto Limestone. Since this evidence establishes age of deformation as over 280 m. y., there is no known macroseismic activity associated with this feature, and there are no known capable faults with which it can be associated, the fault can be defined as noncapable according to Appendix A to 10 CFR 100. Representatives of both the Kansas Geological Survey and the NRC inspected the fault and concurred with Dames & Moore's conclusion.

Deformation affecting the coal seam within the Ireland Sandstone Member of the Lawrence Formation was mapped in the excavation for the service spillway of the main dam. The Ireland Member was exposed in the 3:1 floor of the spillway discharge channel at Station 7+15 and in the east and west excavation slopes between Stations 7+15 and 8+23. The locations of these features are tabulated and shown in plan view in Section 2.5.1.2.4.1.

In the service spillway discharge channel, the Ireland Member consisted of laminated, light tan or grey to greenish grey, micaceous, sandy shale or shaley fine sandstone (USAR Section 2.5.1.2.2.2). Small-scale cross beds were well-exposed in the walls, and ripple marks were exposed on bedding plane surfaces in the floor of the excavation. The coal seam within the Ireland Member was approximately 8 inches thick in the spillway excavation.

As exposed in the excavation, the seam appeared to be discontinuous at 16 points along the walls and floor (Reference 72, Figures 11-H through 11-L). These features were originally numbered 1 through 17. However, feature No. 12 was later interpreted as an unrelated, depositional thinning of the coal bed and was not investigated further. Feature No. 2 is located on the 3:1 floor at Station 7+15 but was too small to be mapped on the scale of Figure 11-H (Reference 72). It is similar in appearance to the other 15 features. At each point of rupture, the coal bed was broken or separated and the intervening zone had been filled from above or below with Ireland Shale.

The shale in most cases was sheared and contained numerous polished, slickensided and curved planes crosscutting one another. Some fragments of coal occurred within the intervening shale. The shale-filled breaks in the coal were irregular in shape and ranged in size from a few inches to nearly a foot in width. A number of the shear zones contained nodules of pyrite a few inches in diameter and at least one shear zone appeared to contain sphalerite.

In some places the coal bed has been slightly bent and tilted on either side of the break giving the appearance of displacement on the order of 1 to 2 inches. A number of the more significant features in the walls were mapped in detail at horizontal and vertical scales of 1 inch = 1 foot (Reference 72, Figures 11-U through 11-Y).

A distinctive marker bed consisting of a light tan to light gray, fine grained, calcareous sandstone with patches of grey or light brown fossiliferous limestone occurs at the base of the Amazonia Member, which immediately overlies the Ireland Member. The bed is approximately 0.7 feet thick and occurs in the walls of the service spillway excavation 12 feet above the top of the Ireland Coal seam. The marker bed was traced and carefully examined where it crops out in the 3:1 north slope and on the east and west walls of the excavation. No evidence of shearing or displacement of the marker bed was found. Clay or shale-filled breaks in the sandstone were found at 6 points along the marker bed, 2 on the west wall, 3 on the east wall and 1 on the south-facing 3:1 slope. The zones ranged from 1/2 to 8 inches in width and exhibited some slickensided, polished surfaces in the intervening clay or shale zone. All the slickensides in the shale were oriented in a subvertical direction, but no vertical displacement of the sandstone marker bed was detected (Reference 72, Figure 11-Y). No shearing could be traced downward to the Ireland Coal. Therefore, shearing in the Ireland Member did not affect the overlying Amazonia Limestone Member.

No evidence of shearing was present in the nearly flat excavation surface of the spillway floor. This indicates that the deformation of the Ireland Coal was not the result of deep-seated faulting. One linear feature, located near the southern end of the excavation floor between Stations 7+95 and 8+23, is a sand dike (Reference 72, Figure 11-M).

The 16 disturbed zones in the Ireland Coal were examined in detail. Evidence of soft-sediment deformation is presented below and indicates that the shales above and below the coal bed were either unconsolidated or semi-consolidated when the deformation took place. The deformation is, therefore, interpreted as having occurred immediately after sedimentation or during early diagenesis.

1. No main central shear can be distinguished in most of the zones of shearing, nor can any shear be traced either upward or downward for any great distance. Only in features No. 13 and No. 14 could a single main shear be distinguished and traced. At these two locations the shears could

be traced only 6 and 8 feet, respectively, above the coal bed. At other locations the shears died out within a shorter vertical distance. The shearing, therefore, appears to be compensatory in nature resulting from dewatering and/or compaction of unconsolidated sediments (Reference 72, Figures 11-J, 11-W, and 11-X).

2. The penecontemporaneous or early diagenetic origin of the deformation is directly or indirectly indicated by a number of observations. Most of these indicate that the Ireland sandy shales either behaved plastically or locally, may have liquified and flowed into gaps in the ruptured Ireland Coal bed.

   a. Shale (mud) was locally injected between the bedding planes of the coal on either side of shale-filled zone of shearing. The injected shale between the coal layers pinches out away from the central shear zone (Reference 72, Figures 11-U to 11-W).

   b. Shale in the gaps between segments of the coal bed appears to have flowed into place rather than sheared down or up in the coal bed along shear planes.

   c. In a gap in the coal bed (feature No. 13), there is a mixing of discernably bedded and nonbedded sandy shale with no shearing or evidence of a break between the two types of sediment. This implies that the materials were introduced into the gap in the coal bed as unconsolidated sediments with a resulting partial destruction of stratification in the shale (Reference 72, Figure 11-W).

   d. Bedding in the shale locally conforms to the walls of the break or shear zone in the coal.

   e. The coal seam does not appear to have been shattered, although it is presently very brittle, but rather to have been ruptured, separated and displaced slightly by flowage of the surrounding sediments.

f. Sheared shale found in the gaps in the coal bed does not occur as discrete, broken fragments. The sheared shale shows no fragment outlines and generally shows no stratification. It occasionally exhibits a weakly developed bedding related to the geometry of the walls of the adjacent coal or to the minor shears within the shale.

3. The nature and geometry of the shearing in the shale-filled gaps in the Ireland Coal bed are also indicative of local differential compaction, i.e., shearing of nontectonic origin.

   a. Many of the slickensided shears intersect, but do not cut across the top or bottom of the coal bed.

   b. Shears converge at coal breaks but most do not extend across the zone where the gap in the coal occurs.

   c. Bending of the coal beds is opposite to, rather than consistent with, the apparent direction of movement along the shears that offset the coal. This suggests that rupturing may be due to abnormal pore pressures above, or more likely below, the coal bed. Differential compaction might also cause the same result.

   d. Vertical displacement of the coal bed on opposite walls of the shear zone is minor and often absent. None of the slickensided fractures indicate horizontal displacement. The slickensides present would tend to indicate relative vertical movement (moderate to high angle dip-slip), however vertical displacement of the coal seam is a maximum of approximately 2 inches. Slickensided shears extend up to the base of the coal bed but do not extend into or across it.

   e. Although the shale filling the breaks in the coal seam contains many curved, polished, and slickensided surfaces, none of the shears affect the coal.

Shears often extend from the sandy shale above the coal downward into the shale in the coal break or from the sandy shale below upward into the shale between the coal. Very few shears extend all the way from the shale above through to the bottom of the coal seam. All of the shears die out at or near the bottom of the coal seam. None of these shears extend through the coal to the underlying shale.

f. Irregularities in the shales overlying the coal, such as folds and steeply dipping bedding planes die out upward in the stratigraphic section.

4. The Williamsburg Coal bed above the basal Amazonia marker bed was found to be unsheared where it crosses the northern (3:1) floor slope of the spillway channel. No evidence of disruption of the Williamsburg Coal was noted during inspection.

The conclusions reached after the field studies were completed indicate that the deformation involving the coal seam within the Ireland Member in the Service Spillway excavation was penecontemporaneous or early diagenetic. The field evidence indicates that the Ireland sandy shales were not lithified at the time of deformation and that they may have liquefied and flowed during deformation. The coal was at least partially lithified at the time of deformation as is evidenced by the fact that discrete coal layers within the seam were pried apart and mud was injected between them. This observation implies that the coal was buried deeply enough to have been at least partly indurated. All indications are that the deformation is old, probably Pennsylvanian in age, and not directly related to tectonism. Representatives of both the Kansas Geological Survey and the Water Resources Board of the Kansas State Board of Agriculture inspected the features and also concluded that the structures are related to post-burial compaction while the sediments were in a semi-indurated state. The features were not caused by tectonic activity and are not capable faults as defined by Appendix A to 10 CFR 100.

The site is located on the flank of the Bourbon Arch, a pre-upper Lansing feature (Figure 2.5-4, and USAR Section 2.5.1.1.5.1.1.1; Reference 124, p. 64-65). All known faulting within 50 miles of the site is either pre-Pennsylvanian (Fault Nos. 1 and 7, Figure 2.5-16), the result of penecontemporaneous differential compaction of Pennsylvanian deposits (Fault Nos. 5, 8, 9, 10, 11, and 12, Figure 2.5-16), or associated with Cretaceous igneous activity (Fault No. 6, Figure 2.5-16).

At approximately 50 miles to the west, Fault No. 23 (Figure 2.5-16) does not appear on structure contours at the top of the Mississippian and from examination of the west-east Regional Cross Section (Figure 2.5-6) shows no evidence of offset of any strata younger than Mississippian. Fault No. 24, approximately 50 miles west of the site, appear to represent a graben in the Precambrian surface (Figure 2.5-7; Reference 45). An inferred fault offsetting the base of the Kansas City Group is in the same area as Faults No. 24 (Figure 2.5-6; Reference 270). This fault, if it exists, is pre-Late Pennsylvanian because it does not appear to offset the top of the overlying Lansing Group (Reference 177). The geological history within 50 miles of the site indicates no post-Pennsylvanian activity which would be associated with faulting.

Slickensided fractures are ubiquitous in the Snyderville Shale Member of the Oread Formation where exposed in the Main Dam keytrench excavation (Reference 326, Figure 10-J). These fractures dip at high to low angles, are concave upward, and have diverse orientations. No offset within the Snyderville or at either upper or lower contact has been observed.

Slickensided fractures also occur in the basal, medium gray to dark greenish gray, calcareous, clayey shale of the Unnamed Member of the Lawrence Formation. These diversely oriented fractures do not offset contacts with either the underlying Amazonia Limestone Member or overlying Williamsburg Coal Bed. Exposure of the Williamsburg Coal in the low-level outlet tunnel excavation revealed several local gentle folds. These folds may have resulted from movement along fractures in the underlying Unnamed Lawrence or could be the result of differential compaction by overlying sediments. No fractures were observed extending upward from the shale into the core of folds in the overlying coal. In general, the small slickensided fractures with no associated offset, noted in some of the shales at the site (USAR Section 2.5.1.2.2.2.1.1), may have formed during the Ouachita Uplift and may be related to the formation of the regional joint pattern (USAR Section 2.5.1.2.4.3), or may be the result of minor adjustments (differential compaction) along the edge of the Vinland channel. Therefore, these fractures are not related to activity along tectonic structures in the site area.

2.5.1.2.4.2 Site Folding

Localized folding occurs in the basal 5 feet of the Jackson Park Sandstone in the northeast corner of the Circulating Water pipeline trench (References 325; 326, Figures 8-LL and 8-LLL). The interlimb area of these folds is generally 5 feet wide. Interlimb angles are variable, and fold geometry can be described as tight

immediately above the Jackson Park/Heumader contact to open or gentle 3 feet above it. Detailed mapping and trenching parallel to the trend of axes indicates that these folds decrease in amplitude and are actually elongated, doubly-plunging domes with a 10-foot, generally east-west trending, hinge line between depressions. Generally, no shearing was observed. All folds had some soft to medium stiff clay and broken sandstone in a relatively damp core zone. In several folds, sandy clay in the core zone fills joints that extend downward into the underlying Heumader Shale. A claylined void occurs in the core zone of one of the mapped folds. The origin of these features is unknown, but may be related to the penecontemporaneous deformation documented above and in previous reports (USAR Section 2.5.1.2.4.1 and References 70, 325 and 326).

The presence of folds in the Heumader Shale Member has been documented in previous reports and is discussed above (Section 2.5.1.2.4.1 and Reference 70, 325; and 326). These folds are asymmetric and inclined. Folds and shear zones which occur at the same locations appear to be geometrically and perhaps kinetically related. Folds are usually confined to the upper Heumader with undisturbed shale located above folded bedding (Reference 326, Figures 6-N, 6-V, and 10-A). At several locations, the Jackson Park/Heumader contact is gently arched (Reference 326, Figures 6-A and 6-C). Undisturbed Jackson Park sandstone is often observed above these elevated contact zones (Reference 326, Figures 6-F, 6-T; also see Reference 69 and 325). Lowermost bedding appears to become thin over the arch but thickens adjacent to the arch. These data are compatible with the information presented above (USAR Section 2.5.1.2.4.1) and indicate that deformation occurred during deposition of basal Jackson Park sandstone and prior to lithification. All data observed in the youngest rock units on site indicate that the latest deformation occurred during the Pennsylvanian (over 280 m.y.). There is no known macroseismic activity associated with these zones, and there are no known capable faults with which these can be associated. Faults and shear zones associated with these folds are noncapable as defined by Appendix A to 10 CFR 100.

Ductile deformation consisting of small, symmetric, concentric folds occurs within the Heebner and Snyderville Shale Members and within the Williamsburg Coal Bed. Folding in the Heebner and Snyderville is local and occurs immediately above or below reddish-brown, clay-filled joints in the Leavenworth Limestone Member (Reference 326, Figure 10-J). Folding affects only the lowermost Heebner and uppermost Snyderville Members. Both shales appear to have "flowed" into the space formerly occupied by continuous Leavenworth Limestone. Folding, therefore, appears to be related to differential compaction and is nontectonic in nature.

Small, concentric folds occur in the Williamsburg Coal Bed (Reference 326, Figure 10-U). These folds do not appear to be geometrically related to fractures in the underlying shale and do not affect overlying shales of the Unnamed Member of the Lawrence Formation. These folds, therefore, appear to have formed as a result of differential compaction.

Figures 2.5-53 through 2.5-57 show structure contour maps on five stratigraphic horizons: Plattsmouth, Leavenworth, Toronto, Haskell, and Stanton Limestone Members. Because the near-surface strata have been explored more extensively in the areas of the plant site and UHS, structure contour maps with greater detail of the Plattsmouth, Leavenworth, and Toronto Limestone Members are presented for those areas (Figures 2.5-58 through 2.5-61).

In and near the site (as shown on Figures 2.5-53 through 2.5-61), the sedimentary strata generally strike north-northeast and dip gently to the west-northwest at 20 to 30 feet per mile. This general structural trend of the strata is modified by a plunging anticline-syncline sequence in the central portion of the site. The axes of these folds trend approximately N70°E and plunge 30 to 50 feet per mile to the southwest. The presence of these folds was inferred from subsurface data and geologic excavation mapping (Figures 2.5-53 through 2.5-61; References 58 and 326).

The three near-surface limestone units, the Plattsmouth, Leavenworth, and Toronto Limestone Members, display similar structural patterns. The structural patterns are best defined in the Plattsmouth and Leavenworth Limestone Members, except in the extreme southern portion of the site where erosion has removed these units from much of the land area. In the vicinity of the plant site, the near-surface beds lie on the nose of a southwesterly plunging anticline. Figure 2.5-59 shows that very small-scale undulations locally modify the anticlinal structure.

Structure contours on the deeper limestone units, the Haskell Limestone Member and the Stanton Formation, reflect somewhat simpler structural patterns than the near-surface units (Figures 2.5-56 and 2.5-57). These simpler patterns are largely a result of the low density of data points available for the deeper units. In the vicinity of the plant site and the UHS, the deeper units display a similar anticline-syncline sequence as that of the shallower strata. This structural parallelism indicates that some gentle warping of the beds has occurred at the site since deposition of the Oread Formation.

Geologic sections of the site illustrate the near uniformity in thickness of the shallower lithologic units, but also show variations in thickness for the deeper strata (Figure 2.5-44). An

isopach map of the interval from the base of the Toronto Limestone Member to the top of the Stanton Formation reveals that the Douglas Group thins in the vicinity of the anticline at the plant site (Figure 2.5-62). This thinning suggests that structural movement occurred prior to or contemporaneously with deposition of the Douglas Group. Within the Douglas Group, the Vinland Shale Member shows a significant increase in thickness in the vicinity of Boring B-11 (Figure 2.5-43). The main axis of the thickened Vinland Shale Member trends northeast-southwest across the site at approximately the same orientation as the anticline-syncline fold axes. The thickening of the Vinland Shale Member and absence of the Westphalia Limestone suggests that pre-Haskell stream channeling has removed the Westphalia Member and the upper portion of the Tonganoxie Sandstone Member locally (Figure 2.5-44).

The structural deformation at the site is at least in part a result of penecontemporaneous differential compaction of the Pennsylvanian sediments along the edge of the Vinland channel as the small-scale features shown on the structure contour maps (Figures 2.5-56 and 2.5-57) have a close correlation with the Vinland channel. The final movements probably were coincident with the joint formation and occurred as a result of the northwest horizontal compressive forces generated during initial Ouachita Mountain uplift (Reference 268, p. 3-22), slight modification occurring during the Cretaceous in conjunction with forces generated during the Laramide Orogeny.

2.5.1.2.4.3 Site Jointing

Jointing at the site is shown on Figure 2.5-52. Three predominant jointing patterns are present in the site area; these joint patterns trend N60° E, N15° E, and N30° W and closely follow the regional joint trends.

The age of the joints is possibly post-Early Permian to pre-Early Cretaceous. The joints are considered to have formed as a result of northwesterly horizontal, compressional forces generated by wrench-fault tectonics during the initial Ouachita Mountain uplift (Reference 268, p. 3-22).

Joints in the site area are almost always vertical and vary no more than 5 degrees from the vertical. Based upon examination of quarries, outcrops, and roadcuts, joint spacing appears to range from 3 feet to about 50 feet. Examination of the cores indicates that joints are more widely spaced in the subsurface. Joints exposed at the surface range from closed to open as much as 6 inches. The near-surface open joints are usually filled with clay and residual debris.

Numerous joints were observed in excavations and mapped during the construction phase of the WCGS (References 70, 325, 326). The majority of joints are subvertical. In several cases, joints were filled with reddish brown clay. This clay was most frequently observed within joints in limestone that had been subjected to some solution weathering at or near the surface. In addition, joints were observed in the sandstone facies of the Stull Shale, the Jackson Park sandstone facies, the Heumader Shale Member, the Heebner Shale Member, the Unnamed Lawrence Member, and the Ireland Sandstone Member. Many N50°E joints in the Heebner were filled with fine-grained calcite, and many of these joints did not propagate upward into the overlying Plattsmouth Limestone (Reference 71, Figure 10-D). The presence of joints in the Main Dam foundation necessitated excavation of cutoff trenches between Station 8+00 and 18+00, Station 36+07 and 47+70, and Station 85+50 and 105+10 (Figure 2.5-29; Reference 326, Figure 9).

Many joints and shear planes were highlighted by a yellowish brown stain indicating that ground-water movement and oxidation had occurred along these planes. Ground water was observed seeping into excavations at several locations. In most cases, either the foundation or a keytrench excavation extended below the point of seepage.

At depths below 10 to 20 feet, the joints seen in cores are tight and almost always closed. Examination of cores indicated that the few open joints located in the subsurface had a maximum measured open width of about 1/8 inch. Keytrench wall mapping supports the conclusion drawn from the examination of cores that fracture frequency within most units at the site decreases with thickness of overburden.

The streams in the area of the site appear to be at least partially controlled by jointing with the control being most apparent where streams are located on competent units such as the limestones. Small-scale slumping of limestone blocks resulting from erosion of the underlying shales along stream banks probably is accentuated due to jointing.

Slope failure along joints in the upper Heumader was documented in the interim reports on excavation mapping (References 325 and 326). During the construction phase, slumping on parts of excavation slopes was noted in the power block, circulating water pipeline, main dam and saddle dam IV excavations (Reference 326, Figures 8-F, 10-C, 12-B and 12-D). These localized slope failures generally occurred along shear planes or joints that strike parallel to the slope and dip toward the excavation.

Slope failure was also observed on the east side of Wolf Creek Valley where the Main Dam excavation crosses the buried bedrock valley of Wolf Creek. A mudslide occurred after a period of extensive rain and after the slope toe had been removed during excavation of alluvium that filled the buried valley. Slide debris was removed by excavation equipment.

Tertiary to Quaternary stream erosion and downhill slumping of jointed Toronto Limestone was documented by excavation of a supplementary exploratory trench in the Main Dam Foundation at Station 77+50 (Reference 326, Figure 10-0 for location). This trench was excavated in order to determine why large blocks of Toronto Limestone appeared to be in stratigraphic contact with the Unnamed Member of the Lawrence Formation at elevations ranging from 1,046.3 feet to 1,011.0 feet although an excavated, in situ contact was clearly visible at an excavation bench located at approximately Elevation 1,052 from Stations 79+00 to 78+00. Exposures in the trench showed that the Unnamed Lawrence Member and Williamsburg Coal Bed are not faulted (Reference 326, Figure 10-00). Blocks of Toronto Limestone were observed in the trench wall in a surficial matrix of yellow-brown, silty clay to greenish gray clay overlying bedrock. These large blocks of Toronto Limestone have apparently been eroded from the very steep, eastern bank of the ancestral Wolf Creek, moved downslope by the nontectonic, geomorphic process of mass wasting, and subsequently been buried by alluvium. A geologic map of the north wall and preliminary borings document the presence of this former main channel of Wolf Creek (Reference 326, Figure 10-N; Reference 58).

2.5.1.2.5 Site Engineering Geology

2.5.1.2.5.1 Evidence of Prior Earthquakes

The site has been exposed to the effects of at least 17 humanly perceptible earthquakes since 1800; the closest recorded earthquake to the site was the 1903 Intensity II event near Baldwin, Kansas, 40 miles northeast of the site. USAR Section 2.5.2.3 describes the estimated effects of major historical earthquakes at the site; USAR Section 2.5.2.1 outlines the earthquake history of the site area. There is no physical evidence of landslides, subsidence, ground breakage or offset of beds or any other such feature which would be caused by an earthquake occurring near the site. There have also been no historically recorded tremors in the area that could be related to earthquakes occurring within 40 miles of the site.

2.5.1.2.5.2 Deformational Zones

The information presented in USAR Sections 2.5.1.2.2 and 2.5.1.2.4 delineates zones of deformation investigated during construction of the WCGS. No major zones of structural weakness composed of crushed or disturbed materials have been found. Minor deformational zones containing highly weathered, locally distorted clay are near-surface phenomena which grade with depth to weathered, distorted shale. Weathered, clayey material in these shear zones was removed from the foundation excavation and mapped on excavation walls prior to construction (Reference 70 and 325).

The largest scale deformational features noted during the site investigation were the anticline and synclines described in USAR Section 2.5.1.2.4.2. Small-scale shear zones, faults, and folds are described in USAR Sections 2.5.1.2.4.1, and USAR Section 2.5.1.2.4.2.

The distorted sandstone bedding noted throughout the Ireland Sandstone and Tonganoxie Sandstone members is probably penecontemporaneous with deposition. According to Weimer, "These deformed layers are believed to result mainly from gravity-induced slumping and sliding on oversteepened depositional slopes associated with the delta progradation process, aided by movement of clays which developed high pore pressures" (Reference 189, p. 76).

The slickensided fractures noted in several of the shale beds probably resulted from differential compaction of the Pennsylvanian deposits along the edges of the Vinland channels (USAR Section 2.5.1.2.2.2, and 2.5.2.4.1). The only other feature noted during the site investigation that may be related to deformation was the joints described in USAR Section 2.5.1.2.4.3.

2.5.1.2.5.3 Solution and Weathering Features

In eastern Kansas, known solution features are confined to areas containing thick outcrops of water soluble rock, local reef build-up of carbonates, faulting of carbonates, or stream channel diversion (USAR Section 2.5.1.1.5.4.1.1). As none of these conditions are present at the site, the possibility of instability due to solutioning is considered minimal. In addition, the relatively low permeabilities of the limestone, the overlying soil units, and interbedded shales apparently precluded the development of major karst features.

John Redmond Reservoir, which has been in operation since 1963, is the closest large body of water to the Wolf Creek lake. The site geology has been examined and found to have a similar geologic setting to that of the cooling lake site. However, the

John Redmond Reservoir site lies down dip from Wolf Creek and is underlain by slightly higher stratigraphic units. The Clay Creek Limestone and Jackson Park Shale Members of the Kanwaka Shale Formation are the two main stratigraphic units exposed at the surface near the spillway at John Redmond Dam. The Jackson Park Shale Member is composed of alternating beds of limestone and shale in this area. The two main limestone units cropping out at the cooling lake site are the Plattsmouth Limestone and Toronto Limestone Members of the underlying Oread Limestone Formation.

No evidence of solutioning of the limestone units in the vicinity of the spillway at John Redmond Reservoir was noted during field investigations. Reference 327 has stated that Foundations and Materials Section personnel observed no indications of any large-volume solutioning of limestone in the vicinity of John Redmond Reservoir.

Two types of features were found during the site explorations and excavation mapping which can be attributed specifically to limestone weathering or solutioning. One type of feature, irregular elongated hollows (karren), are formed by the concentration of solution activity along lines of weakness such as joints. Another type of feature is a group of non-linear hollows that curve in an irregular manner and are not associated with joints. This latter pattern may have been caused by organism trails or burrows prior to lithification. Trail or burrow fillings may have been preferentially dissolved.

Within the site area, karren separated by rounded divides have been noted in areas where the Plattsmouth and Toronto Limestone Members are exposed as the surficial bedrock units and in the main dam keytrench where the Plattsmouth and Toronto occur at or near ground surface. The curved solution features not associated with joints have been mapped in portions of the ultimate heat sink dam foundation approximately between Stations -0+50 and 1+00 at approximately Elevation 1062.8 to 1062.4 (Reference 72, Figures 8MM, 8DD, and 8EE). Linear solution features (karren) occur approximately between Stations 10+08 and 14+15 at approximately Elevation 1065.6 to 1069.2 (Reference 72, Figures 8U through 8BB and 800 through 8TT). In both areas the Plattsmouth Limestone had been covered by clayey soils prior to excavation (Reference 72, Figures 8B, 8G, 8E, 8F, and 8J). Linear solution grooves have also been mapped in portions of the excavation surface of the ultimate heat sink pond between Station AM (Elevation 1077.5) and Station BC (Elevation 1066.7) where the Plattsmouth Limestone had been covered by slightly weathered Heumader Shale (Reference 72, Figures 9I through 9L). As noted in the preliminary site investigation and during construction, this feature is generally

not found in areas where the Plattsmouth and/or the Toronto are overlain by other stratigraphic units (Reference 326).

Typically, karren at the site have rounded divides between the grooves that are spaced from one to several feet apart. The grooves are usually about an inch wide at the surface of the limestone outcrop. However, they narrow quickly with depth and disappear within several feet of the surface.

As observed and mapped in the main dam keytrench, solution activity in the Plattsmouth and Toronto Limestones occurred at joint intersections and along existing joints and resulted in widening those joints. These joints are presently filled with reddish brown clay.

Erosion by ancestral Wolf Creek has formed a valley that is floored by successively lower stratigraphic units ranging from the Plattsmouth Limestone Member at higher elevations to the Lawrence Formation at lower elevations (Figure 2.5-22). Mapping in the main dam keytrench, transverse to Wolf Creek valley, indicates that solution activity along joints has occurred in the Plattsmouth and Toronto Limestone Members where those units had occurred as the uppermost bedrock unit. This solution activity did not affect overlying or underlying shales or the shale layer within the plattsmouth limestone. Solution activity did not occur at locations where the Plattsmouth and Toronto limestones are covered by the Heumader and Snyderville shales, respectively. This fact is documented in geologic maps of the main dam keytrench walls (Reference 326, Figure 10J, Sta. 37+06 to Sta. 38+00; Reference 72, Figure 11A, Sta. 42+00 to Sta. 43+50) Many of the features shown on the two figures referred to above represent solution activity which had occurred along joint intersections and along individual joint surfaces. Blocks of sound limestone between joints which are shown on these figures were plucked away from the keytrench wall during blasting and excavation giving the impression of wide solution features where sound rock had actually occurred between clay-filled fractures.

Coring and pressure testing data obtained during the main dam foundation investigation had indicated that the Plattsmouth and Toronto limestones have relatively low permeabilities below the upper weathered zone and where overlain by the Heumader and Snyderville Shales. (For example see Reference 60, Figures A-2-8, A-2-9, A-2-33, and A-2-36 for borings D-14, D-18, D-40 and D-43, respectively). No solution features were observed in the main dam keytrench from Sta. 8+00 to Sta. 18+00 (Reference 326, Figure 10D). Subsurface investigations and excavation surface mapping indicate that solution features do not occur throughout the

Plattsmouth and Toronto limestones, but occur along near-surface joints at locations where overlying rock units have been removed by stream erosion in Wolf Creek valley.

As observed and mapped in the ultimate heat sink dam foundation between Stations -0+50 and 1+00, the irregular, non-linear solution features occur in areas where the Plattsmouth Limestone Member was overlain by 5 to 8 feet of topsoil, silty clay, clay, and extremely to moderately weathered Heumader shale (Reference 72, walls on Figures 8B and 8G, floors on Figures 8M, 8DD, 8EE, and 8FF. Widths of clay-filled fractures are noted on each figure). Most of the features in this area appear similar to those shown to scale on the detail inset on Figure 8M (Reference 72). These curving, irregular features differ from the linear karren observed elsewhere and do not appear to be associated with fractures. None of the curved solution features were continuous across the UHS dam foundation. Clay-filled joints, apparently widened by solution activity, are rare but occur at approximately Station 0+35, 70'R of centerline; Station 0+38, 60'L of centerline; and Station 1+00, 83'L of centerline. Both the curving irregular features and the joints discussed above were mapped on excavation surfaces ranging in elevation from approximately 1062.8 to 1062.1. No solution features were observed on the foundation surface at approximately 1061.0 to 1060.4 (i.e., south and east of the excavation ledge) (Reference 72, Figures 8N, 8M, 8EE, and 8FF). This observation, coupled with hand excavation of several of the clay-filled solution features and joints, indicates that these features range up to almost 1 foot in depth. These data indicate that both solution features along joints and the irregular features are restricted to the uppermost 1-foot of rock and implies that the occurrence of the curving irregular features is lithologically controlled. Solution features in the Plattsmouth Limestone at the UHS dam between Station 1+00 and approximately Stations 2+55 to 3+00 (i.e., below WCGS elevation 1061) are rare and appear to be joint controlled (Reference 72, Figures 8N, 80, and 8GG).

Solution activity appears to have widened many joints occurring between Stations 10+08 and 14+15 at the southeast end of the ultimate heat sink dam (Reference 72, Figures 8W through 8BB and 8OO through 8TT). The excavation surfaces which contain these clay-filled joints range in elevation from 1964.4 to 1969.2 and had been overlain, prior to excavation, by 4 to 8 feet of silty clay and extremely weathered limestone (Reference 72, Figures 8E, 8F, and 8J). The clay-filled joints in this area range up to almost 2 feet in width. Hand excavation and observations across ledges indicate that these features are generally on the order of up to 1 foot in depth. Only two clay-filled fractures in the Plattsmouth Limestone are continuous across the dam foundation and

cross the centerline at approximately Stations 11+15 and 11+20 (elevation approximately 1066.5 - Reference 72, Figures 8X and 8PP). Other portions of the Plattsmouth foundation surface between Stations 8+60 and 10+08 contain either tight joints or more widely spaced, clay-filled joints up to 1 inch wide (Reference 72, Figures 8U, 8V, 8MM, and 8NN). Mapping of abutment surfaces containing the base of the Plattsmouth Limestone indicates that solution features are not through-going to the top of the underlying Heebner Shale (Reference 72, Figure 8ZZ; also see Figure 8WW).

Logs for Borings HS-15 and HS-1 indicate that no joints and solution features were observed within the Plattsmouth limestone beneath the northwestern portion of the foundation and that both core recovery and RQD were high (Figures 2.5-30, 2.5-36o, and 2.5-36a). No solution features were observed in borings HS-3, HS-5, HS-16, and HS-31 where the Plattsmouth limestone occurs as the upper bedrock unit in the southeastern portion of the ultimate heat sink dam foundation (Figures 2.5-36c, -36e, -36p, and -36gg). No water losses were reported during drilling. The presence of delicate calcite crystals in isolated 0.08 ft. diameter vugs near the base of the Plattsmouth limestone are another indication that solution features do not occur throughout this unit. These data and a cross-section along the UHS dam axis indicate that, as at the main dam, solution features in the Plattsmouth limestone appear to occur only where it is the uppermost bedrock unit in the vicinity of Quaternary stream channels (Figure 2.5-48). Solution features at the southeast end of the ultimate heat sink dam foundation are similar to those at the main dam keytrench in that stratigraphically lower horizons in the Plattsmouth are affected at locations where stream erosion has cut down through the limestone. The irregular, curved solution features and more widely spaced joints in the northern portion of the ultimate heat sink dam foundation differ in that their occurrence is restricted to approximately a 1-foot interval.

Some solution pitting and karren were mapped in the ultimate heat sink pond between Stations AI and BC (elevations 1078 to 1066.7, respectively) (Reference 72, Figures 9 and 9H through 9L). Observation across ledges and hand excavation indicate that these features generally range up to 0.5 to 0.6 foot in depth. This general area had been covered by 5.5 to 7.7 feet of topsoil and silty clay prior to excavation.

Pressure testing in Borings HS-8 and HS-22 in the vicinity of these features indicated no water take within the Plattsmouth limestone (Figures 2.5-36h and 2.5-36v). Additional pressure testing in borings HS-10, HS-20, HS-24, and HS-29 indicated no water takes within the Plattsmouth limestone in the ultimate heat

sink pond area (Figures 2.5-36j, -36t, -36x, and -36cc). These data and the rock core descriptions indicate the absence of solution features in the Plattsmouth limestone and infer that the three joints described as open in logs for Borings HS-5, HS-20, and HS-22 had been closed or filled prior to drilling (Figures 2.5-36e, -36t, and -36v). In addition to these subsurface data, no solution features were mapped within the Plattsmouth limestone where excavated for the essential service water pipeline corridor within the ultimate heat sink pond (Reference 72, Figures 6III through 6TTT), for the foundation for the essential service water pumphouse (Reference 72, Figures 7A through 7D), or for foundations within the power block (Reference 325, see Figures lA and lB for locations of maps within power block). See USAR Section 2.5.6.6.4 for a discussion of estimated seepage through the foundation rock of the UHS dam.

The cooling lake (WCGS-ER(OLS) Sections 3.3 and 3.4) receives water from runoff, precipitation, and make-up water released from John Redmond Reservoir and loses water through seepage, evaporation, and discharge. The results of analyses for a 16-year period indicate (WCGS-ER(OLS) Rev. 3, Section 3.3 and Table 3.3-1) that with one unit operating, an average of 46.9 cfs released from John Redmond Reservoir is pumped into the lake from the Neosho River for make-up and 27.3 cfs comes into the lake from rainfall and runoff. With two units operating, these figures would be 60.9 and 27.3 cfs, respectively. Discharge averages 21.7 cfs with one unit in operation. Discharge would average 20.8 cfs with a second unit in operation. Seepage is assumed to be 3.5 cfs with either one or two units in operation. The remaining water loss occurs through evaporation. (See USAR Sections 2.4.8.2 and 2.4.11.5.)

The three most important parameters which effect the potential for solutioning of limestone are the calcium concentration, temperature, and pH of the water. An increase in any one of these parameters will decrease the potential of water to cause limestone solutioning. This is demonstrated in the calcium solubility curves presented on Figure 2.5-63.

Under normal operating conditions, the make-up water from John Redmond Reservoir has been estimated to have an average calcium concentration of 89 mg/1 (WCGS-ER(OLS) Section 3.6, and Table 3.6-1). Rainfall and runoff water can be assumed to have a concentration similar to existing water in Wolf Creek, which averaged approximately 48 mg/1 in a 1973 sampling program (Reference 131, Appendix 2.5A, and page 5 of Table 5A-2). Therefore, with one unit operating at 100 percent average annual load factor, the concentration of calcium in the cooling lake water is estimated to be approximately 172 mg/1 on the average.

With two units operating at 88.5 percent annual average load factor, the average calcium concentration of the cooling lake is estimated to be 214 mg/l. These figures represent the average conditions. However, the amount of rainfall, make up, and blowdown varies from year to year. In simulating the period from 1949 to 1964, it was found that the calcium concentrations in the cooling lake would vary from approximately 172 mg/l to approximately 218 mg/l with one unit operating at 100 percent average annual load factor. With two units operating, the concentrations would vary from approximately 214 to 389 mg/l.

Based on analysis of the above 16-year period, the seasonal 50 percentile temperature of the cooling lake water with one unit operating at 100 percent average annual load factor has been estimated to vary from a minimum of approximately 2.6°C at the plant inlet to a maximum of approximately 43.1°C at the plant discharge (WCGS-ER(OLS) Section 3.4 and Table 3.4-2). The pH of the lake water will probably be 7.5 or higher, and is assumed to be that of John Redmond Reservoir, which varied from 7.9 to 8.3 in a 1973 to 1975 sampling program (WCGS-ER(OLS) Table 2.4-11). By plotting the above values of calcium concentration, temperature, and pH on Figure 2.5-63, the cooling lake water is shown to be nearly saturated or saturated with respect to calcium during most operational conditions.

Calcium concentration, temperature, and pH were measured four times at John Redmond Reservoir during 1973 (Reference 131, Appendix 2.5A and Table 2.5A-2):

SAMPLING DATE	CALCIUM CONCENTRATION (mg/l)	TEMPERATURE (°C)	pH
3/27/73	33	9.2	8.2
6/12/73	67	24.5	8.3
9/11/73	66	23.0	8.1
12/12/73	42	2.2	7.3

Plotting the above data on Figure 2.5-63 indicated that water in John Redmond Reservoir is generally unsaturated with respect to calcium and much below the values expected within the cooling lake.

In simplistic terms, the Wolf Creek lake acts as an evaporation basin with either one or two operating units. The calcium concentration, temperature, and pH of the water will always be above the corresponding values of the make-up water being released from John Redmond Reservoir and pumped from the Neosho River. An increase in any one of these three parameters

will decrease the ability of the cooling lake water to dissolve limestone. Therefore, there is less potential for solution activity in the limestone units at the Wolf Creek lake than at John Redmond Reservoir.

The cooling lake water is not likely to dissolve limestone outcrops or riprap because the lake water is normally nearly saturated or saturated with respect to calcium. The predicted lack of limestone solution activity at the Wolf Creek lake is further substantiated by the fact that no evidence of large-volume solutioning had been noted at John Redmond Reservoir after 12 years of operation, even though its water is unsaturated with respect to calcium (Reference 327). The ground water in limestone formations, which will be recharged by the cooling lake water, will be at or near saturation levels for calcium. Therefore, the effect of the cooling lake water on the ground-water regime will not create the possibility of development of karst features.

The bedrock units at the site have been weathered to depths ranging from 8 to approximately 30 feet below the ground surface. Because the rock units at the site are characterized by very low permeabilities and the water table is near the ground surface, weathering does not extend to greater depths.

The type and degree of weathering which affects the bedrock is largely dependent upon lithology. The shale units typically weather more deeply and severely than the limestones. Weathering of the shales results in discoloration and a decrease in rock strength and consistency; the weathering typically is concentrated along subhorizontal bedding planes and joints. The clay minerals comprising the shales commonly are degraded and hydrated by the weathering process, resulting in a "clayey" shale matrix.

Generally, the limestone units at the site are weathered along fracture surfaces and along shaley horizontal bedding planes and are a barrier to deeper weathering. Weathering extends completely through a limestone unit only when the unit is very thin or when the unit is exposed at or very near the ground surface. When the limestone is covered by 10 feet or more of shale or soil, weathering does not extend below the base of the limestone unit. Weathering of the limestones results in rock discoloration and loss of strength. Except where the limestone is very near the surface and highly weathered, the loss of strength is minor. These properties were observed during the preliminary site investigation and confirmed while mapping the relatively continuous exposure in the main dam keytrench (Reference 326).

The soil overlying the Jackson Park Shale Member at the plant site extends to a depth of about 6 feet and represents the residual products of the weathering process. Below this soil, the Jackson Park Shale Member, which is comprised mainly of sandstone, extends to approximately Elevation 1,092. This unit has been discolored and is slightly to highly weathered. The Jackson Park Shale Member overlies the Heumader Shale Member, which is slightly to moderately weathered to a depth of approximately 28 feet (Elevation 1,072). The Heumader Shale Member is not discolored or weathered below elevation 1,072 although clayey zones of lower strength may be present locally.

In the area of the UHS, the degree of bedrock weathering varies with location and is a reflection of the near-surface lithology. The UHS dam is constructed in an area where the Plattsmouth Limestone Member crops out at the surface. Weathering here does not extend below the base of the Plattsmouth Limestone Member except along the present creek drainage, where the Plattsmouth has been eroded, the Heebner Shale is exposed, and weathering does not extend below the base of the Leavenworth Limestone Member (4 feet below the base of the Plattsmouth Limestone Member). The Heumader Shale Member occurs in the near surface in most of the reservoir area of the UHS. In these areas, the Heumader Shale Member is slightly to highly weathered to a maximum depth of about 20 feet; weathering does not extend below the underlying Plattsmouth Limestone Member.

2.5.1.2.5.4 Residual Stresses

Evaluation of the geological history of the site indicates that the last major tectonic activity occurred during the initial uplift of the Ouachita Mountains and minor activity occurred during the Cretaceous with uplift of the Rocky Mountains. During the Cretaceous, minor igneous activity occurred in eastern Kansas and is associated with the Silver City Dome and Rose Dome in Wilson County and similar features in Riley County. The site is located on the flank of the Bourbon Arch, a structure formed prior to deposition of the Upper Lansing Group. There is no evidence of any tectonic activity within 36 miles of the site. Faulting along minor deformational zones, mapped during the construction phase, occurred during Pennsylvanian time and is discussed further in USAR Section 2.5.1.2.4.1. The site has never been exposed to glaciation; therefore, no residual stresses related to ice loading are present. Examination of excavation surfaces, cores, quarries, roadcuts, and outcrops would indicate that some force has been dissipated through jointing, faulting, and folding. Examination of the quarries indicated no evidence of rock burst, spalling, or other features which would be associated with unrelieved residual stresses. The seismic history of the site vicinity also indicates

no unrelieved residual stresses are present. It is, therefore, concluded that no unrelieved residual stresses are present at the site and that this is not a factor to be considered in design.

2.5.1.2.5.5 Stability of Subsurface Materials

The information presented in USAR Sections 2.5.1.1.5.4.1 and 2.5.1.1.5.4.3 indicates that no potential instability of surface or subsurface materials exists at the site due to regional warping or the development of karst features. The subsurface soils at the site do not consist of materials subject to liquefaction or thixotropy; therefore, liquefaction and thixotropy present no hazards to the site area.

In their natural state, some of the soils and shales have a slight potential for swelling (USAR Section 2.5.1.2.2.1.4). When placed under a low confining pressure (600 psf or more), the soils have a negligible swelling potential (USAR Section 2.5.6.2.5.1).

The swelling potential of the shales increases with depth and is probably related to the release of its natural confining pressure. The swelling potential of any near-surface shale is very low to negligible (USAR Section 2.5.6.2.5.2.3). Some of the shale members, mainly the Snyderville and Unnamed Lawrence Shale Members, are characterized by very low slaking durabilities (USAR Section 2.5.6.2.5.2.2). These two shales lie below excavation depth of most Category I structures and did not present a problem during construction. The Snyderville Member was exposed in the foundation excavation for the UHS dam.

The shale units present at excavation depths are the Heumader Shale and the Heebner Shale Members. The Heebner Shale Member has a high slaking durability, and the Heumader Shale Member has a low to medium slaking durability. Requirements for protecting this member depended on its position in each excavation and on the length of time it was exposed during construction. Protective measures are discussed in USAR Sections 2.5.4 and 2.5.5.

The Heumader Shale Member is distinguished from other shales in the Category I Area (Figure 2.5-23) by its stratigraphic position, being overlain by overburden or by the Jackson Park Member and underlain by the Plattsmouth Limestone Member (USAR Section 2.5.1.2.2.2.1).

2.5.1.2.5.6 Effects of Man's Activities

The Avon Field (5.5 miles southeast of the plant site), the Lake Shore-Thompson-Pierett Complex (approximately 7.0 miles west of the plant site), and the Ottumwa Field (approximately 7.0 miles

northwest of the site) are the closest oil fields to the site. These fields are located on small anticlinal structures that do not extend into the site (see USAR Section 2.5.1.1.5.4.2). All mineral rights are controlled by the Licensees, and no drilling is permitted within the property boundaries, which are shown on Figure 2.1-2. In addition, no subsidence in eastern Kansas has been reported due to the removal of oil, gas, or water, and no uplift has occurred due to repressurization and secondary recovery processes (Table 2.5-15; Reference 311 and 290). Therefore, instability due to removal of oil or gas is not considered to be a factor in design or safe operation of the plant.

No economic coal resources occur in the site area. There has been and will be no mining within the site; therefore, instability due to the removal of coal is not a factor to be considered in plant design (USAR Section 2.5.1.1.5.4.2).

There is no other anticipated activity of man which could cause instability of surficial or subsurface materials; therefore, instability due to man's activities is not a factor to consider in design.

2.5.1.2.6 Site Ground Water

A detailed discussion of the regional and local ground-water environment is given in USAR Section 2.4.13. The ground-water investigation methods used at the site are discussed in USAR Section 2.5.4.3.2. The techniques used in determining ground-water conditions were water pressure testing, monitoring of piezometers, and field permeameter testing.

Figures 2.4-54, 2.4-55, and 2.4-61 show the locations of the piezometers installed in the borings. Tables 2.4-32 and 2.4-33 list the holes in which piezometers were installed, the depth and geologic unit in which they were installed, and the piezometric readings taken between July 1973 and April 1979. Fifty piezometers were installed in the B-Series borings, 19 in the P-Series borings, and 15 in the HS-Series borings. The results of the pressure testing are presented on the boring logs and in Table 2.4-34. The results of additonal pressure testing are presented in reports on geotechnical investigations of the cooling lake area, main dam, and saddle dam foundations (Reference 62, 60 and 66). Water levels in dug wells and water table wells installed during 1973 indicate that the ground-water table closely follows the topography (Figure 2.4-50). In the site area, the water table generally slopes to the south toward Wolf Creek. At the plant site, the water table ranges from 2 to 10 feet below the ground surface. The soil and weathered bedrock zone act as an unconfined, nonhomogeneous aquifer yielding up to about 5 gpm per

well. Beneath the weathered bedrock and between relatively impermeable shales, water occurs under semi-confined conditions in some of the formations, principally the Toronto Limestone Member, Ireland Sandstone, and Tonganoxie Sandstone Members. The low permeability values as shown in Table 2.4-38 indicated seepage into excavations below the weathered rock zone would be minor. Collector ditches and sump pumps were generally sufficient to keep excavations dry during construction. A detailed discussion of the dewatering system and design bases for subsurface hydrostatic loadings is presented in USAR Section 2.4.13.5.

2.5.2 VIBRATORY GROUND MOTION

A discussion and an evaluation of the seismic and tectonic characteristics of the site and surrounding region are presented in this section. The purpose of this investigation was to develop seismic design criteria for major structures of the Wolf Creek Generating Station (WCGS). Description and results of the field investigations and laboratory testing programs which provided background information for this investigation are presented in USAR Sections 2.5.4.1, 2.5.4.2, and 2.5.4.3.

2.5.2.1 Seismicity

The site is located in a seismically stable region of the central United States. No earthquake epicenter has been reported closer than 40 miles to the site, and the nearest shocks have had intensities no greater than Modified Mercalli Intensity (MMI) III (Table 2.5-18). However, there have been earthquakes of MMI VII at distances of about 90 miles from the site.

A list of seismic events significant to the site is presented in Table 2.5-19. This table includes all earthquakes within 100 miles of the site, earthquakes of MMI V and greater that have occurred within 200 miles of the site, and all other earthquakes that were felt at the site. The epicenters of these earthquakes are plotted on Figure 2.5-64. Table 2.5-20 lists the earthquakes that were perceptible at the site.

The maximum site intensity exceeded MMI IV only during the New Madrid earthquakes of 1811-1812. The closest known earthquake to the site was of MMI II and occurred near Baldwin, Kansas, 40 miles away. Another nearby event occurred 60 miles away near Lawrence, Kansas, and had an intensity of MMI III (Reference 174 and 334). These small events are not known to be related to any recognized geologic structures.

With the exception of earthquakes associated with the Nemaha Anticline, the largest earthquake that has occurred within 100 miles of the site has been assigned an MMI VI. The nearest MMI VI-VII earthquake occurred 140 miles south of the site where the trends of the Nemaha Uplift and Ouachita Mountains intersect (Figure 2.5-64; Reference 334).

No major earthquakes relevant to the seismicity of the site have been located by instrumentation. Installation of a microearthquake network by the Kansas Geological Survey began in the spring of 1977. The three-station network was expanded to six stations in the late summer of 1977. Presently, the network system consists of nine permanent stations and three portable seismographs (Reference 272).

This network is intended to record the seismicity in Kansas not normally detectable without the aid of instrumentation.

Major reliance for historic earthquakes is placed on descriptive reports of the effects of individual earthquakes for purposes of locating the events and assigning a relative damage capability. It should be borne in mind that assigned MMIs describe the effects (on people and structures) of an earthquake at a particular location. By themselves, intensities may or may not be characteristic of the total energy radiated in an earthquake. Individual earthquakes that have occurred in the area and are considered to be relevant to this study for the purpose of either establishing the Safe Shutdown Earthquake (SSE) or illustrating possible tectonic relationships are addressed in the following discussion.

<u>The 1867 Manhattan, Kansas Earthquake</u> - The MMI VII, Manhattan, Kansas, earthquake of April 24, 1867, 39.5°N, 96.7°W (Reference 334), was felt over an area of 300,000 square miles (Reference 85, p. 9). This event was assigned an MMI VII based on reported earthquake effects (Table 2.5-21). The epicentral location is approximately 105 miles northwest of the site (Reference 173). Based on additional accounts for the 1867 event, the Kansas Geological Survey (Reference 85) relocated the April 24, 1867 event to Wamego, Kansas (39.2°N, 96.3°W), which is approximately 75 miles northwest of the site. The MMI at the site based on felt reports was a IV (Table 2.5-25; Figures 2.5-65 and 2.5-67) or a V (Figure 2.5-66). Figures 2.5-65 through 2.5-67 are isoseismal maps for the April 24, 1867 earthquake prepared in Reference 334, 85 and 325, respectively. The isoseismal contours are superimposed on the population figures (by counties) for the eastern portions of the states of Kansas and Nebraska in the year 1867. These figures are based on the U.S. Censuses of 1860 and 1870. The population figures were arrived at using the following formula:

1867 population = 1860 population + 7/10 (1870 population - 1860 population) [2.5-1]

Perhaps the best authority on this earthquake is John D. Parker, late Professor of Natural Science at Lincoln College in Topeka, Kansas. Extensive use has been made of Professor Parker's "Memoranda of the Earthquake of April 24, 1867," (Reference 335) contained in the Kansas Collection of the Kenneth Spencer Research Library in Lawrence, in drawing up the isoseismal map shown on Figure 2.5-66.

Professor Parker was of the opinion that the earthquake occurred somewhere along the Kansas-Colorado border and that two "seismic waves" were propagated eastward from this "epicenter" interfering constructively and destructively across the state of Kansas and eastward into Missouri. He arrived at this conclusion from a study of the arrival times of the "seismic waves" reported from various towns throughout eastern Kansas. This difference in arrival time is readily explained by the fact that in 1867 local clocks could easily be inaccurate by one-half or three-quarters of an hour. Thus, the difference in arrival times is not real. However, latter-day authors still make reference to these "seismic waves" (Reference 42) as ground waves.

The maximum MMI caused by this earthquake was at Manhattan and Louisville, Kansas. The epicenter was probably closer to Louisville where a few chimneys were toppled and horses in the streets were reported to have fallen down. The maximum MMI assigned is a VII. An MMI VII has also been assigned to the Manhattan area (Table 2.5-21). This intensity value is based on a report of a possible 2-foot wave observed on the Kansas River. However, it should be noted that no wave was observed on the Big Blue River which empties into the Kansas River at Manhattan. Although walls in the few stone buildings were reportedly cracked, Professor B. F. Mudger of the State Agricultural College in Manhattan stated in a letter to Professor Parker dated April 30, 1867, "a few stone buildings, with weak walls, were fractured but none fell." It is important to note that the walls of these buildings were weak to begin with. From Professor Mudger'sremarks, we are assured that the intensity could not have been MMI VIII in Manhattan.

Professor Mudger gives probably the most accurate description of the arrival time of the shock:

> I call the whole vibration one shock. The time (duration) of the shock was 10 seconds. At the end of about the third second (of the ten) a more heavy and severe motion was felt, which increased, say 2 seconds, and then diminished.

If the 3-second interval is taken to be the S-P time, (the difference in arrival times between shear and primary waves) the epicenter would be placed between 15 and 25 kilometers (corresponding to hypocentral depths of 20 to 0 kilometers) away from Manhattan.

The Kansas Geological Survey has assigned an MMI of VII-VIII to the Manhattan event and relocated the epicenter to the Wamego area based on a report of possible liquefaction on the floodplain of the Kansas River three miles south of Wamego and strong shaking at the town of Louisville about 10 miles north of that point (References 272; and 85). It has been well documented in the literature that MMIs are greater on alluvium or earthfill sites than those on hard-rock sites at the same epicentral distance (References 186 and 111). In Reference 98 it was recognized that ground motion from the New Madrid events was amplified by river alluvium. In describing the damage of the December 16, 1811 shock, it gives Drake's description of the damage near Cincinnati:

> It [the violent earth motion] seems to have been stronger in the valley of the Ohio than in the adjoining uplands. Many families living in the elevated ridges of Kentucky, not more than 20 miles from the river (the Ohio River), slept during the shock; which can not be said, perhaps, of any family in town.

It appears that this isolated description of an MMI VIII near Wamego may have resulted from amplification of ground vibration on a floodplain rather than a characteristic response from energy released by the 1867 earthquake.

Modified Mercalli Intensities of VII have been assigned to Leavenworth, Kansas; Paola, Kansas; and St. Joseph, Missouri. Reports from these areas included damage to large brick buildings; heavy furniture was moved and damaged; and people found it difficult to stand. (See Table 2.5-21 for complete list of felt reports.)

At Lawrence, Kansas, the 1867 earthquake has been assigned a MMI VI intensity (Table 2.5-21). Several stones were thrown down from the top of a wall of the Unitarian Church in Lawrence. However, Professor Frank H. Snow at the State University at Lawrence describes the condition of the church in a letter to Professor Parker dated May 20, 1867:

> Several stones there (at the church) are so loose and before the 'quake' that a very gentle motion would suffice to send them tumbling to the ground.

Professor Snow also gives an important insight regarding the press reporting of the effects of the earthquake:

> The effects produced were by no means so alarming as a stranger would suppose them to have been, from the accounts of our newspapers.

It appears from these press reports that most of the people who fled outdoors were working in second and third story offices. The fall of plaster was also limited to the second and third floors.

The only mention of the effects of the earthquake near the site was a report in the Kansas Patriot, Burlington, Kansas, which stated:

> The earthquake on Wednesday last was felt at Leavenworth and Lawrence, much more sensibly in those places than in the Neosho Valley.

The earthquake was also felt in Omaha and Fort Kearney, Nebraska as well as in western Missouri. It was reported from along the Mississippi River at Dubuque, Iowa; St. Louis, Missouri; and possibly Cairo, Illinois. In St. Louis, Missouri, most of the reports described damage in upper stories of buildings.

Damage that occurred in Dubuque, Iowa was limited to upper stories since "persons on the ground could hardly detect a shock" (Reference 335). An MMI VI was assigned to Dubuque by DuBois and Wilson (Reference 85, p. 9).

This earthquake may have been felt in Chicago. However, contemporary newspaper accounts state that if it had been felt, it was only recognized as an earthquake after the city had learned from press accounts that there had been an earthquake in eastern Kansas. Coffman and von Hake (Reference 42) reported that the earthquake was felt in Kentucky. Although no account of this report was found, it is conceivable that if the earthquake was felt in Cairo, Illinois, it may have been felt in portions of Kentucky across the Ohio River. Reid (Reference 336) states that this earthquake was also felt in parts of Indiana, but this report has not been verified.

Parker (Reference 208) reported that the earthquake caused an acre of ground 3 miles south of Carthage, Ohio, to sink 10 feet. In his investigations, Reid (Reference 336) acknowledges this reported occurrence, but states specifically that the earthquake was "not felt in Ohio."

The Manhattan, Kansas earthquake of 1867, therefore, appears to have had an epicentral MMI of VII.

<u>The 1877 Eastern Nebraska Earthquakes</u> - The MMI VII eastern Nebraska earthquakes of November 15, 1877 (41 N; 97 W), were felt over an area of 140,000 square miles. The second earthquake was the larger of the two. The earthquake occurred at a distance of more than 200 miles from the site. The site intensity generated by this earthquake was MMI 0-III. A tabulation of felt reports for this earthquake is provided in Table 2.5-22. Figure 2.5-68 shows an isoseismal map (Reference 334) for this earthquake superimposed on the population figures by counties for the eastern portions of the states of Nebraska and Kansas for the year 1877. The population figures were calculated from U.S. Census data using the following formula:

$$\text{1877 population} = \text{1870 population} + 7/10\,(\text{1880 population} - \text{1870 population}) \quad [2.5\text{-}2]$$

There is uncertainty as to the epicenter locations for the two earthquakes. The U.S. Coast and Geodetic Survey (USCGS) has tentatively placed the epicenters at 41 N, 97 W. Because the two earthquakes were only 45 minutes apart and because of uncertainties in local timing of the earthquakes, it is impossible to assess the damage caused by each individual earthquake. Thus, the resulting damage reports are reports of cumulative damages from the two earthquakes. There is some indication that not all towns reporting damage felt both earthquakes; however, this is difficult to determine because of differences in local timing.

As shown on Figure 2.5-68, there are several isolated higher intensity areas near Yankton, South Dakota, and North Platte, Nebraska. It has been suggested by Reference 334 that this may be the result of other earthquakes activated by the major earthquake at 12:30 p.m.

Tectonically, it is not likely that faulting in one area would produce faulting in areas 100 to 200 miles distant. These isolated higher intensity areas are more likely the result of the soil conditions present along the Missouri and Platte River valleys. Furthermore, most of the reports from these areas concerned effects observed in second and third story offices. This is corroborated by the <u>New York Times</u> statement of November 16, 1877:

> Distinct earthquake shocks . . . were plainly felt . . . especially in upper stories of brick and stone buildings.

<u>The 1906 Manhattan, Kansas Earthquakes</u> - The MMI VII Manhattan, Kansas, earthquake of January 7, 1906 (39.2 N; 96.5 W), was felt over an area of 36,000 square miles. The earthquake occurred 85 miles northwest of the site. The site intensity generated by this

earthquake was MMI I-III (Figure 2.5-69). A tabulation of felt reports for this earthquake is presented in Table 2.5-23. Figures 2.5-69, 2.5-70, and 2.5-71 show isoseismal maps for this earthquake by Reference 334 and 85 and Dames and Moore, respectively. DuBois and Wilson indicate that site intensity may have reached MMI IV.

This earthquake is quite similar to the Manhattan (Wamego) earthquake of 1867 in epicentral location and intensity. Both earthquakes were assigned an MMI VII. The main difference between the two earthquakes is the size of the felt area. The felt area of the 1867 earthquake is approximately 8.5 times the felt area of the 1906 earthquake.

The 1935 Tecumseh, Nebraska, Earthquake - The MMI VI Tecumseh, Nebraska, earthquake of March 1, 1935, (40.3° N; 96.2° W) was felt over an area of 50,000 square miles. Two earthquakes occurred within 4 minutes of each other about 145 miles north of the site. The site MMI generated by this earthquake was I-III. A tabulation of felt reports for this earthquake is given in Table 2.5-24. Figures 2.5-72, 2.5-73, and 2.5-74 show isoseismal maps of these earthquakes by Reference 334 and 192, and Dames and Moore, respectively.

The first earthquake was the larger of the two. Seismographs at St. Louis and Florisant, Missouri; Ann Arbor, Michigan; Chicago, Illinois; and Des Moines, Iowa recorded the earthquakes. Lugn (Reference 157) reported that automatic pressure recorders on a water pipeline between Ashland and Lincoln, Nebraska, indicated pressure variations caused by the earthquakes.

Damage was confined to the immediate epicentral area near Tecumseh where chimneys were cracked and a few toppled. Frank Neumann of the USCGS (Reference 192) assigned a maximum intensity of MMI VI to Tecumseh.

Lugn (Reference 157) states in the following that the earthquakes were caused by slippage along the Humboldt fault along the east side of the Nemaha Anticline:

> The writer is in complete agreement with other geologists and seismologists that the tremors were caused by a slight slip along the old fault which delimits the east side of the buried Nemaha mountains.

In addition to the earthquakes discussed above, there were three MMI V earthquakes; one MMI IV earthquake; and one MMI I-III earthquake in 1929 in northeastern Kansas. The MMI V earthquakes resulted in the shaking of houses and the rattling of windows and

dishes in Manhattan and Junction City, Kansas (Reference 108). The felt areas associated with these three MMI V earthquakes are 15,000, 8,000, and 1,000 square miles. The MMI V earthquake of October 21 was barely discernible on the seismograph at Lawrence, Kansas.

Four earthquakes with epicenters outside the state of Kansas were felt in the site vicinity. The MMI X-XII New Madrid earthquakes of 1811-1812 were felt at the site at the MMI V-VI level. These earthquakes occurred approximately 350 miles from the site (Reference 126 and 245).

The MMI VII Bonham, Texas earthquake of 1882 occurred about 240 miles south-southeast of the site. This earthquake was felt over an area of 135,000 square miles. The earthquake rattled windows, moved furniture in Wichita, and rattled windows and caused chandeliers to sway in Leavenworth, Kansas (Reference 183). The site intensity caused by this earthquake is rated as an MMI III- IV. Docekal's (Reference 334) isoseismal map of the earthquake indicates a site intensity of MMI I-III.

The Charleston, Missouri, earthquake of 1895 that had an epicentral MMI VIII generated a site intensity of MMI III (Reference 152).

The El Reno earthquake of 1952, which had an epicentral MMI VII, was felt over an area estimated to vary from 140,000 to 247,000 square miles. The epicenter was 225 miles from the site.

Reports from Iola, Kansas, indicate that an earthquake which occurred in 1952 was felt at the MMI IV level, and Emporia, Kansas, reports indicate that the earthquake was felt at MMI III (Reference 187). The intensity felt at the site was between MMI III and MMI IV levels.

The Catoosa, Oklahoma earthquake of October 30, 1956, which was not felt, has been discussed by Brazee and Cloud (Reference 23), the Bulletin of the Seismological Society of America (Reference 26), Docekal (Reference 334), and Coffman and Van Hake (Reference 42). Docekal and Coffman and Von Hake depend heavily on Brazee and Cloud's (Reference 23) assignment of a maximum MMI VII at the Foster Ranch (just west of Catoosa), where an oil well (Coshow No. 2) was shut down by slippage of strata and the sticking of a drilling tool. However, there is no specific MMI rating associated with the oil well phenomena observed at the Foster Ranch.

This subsurface slippage may have been due to movement along a fault or to a partial collapse and shearing of rock, which is more likely. In either case, oil field operations in the vicinity could have been the triggering force for the earthquake, since the

epicenter lies toward the eastern margin of very large oil fields near Tulsa. Docekal (Reference 334) has also considered the earthquake to be "man-made" and suggested that even the felt area might have been controlled by location of oil pools (as shown by Reference 154, Figure 6-13, p. 200; and Reference 120).

No incidents of fallen chimneys or of significant structural damage at or near the epicenter were reported. At Tulsa, about 10 miles west of Catoosa, one cracked foundation and one instance of cracked plaster (indicating MMI VI effects) occurred. More damage would certainly have been reported in Tulsa (1956 population of 200,000) if this event had been greater than MMI VI.

Examination of contemporary newspaper accounts from communities located near the epicenter of the Catoosa earthquake also indicate an intensity of ground motion much smaller than MMI VII. For example, the Tulsa World stated (Reference 259):

> A search by Tulsa World for something to give photographic evidence was fruitless. Not so much as a broken dish could be located - thus no pictures with this story.

Other newspaper accounts substantiated an MMI of VI or less, including the Tulsa Tribune (Reference 258); Sapula Daily Herald (Reference 225); Claremore-Rogers County News (Reference 40a); Muskogee Daily Phoenix (Reference 190); Perry Daily Journal (Reference 210); Claremore Daily Progress (Reference 406); and the Pawhuska Journal Capital (Reference 209).

It can be concluded that the maximum value of MMI VII assigned to the 1956 Catoosa earthquake is not confirmed by local felt reports. The maximum intensity observed in the epicentral region or at Tulsa was no greater than MMI VI.

The felt area associated with the 1956 earthquake has been estimated as 3,700 square miles by Brazee and Cloud (Reference 23) and 9,500 square miles by Docekal (Reference 334). The average felt area for an MMI VII event in the central United States is over 200,000 square miles (Reference 191). The April 9, 1952 El Reno, Oklahoma earthquake of epicentral MMI VII had a felt area of 140,000 square miles according to Coffman and Von Hake (Reference 42), or 247,000 square miles according to Docekal (Reference 334). A felt area of not more than 9,500 square miles for the 1956 Catoosa earthquake is less than 1/20 of the average felt area expected for an earthquake of MMI VII in the Midwest. The felt area for the Catoosa earthquake corresponds to an intensity of about MMI V (Reference 191).

The magnitude of the 1956 Catoosa earthquake was approximately 4.0 (Reference 337) or 4.2 (Reference 307). This may be contrasted with a magnitude of 5.5 for the El Reno, Oklahoma earthquake of 1952 and the southern Illinois earthquake of November 9, 1968. An event of magnitude 4.0 would normally correspond to an earthquake of epicentral intensity of only MMI V (Reference 191). Therefore, MMI VI is a conservative value for the maximum ground motion associated with the 1956 Catoosa earthquake.

As discussed in USAR Section 2.5.2.6, Reference 199 and 112 indicate that the maximum horizontal acceleration associated with an MMI VII event (such as the November 9, 1968 southern Illinois earthquake) is 0.05g. This level of ground motion is consistent with the damage near the epicenter of the 1968 southern Illinois and 1952 El Reno, Oklahoma earthquakes. The damage caused by the 1956 Catoosa earthquake of MMI VI was much less than that caused by either of the above two earthquakes. Reference 181 has assigned a maximum horizontal acceleration of 0.01g to Midwest earthquakes of MMI VI. A low acceleration value for the 1956 Catoosa earthquake is in agreement with the damage reports from the epicentral region. The maximum ground acceleration associated with the SSE is discussed in USAR Section 2.5.2.6.

In addition to the earthquakes discussed above, there have been several random events not associated with any known structures (USAR Section 2.5.2.2). Within 100 miles of the site, the largest random events have been two MMI V earthquakes near Kansas City in 1931 and 1961, about 80 and 90 miles, respectively, from the site. Throughout the site region (200-mile radius; more than 120,000 square miles), there have been only nine random events of MMI V.

Individual earthquakes that have occurred in the regional area and that are considered relevant for the purpose of either establishing the SSE or for illustrating possible tectonic relationships have been discussed. The following section describes apparent relationships between geologic structures and tectonic activity.

2.5.2.2 Geologic Structures and Tectonic Activity

The site and the regional area are located within the Central Stable Region tectonic province of North America, an area characterized by sedimentary deposits of Paleozoic and Mesozoic ages that have been folded into broad-scale basins and arches. The site lies within a seismically stable portion of this tectonic province; no major faults are known to exist within 15 miles of the plant site. The near-surface bedrock consists of alternating layers of Pennsylvanian age shales, limestones, sandstones, and a few thin coal seams. Below these near-surface deposits, approx-

imately 2,750 feet of Paleozoic sedimentary strata overlie rocks of Precambrian age. The Precambrian rocks consist of an unknown thickness of sedimentary deposits (which may exceed 1,000 feet) resting on a granitic basement complex.

The site area has been submaturely to maturely dissected by the Neosho River and its tributaries to form flat to gently rolling uplands. The tributary valleys contain Quaternary alluvium, which reaches a thickness of approximately 25 feet, and scattered, thin, clayey gravel deposits of Tertiary age cap some of the higher hills. Residual soils, ranging in thickness from 0 to 16 feet, have developed on the Pennsylvanian strata.

The lithology, stratigraphy, structure, and geologic history of the site are discussed in detail in USAR Section 2.5.1.2.

Figure 2.5-75 shows the tectonic structures within the regional area and the locations of earthquake epicenters. These structural features and their tectonic histories are described in USAR Section 2.5.1.1.5. Smaller-scale folds are shown on Figure 2.5-15, summarized in Tables 2.5-1 through 2.5-6, and described in USAR Section 2.5.1.1.5.1.16. Fault distribution in the regional area is shown on Figures 2.5-16 and 2.5-17, summarized in Tables 2.5-8 through 2.5-13, and described in USAR Section 2.5.1.1.5.2.

The most significant tectonic features in the region are the Nemaha Uplift (USAR Section 2.5.1.1.5.1.9) and the Midcontinent Geophysical Anomaly (MGA) (USAR Section 2.5.1.1.5.1.17).

The MGA is a northeast trending gravity and magnetic high extending from Central Kansas northeastward to the Lake Superior region. According to King and Zietz (Reference 136), the MGA is a buried belt of mafic rocks approximately 600 miles in length with an average width of 40 miles (Figures 2.5-7 through 2.5-10). The sequence appears to consist mainly of layered basalt flows and gabbros and is most likely fault-bounded and tilted along the margins.

The individual units of this feature appear to have been offset by east-west trending transform faults. The Kansas portion appears to have been offset to the east just north of the Kansas border (Figure 2.5-10). On the basis of magnetic, gravity, and geologic data, King and Zeitz (Reference 136) postulated that the midcontinent gravity high formed as a result of a Precambrian rift system. They proposed that the location of the rift was controlled by the driving mechanism of the associated plates and that the location of the transform faults was controlled by a pre-Keweenawan (Precambrian) fracture zone. On the basis of the gravity and magnetic data and the assumed densities, King and

Zietz (Reference 136) proposed a model for the Iowa portion of this feature. Their model shows a fault-bordered basin, containing mafic rocks approximately 5 miles thick, that rests on Precambrian basement rocks.

Ocola and Meyer (Reference 202) also examined the midcontinent gravity high (MCGH), also known as the MGA, which they termed the Central North American Rift System (CNARS), on the basis of gravity, seismic, and geophysical data. According to the proposed model (Reference 202, p. 5,185-5,186):

> Differences arrived principally from two factors: First, the determination density through velocity and, second, the bounds placed on permissible models by travel times. The resulting densities are significantly higher than heretofore proposed. The present data support the occurrence, at the core of the MCGH of rock of velocity 6.9 km/sec (density of 3.08 gm/cm^3) imbedded principally in rock of velocity 6.4 km/sec (density of 2.94 gm/cm^3). Thus the new models suggest that the MCGH is the result of the juxtaposition of two basic rock types having a density contrast of 0.14 gm/cm^3 rather than the density contrast of 0.20 gm/cm^3 or greater as previously used for gravity model computation (References 338 and 339), a contrast typical of basic versus acid rock types. The inevitable result of the decreased density contrast is an increase in the anomalous volume (about 40 percent) and the depth to which it extends. This has made previous inferences of a deep, central feeder model (References 340 and 341) more plausible.

The model proposed by Ocola and Meyer is characterized by a high density central core with a minimum thickness of 28 kilometers under the Iowa-Nebraska segment of the midcontinent gravity high (Figure 2.5-13). These authors considered that during the Late Precambrian the midcontinent structure was similar to the present Red Sea Rift.

King and Zietz (Reference 136) and Ocola and Meyer (Reference 202) concentrated mainly on that part of the MGA north of the Kansas state line. King and Zietz (Reference 136) indicated the extreme southern end of this feature to be located near the 38th parallel in Kansas (Figure 2.5-10).

Gravity and magnetic data in Kansas indicate a similar high density core situated in the center of the Kansas section of the midcontinent gravity high west of the axis of the Nemaha Anticline (Figure 2.5-14; Reference 159). Lyons estimated the high density core to be approximately 33 miles in width, but gave no data on

its possible vertical extent. Ocola and Meyer (Reference 202) indicated that echelon segments of the MGA occur in Kansas-Oklahoma and Oklahoma-Texas. Based upon data presented above and in USAR Sections 2.5.1.1.5.1.9, 2.5.1.1.5.1.15, and 2.5.1.1.5.1.17, a cross-section showing the Nemaha Uplift and CNARS is presented on Figure 2.5-76.

It appears, therefore, that following the Penokean Orogeny (1,600 to 1,800 m.y.) and following at least the thermal activity associated with the Mazatzal Orogeny (1,250 to 1,450 m.y.), the crystalline basement of Kansas and possible preexisting structural trends were crosscut by the north-northeast trending CNARS (USAR Sections 2.5.1.1.3.1 and 2.5.1.1.4.1; Reference 88, Plate 2). The CNARS may represent the failed arm of a triple junction, the arm along which crustal plate separation did not occur.

Since the mafic and associated clastic rocks along or adjacent to the MGA are a subsurface continuation of the Keweenawan Series, rifting occurred approximately 1,100 m.y. (Reference 14).

The Nemaha Uplift basement block is located east of and in inferred fault contact with the CNARS (USAR Sections 2.5.1.1.5.1.9 and 2.5.1.1.5.1.17). Initial formation of the Nemaha Uplift appears to have resulted in topographic relief, and this relative elevation of the Nemaha block may be related to formation of the Precambrian rift. Uplift of the Nemaha block and arching of the overlying anticline appear to have occurred in the Early Mississippian Period. Continued uplift of the Nemaha Anticline and initial development of the Abilene Anticline and Irving Syncline occurred during late Mississippian to early Pennsylvanian time. Uplift of the Nemaha and Abilene Anticlines continued in the Late Pennsylvanian through the Permian, resulting in thinning of the Lansing, Shawnee, and Wabaunsee Groups above the crests of those structures. It also caused draping or folding of sediments across the trace of the Humboldt fault zone and faulting along this zone in northern Kansas (USAR Sections 2.5.1.1.5.1.9 and 2.5.1.1.5.1.15). This uplift may have occurred in response to left-lateral wrench faulting in the basement complex along the preexisting Humboldt and parallel fault zones. While the basement blocks were affected by left-lateral wrench faulting, they were also affected by a north-northwest oriented maximum component of horizontal stress resulting from regional compression during the Ouachita Orogeny. This tectonic model, which combines transcurrent faulting and compression (transpression) along the Humboldt and rift system fault zones, would account for uplift of the Nemaha basement block and the formation of many of the major structural elements in the vicinity of the Nemaha Uplift in eastern Kansas and in western Missouri (Figures 2.5-15, 2.5-16, and 2.5-17; Reference 251, p. 2,082, 2,090, 2,099). Structural

elements compatible with such a model would include: N20°-25°E trending faults and folds (Humboldt fault system, Nemaha and Abilene anticlines); north-south to north-northeast trending faults and fractures (Reference 166); and N50°-65°W faults and fractures (Chesapeake fault system and associated folds in Missouri and normal faults cross-cutting the Nemaha Anticline).

The Stockdale Kimberlite and five other ultramafic igneous intrusions occur along the trend of the Abilene Anticline in Riley County. Further north, a carbonatite occurs along the same trend in the subsurface of southern Nebraska (Reference 272, p. 3). The emplacement of these intrusions has been dated as Cretaceous (USAR Section 2.5.1.1.5.1.16). Fractures along which the intrusions were emplaced appear to have opened in response to right-lateral, strike-slip faulting in the basement along a fault or fault zones parallel to the axis of the Abilene Anticline (Reference 38, p. 3-12). This inferred fault or fault zone would be subparallel to the Humboldt fault zone but located toward the west within the CNARS/Salina Basin block (Figure 2.5-76).

If inferences concerning sense of movement along the Humboldt or rift system fault zones are correct, this opposite sense of movement, linked with alkalic to ultramafic intrusions, appears to reflect a reorientation of principle stress axes, a different intraplate-tectonic regime, and a possible reactivation of the fault zone separating the CNARS from the Nemaha Uplift block.

Sbar and Sykes (Reference 342) used focal mechanisms of earthquakes, stress measurements, and geologic observations to describe contemporary stress patterns in the eastern United States. Their results indicate that maximum principle compressive stress is nearly horizontal and trends east to northeast in the area west of the Appalachian Mountains to central North America (Reference 342, Figure 5, p. 1878). The actual stress distribution may be locally complex, but hydrofracturing measurements have also indicated an east to northeast horizontal component of maximum compressive stress in North America (Reference 116, p. 33-36).

The contemporary stress pattern in the site region appears to be quite different from the inferred Late Paleozoic pattern. Faulting along the Humboldt zone or along inferred rift system zones on a scale similar to Late Paleozoic deformation seems highly unlikely.

Historical microseismicity (USAR Section 2.5.2.1) and contemporary microearthquake activity might be caused by the east to northeast trending horizontal compressive stress. Not enough data are available, however, to relate contemporary stress patterns with

seismicity in the site region. However, since there is no evidence that seismicity or tectonic activity has originated at or near the site since the Pennsylvanian, it is not likely that the contemporary regional stress system will trigger tectonic activity at the site.

An empirical correlation which relates seismicity and the presence of mafic intrusives in silicic or felsic basement rocks has been noted in other areas of the central and south-eastern United States (Reference 171). The density contrast between mafic rocks which are the source of the MGA and the silicic Nemaha Uplift block could be the triggering mechanism for earthquakes along the western margin of the Nemaha (USAR Section 2.5.2.3).

The site is located on the northern flank of the Bourbon Arch and the southern flank of the Forest City Basin (Figure 2.5-75). The broad-scale crustal movements which produced these features ended in Late Paleozoic time. Small-scale folds in the site area also formed at this time (USAR Section 2.5.1.2.4.2). Some of these anticlines act as structural traps for oil field reservoirs near the site.

The Bourbon Arch was not an active uplift, but a passive hinge line between the Forest City Basin to the north and the Cherokee Basin to the south during their early stages of development (USAR Section 2.5.1.1.5.1.11). Small faults within 20 miles of the site are related to differential compaction and consolidation of the Pennsylvanian sediments rather than regional tectonics (USAR Section 2.5.1.1.5.2).

The Chesapeake and parallel fault zones are discussed in USAR Section 2.5.1.1.5.2. The Chesapeake Fault can be dated as pre-Pennsylvanian because it is overlain by undeformed Pennsylvanian sandstone. Other northwest trending faults that crosscut the Humboldt fault zone do not appear on structure contour maps of the Lansing Group and must be pre-Upper Pennsylvanian.

Geophysical investigations of the site, which included refraction and surface wave surveys, did not reveal the existence of local tectonic features beneath the site (USAR Section 2.5.4.4).

Rayleigh and Love wave dispersion studies in Eastern Kansas and Western Missouri indicate five layers in the crust (Reference 343). These layers correspond to the Pennsylvanian cyclic sequence, the pre-Pennsylvanian/post-Precambrian sediments, the basement granitic complex, a mafic lower zone, and the mantle. The zones were calculated to have the following parameters:

LAYER	SHEAR WAVE VELOCITY (km/sec)		DEPTH (km)
	P wave	S wave	
Pennsylvanian	2.68	1.55	0 - 0.42
Pre-Pennsylvanian/ Post-Precambrian	5.37	3.10	0.42 - 0.74
Granitic	6.24	3.60	0.74 - 18.6
Mafic	6.67	3.85	18.6 - 37.2
Mantle	8.24	4.76	37.2 - (?)

In compiling information for the transcontinental geophysical survey, Warren (Reference 269) lists two deep seismic refraction lines that were run within 200 miles of the site. One line was located approximately 120 miles south of the site, extending southwestward from Chelsea, Oklahoma. The second line extended eastward from St. Joseph, Missouri, approximately 115 miles northeast of the site. The Chelsea, Oklahoma, line indicated the presence of three layers in the crust below the surface veneer of sedimentary, volcanic, and metamorphic rocks. The upper layer, characterized by a compressional wave velocity of 5.9 km/sec, extended to a depth of 14 kilometers, and was presumed to be of granitic composition. From 14 to 30 kilometers was a zone with a velocity of 6.65 km/sec, and from 30 to 51 kilometers was a zone with an average velocity of 7.2 km/sec. The two deeper layers were assumed to be of a more mafic composition than the upper layer. The Mohorovicic discontinuity, the break between the lower crustal layer and the mantle, was at a depth of 51 kilometers; the upper mantle was characterized by a compressional wave velocity of 8.3 km/sec. The St. Joseph line indicated that surficial material with an average velocity of 5.0 km/sec extended to 2 kilometers. The crust contained three velocity layers. They were 6.1 km/sec from 2 to 12 kilometers, 6.0 km/sec from 12 to 24 kilometers, and 6.7 km/sec from 24 to 42 kilometers. The Mohorovicic discontinuity was indicated at a depth of 42 kilometers and the underlying upper mantle had a velocity of 8.0 km/sec (Reference 269).

Extrapolation of this information suggests a slight north to south increase in compressional wave velocities and crustal thickness. Extrapolation of the data to the site area places the mantle at a depth of approximately 46 kilometers with a velocity of approximately 8.1 km/sec.

Literature searches and personal communications with various geologists and geophysicists confirm that the broad, large-scale features discussed above are the only tectonic features beneath the site.

Other structures within the site region have been described as components of a major feature. Heyl (Reference 115) noted an east-west trending zone of faults and intrusions that approximately follows the 38th parallel from northeastern Virginia to south central Missouri and termed this zone the 38th parallel lineament. The western end of the lineament is the Newburg Fault Zone, which has been described by McCracken (Reference 344). The Newburg Fault Zone is a graben with northwest striking faults, located approximately 215 miles southeast of the plant site.

Heyl's postulation of possible westward extension of the lineament is based on the work of Snyder and Gerdemann (Reference 244). The structures included in this westward extension are the following:

a. The Hazel Green Volcanics, Laclede County, Missouri (number 48 in Table 2.5-11 and on Figure 2.5-16);

b. The Decaturville Structure, Camden County, Missouri (number 47 in Table 2.5-11 and on Figure 2.5-16);

c. The Weaubleau Creek Structure, St. Clair and Hickory counties, Missouri (number 18 in Table 2.5-11 and on Figure 2.5-16); and

d. The Silver City and Rose domes in Woodson and Wilson counties, Kansas (numbers 46 and 47 in Table 2.5-3 and on Figure 2.5-15).

Heyl could find very little evidence in the area of the Silver City and Rose domes to extend the lineament further. He states (pages 890-891):

> The two domes form the west end of the well-defined part the 38th parallel lineament. West of them, toward the Rocky Mountain front, only a few features that suggest the possible extension of the lineament are known: (1) Three oil and gas domes on or near the line between the Silver City Dome and Wichita, Kansas. In these domes drill holes have penetrated metamorphosed Paleozoic rocks containing vesuvianite, garnet, and other metamorphic materials (Reference 345). (2) Zinc deposits similar to those in the Tri-State which have been found at depth (Reference 346) in the northern edge of the Anadarko Basin in southwestern Kansas. (3) An isolated intrusion of alkalic igneous rocks at Two Buttes Dome in southeastern Colorado, which lies along the extension of the lineament. (4) A west trending fault zone about 120 miles long which has been mapped between the Two Buttes area and the Wet Mountains and the Rampart Range of the

Rocky Mountains (Reference 347). (5) Alkalic intrusions and breccia bodies of Cambrian age, many associated thorium and barium veins (Reference 348), and east trending fault zones in the Wet Mountains.

The components of the following portions of the postulated lineament within 200 miles of the site are of the following ages: Hazel Green Volcanics - Cambrian (Reference 244, p. 483); Decaturville structure - post-Silurian (Reference 344); Weaubleau structure - post-Burlington (Mississippian), pre-Cherokee (Pennsylvanian) (Reference 13); Rose Dome and Silver City Dome - 88 to 91 m. y. (Cretaceous) (Reference 285).

The structures comprising the 38th parallel lineament, especially its westward extension, are quite old. No seismicity has been associated with this postulated lineament; therefore, the 38th parallel lineament is not considered to be significant to the site.

Apparent relationships between geologic structures and tectonics have been discussed above. This section has also included discussions of geologically old tectonic structures in the site vicinity. In addition, this section has included discussions of the structure of the earth's crust in the site area and a discussion of the postulated 38th parallel lineament. The following section addresses the question of correlations of earthquake activity with geologic structures or tectonic provinces.

2.5.2.3 Correlation of Earthquake Activity with Geologic Structures or Tectonic Provinces

All of the earthquakes in the regional area occur within the Central Stable Region tectonic province. Most of the significant earthquakes within 200 miles of the site can be associated with the Nemaha Uplift or the adjacent CNARS (USAR Sections 2.5.1.1.5.1.9 and 2.5.1.1.5.1.17). Figures 2.5-64 and 2.5-75 indicate that many of these major earthquakes appear to be associated with the west flank of the Nemaha Anticline. A microearthquake network is currently being operated by the Kansas Geological Survey (USAR Section 2.5.2.1). The survey has reported twelve microearthquakes occurring within or near Kansas borders between December 1, 1977 and the end of September 1978 (Reference 272, p. 42). Several of these minor earthquakes appear to be related to portions of the eastern flank of the Nemaha Anticline and along the discontinuous Humboldt fault zone (Reference 272, Figure 23, p. 42-45; and Reference 249, p. 135). On the basis of this microseismic activity and a reevaluation of felt reports, Reference 85 relocated the epicenter of the 1867 Manhattan earthquake to the vicinity of the trace of Humboldt fault zone

near Wamego, Kansas (USAR Section 2.5.2.1). Two other earthquake epicenters were also relocated to areas along the eastern margin of the Nemaha Anticline (USAR Section 2.5.2.1).

The Nemaha Anticline was a tectonically positive feature from the Early Mississippian to the beginning of the Middle Pennsylvanian, with some deformation continuing into Permian time. This structural arch forms a boundary between the Forest City and Cherokee basins on the east and the Sedgwick and Salina basins on the west. There is evidence for westward dipping reverse faults on the eastern flank of the anticline (Reference 174, p. 182, 221-225). Because there has been no observable surface offset, Merriam (Reference 174, p. 221-225) considers earthquakes along the Nemaha Anticline to result from minor adjustments of deep-seated rocks that may have continued since Permian time. The activity may possibly be related to the westward dipping reverse faults. The deep-seated nature of the foci would place the epicenters to the west of the anticline axis, 80 to 120 miles from the site at the nearest approach.

Seven of the 17 events felt at the site originated on the Nemaha Anticline. The historic seismic activity has been restricted to only a few spots along the 400-mile length of the structure.

This phenomenon of seismic isolation has led Docekal (Reference 334) to examine the geology and tectonics near the Nemaha Anticline and to propose a more complex theory of seismogenesis than that of Merriam (Reference 174). Docekal attributes the seismic activity near the Nemaha Anticline to deep structures and a zone of weakness at the junction of the Precambrian Keweenawan volcanics and Nemaha-type granitic rocks. The model for this type of analysis is similar to that shown on Figures 2.5-14 and 2.5-16. This zone of weakness may be the eastern border fault of the CNARS (Reference 136 and 202). Further discussion of the Nemaha Anticline and the CNARS is presented in USAR Section 2.5.2.2.

Both Docekal (Reference 334) and Merriam (Reference 174) agree that the major seismic activity occurs on the west flank of the Nemaha Anticline. Merriam's work is not necessarily inconsistent with that of Docekal, who had access to more recent geophysical and geologic data. According to Docekal, earthquakes are generated at points west of the axis of the Nemaha Anticline where it is closely associated with a Precambrian, Keweenawan mafic volcanic belt. This region of Keweenawan mafics terminates to the south at about latitude 38.5 N, 75 miles from the site (even though the nearest approach of the east flank of the structural anticline is only 50 miles from the site). This 75-mile approach of the seismogenic region of the anticline is further substantiated by Docekal's study of isoseismal maps. Docekal has

related the distribution and elongation of isoseismal lines to basement structure. Using this method, particular basement structures may be identified as they are outlined by isoseismal line "lobes". These maps show a definite break in basement structure at the southern termination of the mafic sequences. Also, as shown on Docekal's Figure 2-A, maximum intensities experienced along the Nemaha Anticline are projected as lobes of MMI V, MMI VI, and MMI VII along the anticline to the north and south. However, at the area nearest the site, the value is only MMI IV. This indicates seismic inactivity of the Nemaha Uplift at its nearest approach to the site. Docekal states the maximum intensity at the site from any earthquake, except the New Madrid earthquakes, was IV.

As discussed in USAR Section 2.5.2.2, an empirical correlation appears to relate seismicity in parts of the central and southeastern United States with the presence of mafic intrusions in silicic or felsic basement rocks (Reference 171). This seismicity might be related to stress concentrations around these inclusions due to the different mechanical/physical properties of the mafic intrusives and silicic country rock. In Kansas, stress concentrations or density contrasts may be the triggering mechanism for major seismicity along the fault zone contact between the CNARS and the granitic Nemaha block.

In seismically active faults such as the San Andreas in California, lengths of the fault that have neither exhibited earthquakes nor creep are sometimes called "seismicity gaps". Seismicity gaps are regions that have geologic and tectonic environments similar to those of adjacent areas but have not been as active as adjacent areas. Such conditions also occur in some areas in Italy and Iran, where seismic subregions are known to have been alternately active and inactive. Presumably, such regions are postulated to be the loci of future earthquakes that will occur as stress accumulates within these regions.

In the case of the Nemaha Uplift and Humboldt fault zone, no continuous seismogenic structure exists. The mafic volcanics and the proposed Precambrian rift terminate to the northwest of the site and do not continue southward at the nearest approach of the Nemaha Anticline to the site (USAR Section 2.5.2.2 and Figures 2.5-7, 2.5-10, 2.5-13, and 2.5-14). It is the zone of weakness at the junction of the mafic volcanics with the uplift that is seismologically significant. A seismicity gap does not exist to the immediate west of the site on the Nemaha Uplift, because that structure does not appear to be, in itself, a seismogenic structure. However, if microseismicity is associated with the Humboldt fault zone, these minor events may not be related to density contrasts in the basement but to deep-seated adjustments

along preexisting structures in response to contemporary regional stress (USAR Section 2.5.2.2). The small number of earthquakes, 13 (Reference 272) cannot be used to interpret an increase in regional stress along the Humboldt fault zone in the vicinity of the site. No microearthquake epicenters have been located within 50 miles of the site (Reference 272, Figure 23), and the Humboldt fault zone has not experienced movement at its closest approach to the site since pre-Middle Pennsylvanian time (USAR Section 2.5.1.1.5.2).

Some of the moderate earthquakes used by Docekal to delineate the "midcontinent seismic trend" coincide generally with offsets in the Keweenawan mafic belt, which are either inferred from the MGA or predicted by Reference 349. The possible association of earthquakes with offsets in the rift system may indicate that some of the recent seismicity is controlled spatially by preexisting and crosscutting regional Precambrian fracture zones (Reference 272, p. 4).

In northwestern Kansas and southwestern Nebraska, several epicenters of both historic earthquakes and microearthquakes appear to be related to the Central Kansas Uplift and the Chadron and Cambridge Arches in Nebraska. Both micro- and historic seismicity suggest that this structural trend may be experiencing tectonic adjustments (Reference 272).

In addition to earthquakes associated with these structures, there have been a few other small events randomly distributed throughout the area that are not easily correlated with known geologic structures.

The nearest, major, mapped fault to the site is the Chesapeake Fault, 36 miles to the east-southeast. It has been shown in USAR Section 2.5.1.1.5.2 that the last movement of this fault was in pre-Pennsylvanian time; therefore, this fault is not capable as defined in appendix A to 10 CFR 100. A few earthquakes have occurred with epicenters somewhat near the trend of the fault. However, these were quite small events and random chance would place some events near such a long linear feature.

The Bourbon Arch is discussed in USAR Sections 2.5.2.2 and 2.5.1.1.5.1.11. This Arch has not been active since Pennsylvanian time and is not associated with faults. It has no history of seismic activity or earthquake generating potential.

The Cherokee and Forest City basins are primarily Paleozoic sedimentary basins. There are no known faults specifically related to these basins. There have been a few randomly occurring earthquakes with epicenters in these basins, mostly of MMI V or less. These may be related to adjustments at the border flexures of the

basins, although this has not been established. These events must be considered as random with maximum intensities of MMI V.

The most active seismic region in the central United States is the New Madrid seismic zone (Reference 200, p. 22). This area, which is located in the Mississippi Embayment section of the Gulf Coastal Plain tectonic province, is approximately 350 miles east of the site.

No known major faults are located within 15 miles of the site. Minor faulting at the site is confined within the Heumader Shale Member of the Oread Limestone Formation and in the Unnamed Member of the Lawrence Formation. These faults, which appear to be the result of penecontemporaneous deformation, are noncapable as defined in Appendix A to 10 CFR 100 and are discussed further in USAR Section 2.5.1.2.4.1. A fault in Allan County, 15 miles southeast of the site, is a minor offset. Another small offset is reported in Coffey County, 15 miles north of the site. These and other nontectonic structures are discussed in USAR Section 2.5.1.1.5.2 and are not associated with any earthquake activity.

This section has discussed apparent correlations of earthquake activity with geologic structures or tectonic provinces. Major earthquake activity appears to be associated with the inferred fault zone that separates the eastern margin of the CNARS from the Nemaha Uplift. Several triggering mechanisms for these major earthquakes have been discussed. There is no seismic gap along the eastern margin of the Nemaha Uplift, because the Humboldt fault zone is not a continuous seismogenic structure. If microseismicity is associated with the Humboldt fault zone, these minor events may be related to deep-seated adjustments along preexisting structures. The following section elaborates upon these data in a discussion of maximum earthquake potential.

2.5.2.4 Maximum Earthquake Potential

The site is located within the Central Stable Region tectonic province in a gentle basinal area having a low level of seismicity (Figure 2.5-75). Although this concept of the region is adequate when subdividing the general region into a few large divisions, it is an oversimplification and should not be used to evaluate the maximum earthquake potential at a specific site. Seismically, the difference between subregions may be greater than the difference between the Central Stable Region and adjacent large-scale tectonic regions. The Central Stable Region is actually composed of a series of large basins and uplifts that include the Nemaha Uplift to the north and west, the Ouachita Mountain trend to the south, the Ozark Uplift to the east, and a generally featureless area to the northeast that grades into the Mississippi River Arch

and the Illinois Basin. Each of these large features has its own tectonic and seismological history. In evaluating the maximum potential earthquake for the Wolf Creek site, major features that must be considered are generally located within the regional study area (Figure 2.5-75) and include the Nemaha Uplift, the CNARS, the Forest City Basin, and other structures described in USAR Sections 2.5.1.1.5 and 2.5.2.2.

The major zone of seismicity in the region surrounding the site is associated with the Nemaha Uplift and adjacent CNARS (USAR Sections 2.5.1.1.5.1.9, 2.5.1.1.5.1.17, 2.5.2.2, and 2.5.2.3). At least four MMI VII earthquakes have been associated with the Nemaha Uplift (USAR Section 2.5.2.3). These seismic events have occurred at different points along the 400-mile length of the anticline and imply that this structure and related faults localize moderate seismic activity. These data suggest that the Nemaha Uplift/CNARS contact is not a seismogenic structure along its entire length, as is discussed in the previous section.

Since 1860, and perhaps as early as 1845, the population in Kansas has been such that the effects of an MMI VIII (or larger) earthquake along the Nemaha trend would have been reported. The shocks of an MMI VIII earthquake would also have been felt to some degree in western Missouri. No earthquakes were noted in that area as far back as 1825 to 1830. Thus, the time of recorded earthquake activity of events greater than Intensity VII can reasonably be extended to 155 years. Modified Mercalli Intensity VII earthquakes are also not characteristic of the entire Central Stable Region but only of some of its tectonic subdivisions.

The main seismic activity within the site region has been located on the western margin of the Nemaha Uplift along the inferred fault contact with the CNARS (USAR Section 2.5.2.3). The mafic igneous rock within the CNARS presents a marked density contrast when compared to the granitic basement of the Nemaha Uplift (USAR Sections 2.5.2.2 and 2.5.2.3). The contact zone between the mafic and felsic rock types spatially coincides with most of the major seismic activity within the regional area.

The other main location of seismic activity is associated with the intersection of the Nemaha trend with the Ouachita trend. Neither of these trends exhibit marked seismic activity by themselves. It is only at this intersection or where the Nemaha Anticline is in close proximity with the CNARS that major seismic activity occurs. According to Docekal (Reference 334), Nemaha-type events are associated either with the intersection of Precambrian fracture zones and the Nemaha Uplift (Tecumseh event, 1935), fracture zones parallel to the Nemaha trend and adjacent to the CNARS (Manhattan, 1867 and 1906), or the intersection of the

Nemaha trend and the Ouachita-Arbuckle tectonic system (El Reno event, 1952). The Ouachita trend is approximately 200 miles from the site at its closest approach. In addition, microseismic activity appears to be associated with the Humboldt fault zone. Based on data presented in USAR Sections 2.5.2.1, 2.5.2.2, 2.5.2.3 and above, an MMI VII event occurring along the western margin of the Nemaha Uplift at its closest approach to the site (75 miles) appears to be reasonable as a maximum probable earthquake. Such an event would be approximated by the Manhattan (Wamego) earthquake of 1867, which produced site intensities of IV (USAR Section 2.5.2.1). A more conservative approach by the Kansas Geological Survey indicates that the site intensity produced by the 1867 earthquake was no more than MMI V (USAR Section 2.5.2.1). Two different estimates for the maximum geologically credible earthquake appear to have approximately equal degrees of conservatism. One approach is to move this maximum probable event of an MMI VII to the nearest approach of the Nemaha Uplift (Humboldt fault zone) to the site, a distance of 50 miles. An alternative approach is to postulate an event larger than ever definitively felt, an MMI VIII earthquake, at the nearest approach of Docekal's seismogenic region, or the inferred fault contact between the Nemaha Uplift and the CNARS, a distance of 75 miles from the site.

Attenuation curves have been developed for the four major earthquakes along the Nemaha Uplift: Manhattan (Wamego), 1867 (Figure 2.5-77); Eastern Nebraska, 1877 (Figure 2.5-78); Manhattan, 1906 (Figure 2.5-79); Tecumseh, 1935 (Figure 2.5-80). These earthquakes would be similar to the maximum probable event postulated nearest the site, since they appear to be related to the contact zone between the CNARS and the Nemaha Uplift (USAR Section 2.5.2.3). Although an MMI VIII event can be postulated as geologically possible along Docekal's seismogenic region, it is not probable. As stated in USAR Section 2.5.2.1, a report of an MMI VIII for the 1867 Manhattan event has been attributed to the fact that flood-plain alluvium tends to amplify vibration.

If an MMI VIII earthquake were to occur, it might occur only in areas susceptible to such motion (see above), and the resultant energy would not propagate far from the epicenter. This is substantiated by the fact that MMI VII values for most of the Nemaha-type events were propagated only for short distances. The 1906 MMI VII Manhattan earthquake was probably not felt at the site, which is only 85 miles away (Reference 334), although reported site intensities vary from I to IV (USAR Section 2.5.2.1).

The attenuation curves referred to above (Figures 2.5-77 through 2.5-80) were constructed along the two semimajor and semiminor axes of the relevant isoseismal maps (Figures 2.5-65 through 2.5-

74). These curves have been used to determine ground motion at the site for the proposed maximum earthquakes. Therefore, by using the first method for the maximum earthquake (MMI VII at 50 miles), the site intensities based on the attenuations of the four historic shocks above would be V, IV, IV, and IV, respectively. For the second method (MMI VIII at 75 miles), the site intensities would be VI, IV, IV, and V, respectively. The maximum site intensity from either of these two methods is MMI VI.

As an exercise, an extremely conservative approach was examined by postulating an MMI VIII event at the nearest approach of any part of the Nemaha Uplift, the Humboldt fault zone 50 miles west of the site. Site intensities would be VI, V, V, V, respectively, based on the attenuation curves shown on Figures 2.5-77 through 2.5-80. With this ultra-conservative postulation, none of the four attenuations exceeds the design ground motion.

Several general relationships for the attenuation of MMIs with distance have been derived for earthquakes in the central United States (defined as the region east of the Rocky Mountains and west of the Appalachians). Gupta and Nuttli (Reference 103) derived the following equation describing this type of relationship:

$$I(R) = I_o + 3.7 - 0.0011\,R - 2.7\log R \quad (\text{for } R>20\text{ km}) \qquad [2.5\text{-}3]$$

where:

I(R) = The site intensity at a distance of R kilometers from an earthquake of epicentral intensity I_o .

Gupta (Reference 102) refined the above relationship by measuring the areas occupied by isoseismals of 10 earthquakes in the central United States for various intensities and by applying the least squares method. The following attenuation relationship was obtained:

$$I(R) = I_o + 2.35 - 0.00316\,R - 1.79\log R \quad (\text{for } R>20\text{km}) \qquad [2.5\text{-}4]$$

where:

I(R) = The site intensity at a distance of R kilometers from an earthquake of epicentral intensity I_o .

Nuttli and Herrmann (Reference 200) further modified the relationship for earthquakes in the central United States and obtained the following equation:

$$I_{mm} = 3.1 + I_o - 2.46 \log_{10} R \text{ (for R>20 km)} \quad [2.5\text{-}5]$$

where:

I_{MM} = the site intensity at a distance R kilometers from a source with maximum intensity I_o .

These three attenuation relationships were derived from data measured on alluvium in the Mississippi Embayment. Unconsolidated soils can increase ground displacement, wave amplification, particle velocity, ground acceleration, and, therefore, earthquake intensity. Because the site is located on bedrock, attenuated intensities derived from any of the three relationships are higher than would be experienced. In spite of the amplification effect and assuming a maximum earthquake of epicentral MMI VII at a distance of 50 miles from the site, the calculated site intensity values are V-VI (5.4-5.7). Similarly, if one considers a maximum earthquake of MMI VIII at a distance of 75 miles from the site, the site intensity value becomes VI. Therefore, the maximum site intensity value as a result of Nemaha-type events is VI, the same as obtained above by other methods. To be even more conservative, a postulated MMI VIII event, 50 miles from the site, would attenuate to a site MMI of VI (6.4), which is also well within the recommended design acceleration for the Safe Shutdown Earthquake (Figure 2.5-81).

An MMI of VI would also bracket ground motion from an MMI XI-XII New Madrid-type event (Reference 245) or any local random events (USAR Section 2.5.2.1 and below).

The NRC staff, in a separate analysis, considered the possibility that earthquakes with intensities greater than MMI VIII could occur along the Nemaha Uplift (Reference 265, p. 2-20). However, if earthquakes of intensity MMI X had been occurring, some geological evidence of recent movement would have been observed. Since no such evidence is known, the NRC Staff decided that a conservative upper bound for earthquakes associated with the Nemaha Uplift would be less than MMI X. If an earthquake with an MMI less than X were to occur along the Nemaha at its closest approach to the site (50 miles west), the attenuation of this conservative, upper bound earthquake would result in a site intensity no greater than MMI VII (Reference 265, p. 2-20).

No studies have been done relating the length of a geological structure such as an anticline or uplift to earthquakes that may be produced along such a structure. There is no continuous fault along the Nemaha Anticline. The faults that exist are discontinuous (USAR Section 2.5.1.1.5). Several authors have found relationships between the length of fault rupture and the

magnitude of the earthquake causing the rupture, but these relationships are approximate at best and have been analyzed only for tectonic areas where surface faulting occurs. They are not accepted for the nonsurface faulting east of the Rocky Mountains.

Total fault length has been used by Housner (Reference 117) to determine the maximum earthquake magnitude. Greensfelder (Reference 101) based his analysis on Bonilla (Reference 18) and related maximum earthquake magnitude to the length of fault rupture as a means of determining the energy release. Almost all of the faults used by Bonilla and all of those studied by Housner were strike-slip faults, mostly in California. Wyss (Reference 280) noted that surface rupture length does not necessarily approximate the source geometry of an earthquake and suggested that estimates of expected magnitude based on fault rupture area would be more reliable. At the present time, none of these estimating methods can be applied to the Humboldt fault zone or faults related to the Nemaha Uplift and the CNARS.

In summary, all events of MMI VII within 400 to 500 miles of the site can be related to known structures or seismogenic regions. There are no capable structures near the site, and the random events in the study region of the site (200-mile radius) have intensities no greater than V, although a maximum random event of VI based on the 1956 Catoosa event (USAR Section 2.5.2.1) is still within the limits of the design earthquakes. The NRC staff also chose an earthquake similar to the 1956 Catoosa event as the maximum random earthquake. However, the NRC Staff felt that an MMI VII would be an appropriate value for the random earthquake that could occur at the site (Reference 265, p. 2-20).

The site is located in a stable portion of Kansas that has experienced only minor earthquake activity of relatively low intensity. The return periods for various horizontal accelerations have been calculated according to the procedures of Cornell (Reference 50) using the attenuation relationships developed by Donovan (Reference 81) and the central U.S. magnitude-intensity relations proposed by Nuttli (Reference 199).

This method uses historical earthquakes that are placed into a three-dimensional model of the region. The locations are analyzed by spherical trigonometry and a least-squares fit is made into the Richter frequency-magnitude equation. The return periods for areal and linear seismogenic sources at specified distances from the point of interest are calculated. The recurrence interval is evaluated using both a Bayesian and Poisson probabilistic approach. Earthquakes that have occurred within a 200-mile radius of the site and along the entire length of the Nemaha Anticline and the New Madrid series of 1811-1812 have been used in deriving the following:

HORIZONTAL ACCELERATION (a, as percent gravity)	RETURN PERIOD (years)
0.02g	100
0.03g	300
0.04g	800
0.05g	2,000
0.075g	20,000
0.10g	4,000,000

The method described above has been used successfully for a variety of problems. For completeness, more conventional recurrence relationships are also provided below.

The area between latitudes, 35°N and 41°N, and longitudes, 92°W and 100°W, was selected for a study of intensity-recurrence relationships. This region covers epicenters within a distance of at least 200 miles from the site and has an area of about 180,000 square miles (Figure 2.5-75).

Nuttli (Reference 199) examined the magnitude-recurrence relation for the central Mississippi River Valley seismic region for the interval 1833 through 1972. As expected, the earthquake data set was found to be incomplete for the interval, 1833 to 1972, especially for the smaller events. Applying a test described by Stepp (Reference 250), the available earthquake data for the past 100 years appear to be complete for events of approximately body wave magnitude, m_b, 4.1 (corresponding to maximum intensity of about MMI V) and larger. While examining seismicity of the southeastern United States, Bollinger (Reference 17) arrived at a similar conclusion regarding the reporting of MMI V events over the last 100 years. Therefore, it may be assumed that all or nearly all events of MMI V and greater have also been included in Table 2.5-19 for the interval, 1873 to 1981.

The region around the site may be divided into two distinct zones on the basis of their vastly different seismic histories. Most epicenters of large and small earthquakes lie along the Nemaha trend, a zone about 50 to 60 miles in width and located about 50 miles west of the site. Within this area, the seismic zone (called Region I) has an area of about 30,000 square miles. The remaining zone (called Region II) has much lower seismic activity and an area of about 150,000 square miles.

The distribution of seismic events of MMI V or larger during the interval, 1873 to 1981, for Regions I and II (as obtained from Table 2.5-19) is as follows:

MAXIMUM MMI (I_o)	NUMBER OF EVENTS IN REGION I	NUMBER OF EVENTS IN REGION II	TOTAL
VII	3	2	5
VI - VII	0	1	1
VI	4	1	5
V - VI	2	3	5
V	6	9	15
IV - V	1	1	2

It should be noted that one MMI VII event which was included in Region II is not a random event. This event, the 1882 western Arkansas (Bonham, Texas) event, occurred approximately 240 miles south of the site along the Ouachita trend. It was included for the sake of completeness in Region II, because it was felt at the site and did not occur along the Nemaha trend. With the exception of this event, there have been no events in Region II definitively greater than MMI VI. In order to present a conservative analysis the 1956 Catoosa, Oklahoma earthquake has been included as an MMI VI-VII rather than an MMI VI.

A least-squares, straight-line fit has been applied to an equation of the following form:

$$\log N = a - b\, I \qquad [2.5\text{-}6]$$

where:

N = The number of events per year of MMI I and greater; a and b are constants.

Therefore,

$$\log N = 0.963 - 0.357\, I \text{ (for Region I)}$$

and

$$\log N = 1.211 - 0.410\, I \text{ (for Region II)}$$

where:

N = The number of events per year within the areas of the two seismic regions.

It can be seen from the attenuation curves on Figures 2.5-77 through 2.5-80 that the average MMI within a radius, R, of 10 miles from the epicenter is the same as the epicentral intensity, which can be expressed in the following:

$$I_{site} = I_{epicenter} \text{ for } R \leq 10 \text{ miles} \qquad [2.5\text{-}7]$$

It may be noted that this relationship has also been obtained by Cornell and Merz (Reference 51) in their study of northeastern earthquakes near Boston.

Considering the number of events, n, per year within a radius of 10 miles, the above equations provide the following results for various MMI values:

I_o	n (Region I)	n (Region II)
I	4.2×10^{-2}	$1 3 \times 10^{-2}$
II	1.9×10^{-2}	5.2×10^{-3}
III	8.2×10^{-3}	2.0×10^{-3}
IV	3.6×10^{-3}	7.8×10^{-4}
V	1.6×10^{-3}	3.0×10^{-4}
VI	6.9×10^{-4}	1.2×10^{-4}
VII	3.0×10^{-4}	4.6×10^{-5}
VIII	1.3×10^{-4}	1.8×10^{-5}
IX	5.9×10^{-5}	6.9×10^{-6}

These results demonstrate that for very small intensity earthquakes, the number of events per unit area per unit time in the Nemaha Trend region (Region I) is only slightly greater than that in Region II. For large intensity events, Region I shows many more earthquakes than Region II.

Therefore, the maximum credible earthquake, or maximum earthquake, to affect the site is postulated as an event considerably larger than that which has occurred historically (10 to 15 times the energy release of the largest historical earthquake). This earthquake may be defined as an MMI VIII event some 75 miles from the site, the nearest approach of Docekal's seismogenic area associated with the location of mafic intrusives in the CNARS or at the probable location of events on Merriam's proposed westward dipping Nemaha reverse faults. Alternately, this earthquake may be defined as an MMI VII event occurring 50 miles from the site at the nearest approach of the Nemaha Uplift (Humboldt fault zone). As discussed in USAR Section 2.5.2.3 and in this section, the whole length of the Nemaha Uplift cannot be considered as a major seismogenic structure. The postulation of an MMI VIII event on the eastern margin of the Nemaha Uplift 50 miles from the site introduces an appropriate degree of conservatism by selection of an intensity that is much greater than any historic event.

An MMI VII event occurring along the western margin of the Nemaha Uplift at its closest approach to the site (75 miles) appears to be reasonable as a maximum probably earthquake. Such an event would be approximated by the Manhattan, Kansas earthquake of 1867 that produced site intensities of IV to V. Two estimates for the maximum geologically credible earthquake appear to be equally conservative. One approach is to postulate an MMI VII event along the Humboldt fault zone, 50 miles from the site. The other approach would postulate an MMI VIII approach along the western margin of the Nemaha Uplift. An even more conservative approach would postulate the occurrence of an MMI VIII event along the Humboldt fault zone. The NRC Staff has determined that a conservative upper bound for earthquakes associated with the Nemaha Uplift would be less than MMI X. Such an earthquake occurring 50 miles from the site would result in a site intensity no greater than MMI VII (Reference 265, p. 2-20). All of these postulated earthquakes would attenuate to site intensities within the recommended design acceleration for the SSE.

2.5.2.5 Seismic Wave Transmission Characteristics of the Site

Material properties for each stratum under the site and the methodology used to ascertain these properties are described in the sections listed in the following. Soil properties and their classification are described in USAR Section 2.5.4.1. Bulk densities and shear modulus and its variation with strain levels are described in 2.5.4.2. Seismic compressional and shear velocities are described in USAR Section 2.5.4.4. Water table elevation and its variation for each stratum is described in USAR Section 2.4.13.2. The methodology used to determine these material properties can be found in USAR Section 2.5.4.10.

The site lies at least 300 miles from the New Madrid seismotectonic area, defined as Region I by Nuttli (Reference 198, Figure 5). According to Nuttli (Reference 198), a New Madrid-type event will have an epicentral intensity of XI (body wave magnitude (m_b) = 7.2) and will generate site accelerations (for hard rock) of 0.005, 0.021, and 0.012 times the acceleration of gravity for surface waves having periods of 0.33, 1.0, and 3.3 seconds, respectively. Data for sedimentary rocks and conglomerates (Reference 98) suggest that the predominant period of maximum acceleration would be approximately 1.4 seconds for an epicentral distance of 300 miles.

Assuming an earthquake of magnitude, m_b = 7.5, the maximum site acceleration in rock, based on the studies of Schnabel and Seed (Reference 226) or Seed and others (Reference 231), is less than 0.03g at an epicentral distance of 300 miles. A conservative extrapolation of the m_b = 8 attenuation curves. (Reference 231,

Figure 10) employs the following:

$$A = - 0.004 + (14.39/R) \qquad [2.5\text{-}8]$$

where:

A = The site acceleration expressed as a fraction of gravitational acceleration; and

R = The epicentral distance in kilometers.

This extrapolation results in an acceleration value of less than 0.03g at a distance of 300 miles (483 kilometers). If an amplification factor of 1.5 (USAR Section 2.5.2.6; Reference 198, p. 37) is applied to bring the rock acceleration value to the foundation rock units, then a conservative value of peak acceleration at the site due to a New Madrid-type event may be taken as 0.045g. This acceleration is less than that assumed for the site OBE (USAR Section 2.5.2.7).

The effects of low frequency, long duration, ground motion resulting from an occurrence of a New Madrid-type event have been evaluated in order to ensure the conservatism of the SSE response spectra (Figure 2.5-82). This evaluation was performed using the following approach:

a. The horizontal accelerograms of two historical earthquakes having a long time duration and with predominant energy in the period range of 1 to 3 seconds were selected. These accelerograms were scaled to a peak acceleration of 0.045g for periods of about 0.01 seconds and then used to compute model response spectra;

b. The model response spectra of the scaled accelerograms were compared to the horizontal SSE response spectra (Figure 2.5-82) prepared in accordance with Regulatory Guide 1.60;

c. The SSE response spectra (Figure 2.5-82) were compared with the seismic design recommendations for the central United States, provided by Nuttli (Reference 198).

The accelerograms chosen for evaluation were those from the 1949 Olympia, Washington earthquake, and the 1968 Tokachioki, Japan earthquake. They are considered to possess seismic characteristics that approximate the low frequency, long duration site ground motion that would be generated by an earthquake of MMI XI postulated to occur at the western boundary of the New Madrid seismotectonic area about 300 miles from the site.

Murphy and Ulrich (Reference 188) have described the record of the Olympia, Washington earthquake recorded at Seattle, about 40 miles from the epicenter. A magnitude m_b = 7.1 has been assigned to this event. Its duration in Seattle was less than 70 seconds. The Tokachioki, Japan, earthquake is considered to be even more representative of the postulated New Madrid earthquakes because of its size and long duration This earthquake had a magnitude m_s = 7.9 and a duration of about 120 seconds at the recording station (Hachinohe Harbor), 120 miles from the epicenter. The predominant energy was in the period range of 1 to 3 seconds.

When scaled to a peak acceleration of 0.045g, the computed model response spectra for both accelerograms fall within the entire SSE response spectra (Figure 2.5-82). Therefore, it is concluded that the effect of earthquake duration and frequency response between 0.3 and 3 Hz have been conservatively incorporated into the site SSE response spectra.

Furthermore, the SSE response spectra (Figure 2.5-82) envelopes the ground motion spectra proposed by Nuttli (Reference 198) in the period range of 1 to 3 seconds. A ground motion response spectra curve for Nuttli's Region I at an epicentral distance of 300 miles consists of the following three points:

a. At period T = 3.3 seconds, the resultant displacement = 2.7 centimeters;

b. At period T = 1.0 seconds, the resultant velocity = 3.4 cm/sec; and

c. At period T = 0.33.seconds, the resultant acceleration = 0.005g.

The resultant or total ground motion values proposed by Nuttli can be resolved into horizontal and vertical components as shown by Mohraz, Hall, and Newmark (Reference 182). Since the magnitude of either component is less than the resultant, the comparison of horizontal component spectral values derived from Regulatory Guide 1.60 with those for total ground motion is conservative.

A comparison of the SSE and the scaled response spectra, as well as Nuttli's proposed spectra is shown in Figures 2.5-85a through 2.5-85c. The 1949 Seattle, Washington and 1968 Hachinohe Harbor Tokachioki, Japan earthquake records, used in the scaled response spectra, were obtained from published sources (Washington response spectra from the Reference 33, and Japan response spectra from Reference 207). For each, the envelope of both 5% damped horizontal response spectra components was determined and then scaled to a peak ground acceleration of 0.045 g and drawn using Figure 2.5-82 as a base (Figures 2.5-85a and 2.5-85b). The SSE response spectra envelopes the response spectra for each earthquake.

Nuttli's proposed spectra does not exceed the SSE curve of Figure 2.5-82 (Figure 2.5-85c).

The above values may be compared with the corresponding values computed in accordance with Regulatory Guide 1.60:

a. Displacement = 11.0 centimeters for T equal to or greater than 4 seconds;

b. Velocity = 0.6 to 17.1 cm/sec for T = 0.03 to 4 seconds;

c. Acceleration = 0.12g for T less than or equal to 0.03 second.

Therefore, based on an evaluation of the two historical acceleration records and an evaluation of the work of Nuttli (Reference 198), the SSE response spectra for the Wolf Creek site are considered to be conservative and adequate to take into account the effects of low frequency and long duration ground motion resulting from an occurrence of a New Madrid-type event.

2.5.2.6 Safe Shutdown Earthquake

Based on the data presented in USAR Section 2.5.1.1.5 and the analysis presented in USAR Section 2.5.2.4, the Safe Shutdown Earthquake (SSE) is conservatively defined as an MMI VIII earthquake with an epicenter on the western flank of the Nemaha Uplift adjacent to the southern limit of the CNARS (Reference 334) or to the seismogenic portion of the westward dipping reverse faults (Reference 174). The epicenter of such an event could not occur any closer than 75 miles from the site. This event would generate a maximum ground motion of MMI VI at the site. However, recent work by the Kansas Geological Survey suggests that portions of the Humboldt fault zone along the eastern flank of the Nemaha Uplift are seismogenic (Reference 85; and 249 and 272). The

epicenter of such an event could not occur any closer than 50 miles from the site. At that distance, an MMI VII or VIII event would generate a maximum ground motion of MMI VI (6.4) at the site (USAR Section 2.5.2.4).

The maximum horizontal ground motion at the site resulting from the SSE would be about 0.02 to 0.08 times the acceleration of gravity (g) for average foundation conditions (Figure 2.5-81). To be consistent with conservative design bases, non-power block safety-related structures, systems, and related components have been designed for safe shutdown at a horizontal acceleration of 0.12g. However, a seismic evaluation of these structures, systems and components using the Lawrence Livermore Laboratories spectrum is contained in Appendix 3C. This spectrum is enveloped by a Regulatory Guide 1.60 spectrum anchored at 0.15g for structural components founded on bedrock. Power block safety-related structures, systems, and related components have been designed for a safe shutdown at a horizontal acceleration of 0.2g.

Investigations have attempted to establish relationships between the epicentral intensity and acceleration of earthquakes (References 193, 52, 257, 196, 141, 102, 103, 201, 186 and 200). These investigations developed acceleration/ MMI relationships in an attempt to further evaluate the correlation between instrumentally recorded earthquakes and reported epicentral intensities (see Figure 2.5-81). Nuttli and Herrmann (Reference 200) used a body wave magnitude/acceleration relationship, instead of MMI. However, MMI can be related to body wave magnitude as shown in the following equation:

$$I_o = 2m_b - 3.5 \text{ (Reference 200)} \qquad [2.5\text{-}9]$$

These empirical relationships (see Figure 2.5-81) between intensity and acceleration can be used to assess the ground motion of an earthquake occurring at the site. One of the earliest relationships is presented by Neumann (Reference 193). He relates acceleration (a) to MMI (I_o) in the following equation:

$$\log a = 0.308\ I_o + 0.041 \qquad [2.5\text{-}10]$$

Application of the equation is restricted to an affected area with an epicentral distance of 25 kilometers.

Coulter, Waldron, and Devine (Reference 52) plotted accelerations against MMI in order to further evaluate the correlation between instrumentally recorded earthquakes and reported epicentral intensities. These curves represent documented strong motion records and their corresponding intensity ratings for various

geologic settings. In addition to the empirical data, Coulter, Waldron, and Devine (Reference 52) assimilated the work of others, Barosh (Reference 9), Hershberger (Reference 156), Gutenberg and Richter (Reference 104), Medveden, Sponheuer, and Karnek (Reference 172), and Peterschmitt (Reference 211), in their recommended curves (Figure 2.5-81).

The intensity-acceleration relationships developed by Coulter, Waldron, and Devine (Reference 52) are based on data from West Coast records (Reference 294). For regions east of the Rocky Mountains, one should not use empirical relations derived from earthquakes within the western states (Reference 196). Detailed studies of attenuation characteristics of earthquakes in the central United States were carried out by Nuttli (Reference 196 and 197). Calculations of acceleration yielded a conservative value for horizontal acceleration of 0.05g in the epicentral region of an MMI VII earthquake, such as the southern Illinois earthquake of 1968 (Reference 306). This value is in conformity with the damage observed in the 1968 earthquake (Nuttli, 1974; written communication). Similar calculations for an MMI VI earthquake indicate a horizontal acceleration of only 0.01g (Reference 181).

Until recently, the most complete intensity-acceleration correlation was that of Trifunac and Brady (Reference 257), which is based on arithmetic averages of accelerations from 187 accelerograms of 57 western United States earthquakes:

$$\log a = 0.30\ I + 0.014 \qquad [2.5\text{-}11]$$

where:

a = Peak horizontal acceleration (cm/sec^2); and

I = Local Modified Mercalli Intensity.

A more recent study was carried out by the Computer Sciences Corporation (CSC) for the NRC (Reference 186) with data measured from almost 1,500 strong motion accelerograms. Computer Sciences Corporation found that Trifunac and Brady's data more closely conform to a log-normal distribution and that logarithmic means of accelerations would be statistically more appropriate for the intensity-acceleration correlation.

A least-squares fit to the logarithmic means of Trifunac and Brady's accelerations for MMI V-VIII yields the following equation:

$$\log a = 0.25\ I + 0.23 \qquad [2.5\text{-}12]$$

The above relationship is almost identical to CSC's best correlation of peak horizontal ground acceleration and MMI from their worldwide sample:

$$\log a = 0.24\ I + 0.26 \qquad [2.5.13]$$

Computer Sciences Corporation (Reference 186) found a general dependence of acceleration on epicentral intensity (I_O), site intensity (I), and epicentral distance (R). Computer Sciences Corporation developed a correlation equation based on 405 strong motion observations from 145 western Unites States earthquakes relating peak horizontal acceleration to local intensity (I), epicentral intensity (I_O), and epicentral distance (R) in kilometers.

$$\log\ a_H = 0.83 + 0.17\ I + 0.07\ I_o - 0.45 \log R \quad [2.5\text{-}14]$$

Assuming this relation holds for the central United States it can be combined with the equation below (Reference 102) which shows the spatial attenuation of intensity in the central United States:

$$I = I_o + 2.35 - 0.00316\ R - 1.79 \log R \qquad [2.5\text{-}15]$$

to yield

$$\log a_H = 0.24\ I_o + 1.23 - 0.00054\ R - 0.75 \log R. \quad [2.5\text{-}16]$$

A graphic representation of these relationships indicates that the maximum horizontal ground motion at the site resulting from the SSE would be approximately 0.02 to 0.08 times the acceleration of gravity for average foundation conditions (Figure 2.5-81).

Nuttli and Herrmann (Reference 350) recently surveyed earthquakes within the central United States in order to establish an acceleration-body wave magnitude relationship for the midcontinent. Their recommended equation for maximum horizontal acceleration on saturated alluvial soils in the Mississippi Embayment is as follows:

$$\log a_H = 0.84 + 0.52\ m_b - 1.02 \log R \text{ (for } R \geq 15 \text{ km)} \quad [2.5\text{-}17]$$

where:

m_b = Body wave magnitude.

Body wave magnitude is related to MMI by Equation 2.5-9. This relationship should be used with caution outside the Mississippi Embayment since loose, nonrigid surface soils like those in the Embayment region generally amplify earthquake-induced ground displacement and cause the local intensity to increase. Similar references to this amplification effect are common in seismological literature. An empirical approach indicated that unconsolidated soils can increase ground displacements and wave amplification by a factor of 4 to 5, particle velocities by a factor of 2 to 3, and ground acceleration by about 1 to 1.5 (Reference 196).

If we assume a worse case, an MMI VIII earthquake along the Humboldt fault zone at its closest approach to the site, and if we use the conservative attenuation relationship developed by Nuttli and Herrmann (Reference 200) for saturated alluvial soils in the Mississippi Embayment (therefore, not relevant to eastern Kansas), horizontal acceleration at the site would be only 0.078g. Therefore, the SSE of 0.12g is extremely conservative and probably exceeds the sustained acceleration value which would be associated with an MMI VII or VIII earthquake occurring near the site. However a seismic evaluation of Wolf Creek Generating Station structures utilizing the Lawrence Livermore Laboratories spectrum is contained in Appendix 3C. This spectrum is enveloped by a Regulatory Guide 1.60 spectrum anchored at 0.15g.

The SSE of 0.12g also includes an estimate of any possible earthquake wave amplification effect caused by cyclothemic layers and surficial material. The cyclothemic layers will have little or no effect as the typical shear wave velocities for unweathered shale layers is 3,500 fps or greater with a Poisson's ratio of 0.32. The limestones have a typical shear wave velocity of 5,000 fps or greater with a Poisson's ratio of 0.31.

Magnitudes for the maximum random earthquake near the site and the maximum event associated with the Nemaha Uplift were determined using equation 2.5-9 on page 2.5-150 (Reference 200). These two magnitudes are (a) for the maximum random earthquake using epicentral intensity of MMI VII, m_b = 5.25 and (b) the maximum event associated with the Nemaha Uplift using epicentral intensity of MMI VIII, m_b= 5.75.

Attenuation of ground motions is a still-evolving subject, especially for the Central United States of attenuation equations. Accordingly, Table 2.5-10a presents peak ground accelerations calculated according to best available recent attenuation equations. Examination of this table indicates that for (a) the maximum random earthquake near the site a conservative value of peak ground acceleration would be 0.10 g. The table indicates two

distance measures, R=17.7 and R=25 kilometers. R=17.7 represents a mean radius for a circle of 25 kilometer radius (i.e., 17.7 kilometers divides a 25-kilometer radius circle into a smaller circle and an annulus of equal areas). For item (b), the maximum event associated with the Nemaha Uplift Table 2.5-10a indicates that a conservative value would be an acceleration of 0.05 g.

A recent study (Reference 146) has presented mean and 84 percentile 5% damped response spectra determined from 15 accelerograms recorded on rock sites. These spectra were sorted into those with M_L between 4.8 and 5.8 (i.e., central M_L approximately equal to 5.3) and those with M_L between 5.3 and 6.3 (i.e., M_L = 5.8). In this range, m_b and M_L are substantially equivalent. The former, with M_L=5.3, is appropriate for the maximum random event, if scaled to a PGA = 0.10 g. This is presented in Figure 2.5-85d, together with the Wolf Creek 5% damped SSE spectra. This figure indicates that the mean spectra is everywhere less than the SSE spectra, while the 84 percentile is equal or less than the SSE everywhere except for a small region from about 0.07 to 0.10-second natural period.

Similarly, it is seen on Figure 2.5-85e, with M_L = 5.8 appropriate for the maximum event associated with the Nemaha Uplift when scaled to 0.05 g, that both mean and 84 percentile are everywhere less than the comparable 5% damped SSE spectra.

In summary then:

(a) For maximum random event:

m_b = 5.25
PGA = 0.10 g

Mean response spectra everywhere conservative

84 percentile response spectra everywhere conservative except 0.07 to 0.10 seconds.

(b) For maximum event associated with Nemaha Uplift:

m_b = 5.75
PGA = 0.05 g

Mean and 84 percentile response spectra everywhere conservative

Studies have been conducted to determine the effect of the alternating Pennsylvanian cyclothems on possible spectral amplification of ground motion at the site. The method used here for spectral amplification analysis is based on the methods of Duke and Leeds (Reference 86) and Matthieson and others (Reference 165). While more sophisticated methods for this type of analysis exist, this technique is sufficiently general so that small errors in the model will not appreciably affect the final outcome. A variety of data was used to determine the amplification, but the model below represents one of the best average models:

LAYER	THICKNESS (ft)	SHEAR-WAVE VELOCITY (ft/sec)	DENSITY (lb/ft^3)
01	Initial Layer	7000	165
02	535	4500	150
03	555	5000	155
04	140	4250	145
05	80	4000	145
06	17	6200	160
07	16	3500	140
08	12	6200	165
09	7	1735	150
10	20 (surface layer)	1025	135

These are generalized data based on geological and geophysical studies at the site as presented in USAR Sections 2.5.1, 2.5.4.4, and 2.5.4.2.1. These calculations have led to a determination of amplification factors of 1.3 to 1.5 at five percent damping. This means that motion present in the dense Mississippian carbonates would be amplified a maximum of 1.3 to 1.5 times at the surface for waves with periods above 0.1 second. Standard attenuation curves, such as the one used by Donovan (Reference 81), taken from the Nemaha seismogenic area or even the values for MMI VI ground motion (Reference 52) give ground motion at depth no more than 0.04g. Multiplying that figure by 1.5 gives a value of 0.06g, which agrees well with the value obtained by surface and historical methods. The resulting surface motion from amplification of the waves from the Mississippian limestones are, thus, still well below the recommended SSE.

Ground motion at the site resulting from larger, more distant shocks, such as a New Madrid 1811-1812 type sequence, would also be less than the specified design acceleration of 0.12g. However, the duration of shaking would be somewhat longer for the larger more distant shocks than for the smaller, but closer, MMI VII events. The response spectra will adequately envelop any longer period motion for a recurrence of the New Madrid events (discussed in USAR Section 2.5.2.5).

Although regional seismic history indicates maximum random events of no more than MMI VI within 400 miles of the site, the response spectra will envelop acceleration derived from local random events of intensities greater than VII but less than VIII.

Response spectra for use in designing structures to resist earthquake loading are presented on Figures 2.5-82 through 2.5-85. The response spectra are scaled or normalized to the expected maximum horizontal acceleration of 0.12g produced by the SSE and the 0.06g produced by the OBE (USAR Section 2.5.2.7). The vertical response spectra are normalized to two-thirds of the horizontal accelerations. The response spectra are based on recommended criteria by Newmark, Blume, and Kapur (Reference 194) and Regulatory Guide 1.60.

The spectra represent the maximum amplitude of motion over the natural frequency range of various structural elements with typical degrees of damping.

The Lawrence Livermore Laboratories spectrum, contained in Appendix 3C, has also been used to seismically evaluate non-power block safety-related structures, systems and components. This spectrum is enveloped by a Regulatory Guide 1.60 spectrum anchored at 0.15g.

2.5.2.7 Operating Basis Earthquake

The Operating Basis Earthquake (OBE) is defined as a recurrence of the New Madrid earthquake near its historic epicenter; such an event produced site intensities of V-VI. These intensities would result in ground motions of 0.02 to 0.04g at the site (see Figure 2.5-81). This range of accelerations also brackets the resultant ground motions from MMI VII earthquakes associated with the seismogenic area of the Nemaha Uplift as well as local random events.

Consistent with the conservatism already developed for the SSE, the maximum horizontal acceleration for the OBE is established as 0.06g and constitutes a level of ground motion with a low probability of occurring during the operating life of the WCGS (USAR Section 2.5.2.4).

2.5.2.8 Response Spectra

Figures 2.5-146 through 2.5-151 present the response spectra for the WCGS power block and demonstrate that the selected spectra for the standard plant design SSE and OBE envelope the bounds of the spectra for the WCGS site.

The response spectra are scaled or normalized to the maximum horizontal ground acceleration for the SSE of 0.20 g and for the OBE of 0.12 g in accordance with Regulatory Guide 1.60.

2.5.3 SURFACE FAULTING

The data contained in USAR Sections 2.5.1 and 2.5.2 and the interpretation and conclusions drawn from the data indicate that there are no known tectonic faults within 15 miles of the site and no capable faults are present within 200 miles of the site. Therefore, the site does not require design for surface faulting.

2.5.3.1 Geologic Conditions of the Site

The lithologic, stratigraphic, and structural geologic conditions of the site and surrounding region, including geologic history, are presented in USAR Sections 2.5.1.1 and 2.5.1.2.

2.5.3.2 Evidence of Fault Offset

Faults and shear zones were mapped in foundation excavations within the Heumader Member of the Oread Limestone Formation. One fault was mapped offsetting the Williamsburg Coal Bed within the Unnamed Member of the Lawrence Formation. These faults are overlain by unfaulted Pennsylvanian sedimentary rock and, therefore, are noncapable, as defined by Appendix A, to 10 CFR 100 (Section 2.5.1.2.4.1). No other faults are known to exist within 15 miles of the site.

2.5.3.3 Earthquakes Associated with Capable Faults

There have been no historically reported earthquakes within 40 miles of the site. No capable faulting is known to exist within 200 miles of the site.

2.5.3.4 Investigation of Capable Faults

There are no capable faults within 200 miles of the site.

2.5.3.5 Correlation of Epicenters with Capable Faults

No capable faulting is known to exist within 200 miles of the site; no earthquake epicenters are associated with capable faults within 200 miles of the site.

2.5.3.6 Description of Capable Faults

No capable faulting is known to exist within 200 miles of the site.

2.5.3.7 Zone Requiring Detailed Faulting Investigation

Geologic investigations of the site have not indicated evidence of capable faulting. Faults observed in foundation excavations were mapped in detail and found to be noncapable, as defined by Appendix A, to 10 CFR 100. There is no basis to warrant detailed faulting investigations.

2.5.3.8 Results of Faulting Investigation

A detailed faulting investigation was not required at the site.

2.5.4 STABILITY OF SUBSURFACE MATERIALS

This section presents an evaluation of the stability of the subsurface materials that underlie the foundations of Category I structures. The evaluation is based on the actual grades and final values for foundation loads.

2.5.4.1 Geologic Features

The geologic features of the site are discussed in detail in USAR Section 2.5.1.2. A detailed description of the field explorations performed at the site is presented in USAR Section 2.5.4.3. A comprehensive field investigation program, including borings, test pits, geophysical surveys, and field reconnaissance, was undertaken to determine the geologic features at the site and their significance to site stability.

No major solution features were noted in the limestone units during the investigation. At depth, joints in the limestone units were tight and lacked solution features. Irregular, elongated indentations formed by the concentration of surface weathering along joints and bedding planes was noted in areas where the Plattsmouth and Toronto Limestone members are exposed as the surficial bedrock. The joints were filled with reddish brown clay. These minor solution features are narrow and disappear within several feet of the surface (USAR Section 2.5.1.2.5.3).

The drill rig "geolograph" record revealed no drops in the drill bit, and the geophysical borehole logging indicated no cavities. Known solution features in southeastern Kansas are confined to areas containing thick outcrops of water-soluble rock, local carbonate reefs, faulting or stream channel diversion (see USAR Section 2.5.1.1.5.4.1.1). As none of these conditions are present at the site, the possibility of instability due to solutioning is considered minimal. In addition, the relatively low permeabilities of the limestones themselves and the low permeabilities of the overlying soils and interbedded shales preclude the development of karst features.

Ground water leaving the cooling lake through seepage will be saturated or near saturated with respect to calcium at all times (USAR Section 2.5.1.2.5.3). Therefore, the effect of the cooling lake on the ground-water regime will not increase the possibility of instability due to the development of karst features.

The closest approach of underground mining to the site is 3.5 miles to the southeast in the northwest-southwest portion of Section 28. Coal mining took place in this area in an operation that ended about 1916. Since none of these drifts extends under the site, there is no danger of surface or subsurface subsidence (USAR Sections 2.5.1.2.5.6 and 2.5.1.1.5.4.2.)

The nearest producing oil well is 5.5 miles to the southeast of the plant site (USAR Sections 2.5.1.2.5.6 and 2.5.1.1.5.4.2.) Since neither oil nor gas will be extracted from beneath the site property and only minor amounts of ground water are withdrawn within a 5-mile radius, there is no potential for surface or subsurface subsidence caused by the withdrawal of fluids.

Field investigations reveal a gently plunging anticlinesyncline structure at the site (Figures 2.5-53 to 2.5-61). No evidence has been found to suggest that any movements have occurred since the Paleozoic Era.

Investigations show that joint patterns representing local adjustments to the gentle structural flexures of Paleozoic time exist. Joints representing stress relief from the erosion of overlying sediments are also found in the borings and nearby quarries. Since this area has never undergone glaciation, the possibility of any residual stresses remaining in the rock is minimal. Field investigations and laboratory tests revealed no soil or rock strata that might be unstable due to mineralogy, consolidation, or water content during a seismic event (USAR Section 2.5.1.2.5.4).

Slickensided fractures noted in some shale formations underlying areas of Category I facilities are more numerous in the UHS area, particularly in the area of the Vinland Channels (Figure 2.5-43). These slickensided fractures are believed to have formed as a result of differential compaction along the edges of these channels (USAR Section 2.5.1.2.5.2).

Several shear zones and faults were mapped within the Heumader Shale Member of the Oread Limestone Formation and one fault was mapped within the Unnamed Member of the Lawrence Formation. These features, overlain by unfaulted Pennsylvanian sedimentary rock, occurred during the Pennsylvanian and, therefore, are not capable as defined by Appendix A to 10 CFR 100 (USAR Section 2.5.1.2.4.1).

Ground-water samples and soil and rock samples obtained in the Category I area as well as in neighboring water wells indicate that water-soluble sulfate concentrations could reach 1,000 mg/1 of ground water (USAR Section 2.4.13.1.1.2). The maximum concentration of soil and rock samples obtained in the area of Category I structures was 535 mg/kg for the Heumader Shale Member at Boring ESW-2. Ground water from the Plattsmouth Limestone Member at Boring ESW-8 had an average sulfate concentration of 346 mg/1.

Frost depths representing 1 in 100 year events are used in the design of all Category I structures. Frost depth, x, is computed using the modified Berggren formula:

$$x = \lambda \sqrt{48K.S.FI / L} \qquad [2.5\text{-}18]$$

where:

FI = the 1 in 100 year recurrence freezing index described in USAR Section 2.3.2.2;

K, S, and L = Physical parameters of the soil; and

λ = A dimensionless constant.

The values used for S are based on Sanger (Reference 244). Using the above method, the 1 in 100 year recurrence frost depths are computed to be:

a. 3.4 feet for cohesive natural soils and cohesive backfill; and

b. 4.1 feet for granular backfill and all soils beneath paved surfaces.

2.5.4.2 Properties of Underlying Materials

2.5.4.2.1 Laboratory Test Procedures

This section presents the procedures and results of a laboratory testing program that was performed to assess the engineering properties of the subsurface materials. The tests were performed on representative soil and rock samples extracted during the test boring program, which is described in USAR Section 2.5.4.3. The results are presented on the boring logs and/or are summarized in tables and on figures that are referenced in the following sections. Test procedures used for the dam and embankment analyses are also described in USAR Section 2.5.6.4.1.4.1.

Soil samples were obtained from 3-inch diameter Shelby tubes, 2 1/2-inch inside diameter (I.D.) Dames & Moore thin-wall and Type U Samplers, and 2 3/8-inch I.D. Denison samplers. Rock samples were obtained from NX-wireline core barrels. All laboratory tests were performed by Dames & Moore unless otherwise stated.

2.5.4.2.1.1 Static Strength Tests

2.5.4.2.1.1.1 Strength Tests on Soil

2.5.4.2.1.1.1.1 Unconfined Compression Tests

Selected representative soil samples at in situ and recompacted densities were subjected to unconfined compression tests. A load deflection curve was plotted for each test, and the strength of the soil was defined as the peak shear strength or the shear strength at 15 percent strain, whichever occurred first. Determinations of natural moisture content and dry density were made in conjunction with the tests. The results of the tests are shown on the boring logs and are summarized in Tables 2.5-25 and 2.5-26. The testing procedure was in conformance with ASTM D 2166.

2.5.4.2.1.1.1.2 Direct Shear Test

Direct shear testing was performed by Dames & Moore on a representative soil sample obtained from Boring B-9. The shear strength of the soil sample was determined from the resulting load-deflection curve. Field moisture content and dry density determinations were made in conjunction with the test. The test results are summarized in Table 2.5-27 and are shown on the log for Boring B-9, Figure 2.5-34i. The tests were run in accordance with ASTM D 3080-72.

2.5.4.2.1.1.1.3 Triaxial Compression Tests

Unconsolidated-undrained and consolidated-undrained triaxial compression tests were performed on selected undisturbed and recompacted soil samples under confining pressures representative of their in situ condition. For the consolidated-undrained test, samples were fully consolidated under the desired all-around pressure. The samples were then tested, and the following parameters were recorded: axial load, deflection, and pore pressure. Stress path curves and Mohr envelopes were drawn to define the effective stress strength parameters. A load-deflection curve was drawn for each test, and the shear strength was defined using the same failure criterion as for the unconfined compression tests. Effective stress parameters used in the analysis of the UHS are shown in Table 2.5-65. Parameters for samples obtained outside the UHS were not used in the analysis and, therefore, are not presented. In addition to natural moisture content and dry density, Atterberg limits were determined for some of the samples.

The tests were performed by Dames & Moore and Geotesting, Inc., San Rafael, California. The test results are presented on the boring logs and in Tables 2.5-28 through 2.5-31. The tests were run in accordance with ASTM D 2850-70, the U.S. Army Manual EM 1110-2-1906 and "The Measurement of Soil Properties in the Triaxial Test" (Bishop and Henkel, 1962).

2.5.4.2.1.1.2 Strength Tests on Rock

The strength of the subsurface rock units was evaluated by subjecting representative rock core samples to unconfined compression tests. These tests were performed by Walter H. Flood and Company, Inc., Chicago, Illinois. Samples approximately 4 inches in height and 2 inches in diameter were subjected to a constant rate of axial strain. The modulus of elasticity and Poisson's ratio were computed at 40 percent of the unconfined compressive strength. The bulk modulus was computed from the elastic modulus and Poisson's ratio. The results of the strength tests are presented in Table 2.5-32. The tests were run in accordance with ASTM D 2938-71.

2.5.4.2.1.2 Compaction, Consolidation, and Permeability Tests

2.5.4.2.1.2.1 Compaction Tests

Representative bulk samples and soil samples obtained from the borings were used to determine the compaction characteristics of the soils which may be used as earthfill materials. Compaction tests were performed in accordance with ASTM Standards D 698-70 and D 1557-70. Harvard Miniature Compaction Tests were performed in accordance with the proposed ASTM method for Harvard Miniature Compaction Tests (Reference 273). Grain-size analyses were also performed in conjunction with the compaction tests (Figure 2.5-90, Sheets 1 through 4). These tests were performed by Dames & Moore and Geotesting, Inc. The results of the compaction tests are shown on Figure 2.5-86 and are presented in Table 2.5-33.

2.5.4.2.1.2.2 Consolidation Tests

Consolidation tests were performed on selected, representative, undisturbed and remolded samples of soil to determine their compressibility characteristics. The samples tested were confined laterally in a ring and incrementally subjected to increasing vertical loads, while the resulting deformations were measured. Most samples were unloaded incrementally and then reloaded to determine the unload/reload characteristics. The consolidation test results are presented on Figures 2.5-88a through 2.5-88j. Natural water content and dry density were determined in conjunction with each test and are presented on Figures 2.5-88a through 2.5-88j. The tests were run in accordance with ASTM D 2435-70.

2.5.4.2.1.2.3 Permeability Tests

Permeability tests were performed by Dames & Moore and Geotesting, Inc., on representative undisturbed soil samples to evaluate their permeability characteristics. The testing process generally followed the procedures outlined in ASTM D 2434-68, except that a falling head rather than a constant head test was used to measure the permeability. The test results are summarized in Tables 2.5-34 and 2.5-35.

2.5.4.2.1.3 Classification Tests

2.5.4.2.1.3.1 Particle-Size Analyses

Grain-size analyses were performed in conjunction with the compaction tests according to ASTM Standard D422-63. The analyses of the gradation curves were used primarily for classification and correlation purposes. The results of the particle-size analyses are presented on Figure 2.5-90.

2.5.4.2.1.3.2 Atterberg Limits Tests

Atterberg limits were determined on representative soil samples and in conjunction with the triaxial compression and consolidation tests in order to define the plasticity characteristics of the soil. The liquid limit and plastic limit determinations were made in accordance with ASTM Standards D 423-66 and D 424-59. The results of the Atterberg limits determinations were used for classification and correlation and are shown in Table 2.5-36.

2.5.4.2.1.3.3 Moisture and Density Determinations

2.5.4.2.1.3.3.1 Soil Samples

Moisture content and density determinations were made on samples in accordance with ASTM Standard D 2216-66. The results are shown on the boring logs and in Table 2.5-37.

2.5.4.2.1.3.3.2 Rock Samples

Bulk density determinations on rock core samples were performed by Dames & Moore in conjunction with resonant column testing (Section 2.5.4.2.1.4.1) and are listed with the results of these tests in Table 2.5-38. In addition, bulk density determinations were performed on representative shale, siltstone, and sandstone samples and are presented in Table 2.5-39. The tests were performed in general accordance with the 1970 U.S. Army Engineer Manual EM 1110-2-1906.

2.5.4.2.1.4 Dynamic Tests

Dynamic tests were performed by Dames & Moore, Geotesting, Inc. and Professor Marshall Silver, University of Illinois, Chicago.

2.5.4.2.1.4.1 Resonant Column Tests

Resonant column (dynamic torsional shear) tests were performed on selected undisturbed soil samples and rock cores to evaluate their modulus of rigidity and damping. The tests were conducted over a range of confining pressures at natural moisture content. The testing method is described in detail on Figure 2.5-91. The test results are presented in Tables 2.5-38 and 2.5-40.

Dynamic values obtained from resonant column tests on limestone samples were considerably lower than those obtained from static and other dynamic tests. These limestone values are considered invalid since the rigidity of the resonant column testing apparatus was not sufficient for testing high strength rocks. The tests were performed in general accordance with the procedures described in "Suggested Method of Test for Shear Modulus and Damping for Soils by the Resonant Column" (Reference 107) in ASTM STP-479.

2.5.4.2.1.4.2 Shockscope Tests

Compressional wave velocity (shockscope) tests were performed on representative rock samples by Professor M. L. Silver in the Soil Mechanics Laboratory at the University of Illinois, Chicago Circle Campus. The velocity observed in the laboratory was used to verify field velocity measurements obtained during the geophysical survey. Although the laboratory test values (Table 2.5-41) were found to be slightly higher than the field geophysical values (Tables 2.5-46 and 2.5-51), it should be noted that the laboratory tests represent values for intact rock and an RQD of 100 percent.

In the test, samples are subjected to a physical shock; the time required for the shock wave to travel the length of the sample is measured. The velocity of compressional wave propagation is then computed. The samples were tested in an unconfined state. The tests were conducted in accordance with ASTM D-2845-69.

2.5.4.2.1.4.3 Dynamic Triaxial Tests

The dynamic behavior of the various soil strata encountered at the site was determined by testing representative soil samples obtained by Shelby tubes, Dames & Moore soil samplers, and Denison samplers.

2.5.4.2.1.4.3.1 Sample Preparation

To prepare the undisturbed cohesive samples for dynamic material property test, the samples were first extruded from their liners or brass rings and placed in a mitre box where the ends were trimmed square. The average diameter and initial height and weight of the sample was recorded, and the sample density was calculated. The triaxial cell was assembled around the sample. The samples were then consolidated isotropically under estimated in situ pressure to simulate field conditions as closely as possible.

2.5.4.2.1.4.3.2 Laboratory Procedure

The dynamic triaxial tests were performed under controlled strain conditions. To begin the test, a very small amplitude, 0.5-cps, sine wave signal was programmed into the loading frame. The piston was connected to the load cell, the recording equipment was zeroed, and the sample was cycled at the lowest possible strain amplitude. At the tenth load cycle, the pen of the x-y recorder was lowered to record the load-deformation hysteresis loop for modulus and damping calculation. The tenth load cycle was chosen for modulus and damping determination as representative of the duration of strong motion for the SSE postulated for the site. At the end of cycle 25, the test was stopped. The drainage valve was then opened and excess pore water pressure was allowed to dissipate. The drainage valve was again closed, a new slightly higher strain amplitude was programmed, and another test was performed. This procedure was repeated six or seven times for each sample to provide a record of dynamic sample response covering the range of vertical strain between approximately 0.01- to 1.0-percent, single-amplitude axial strain. The results are summarized in Table 2.5-42 and on Figure 2.5-92.

Values of dynamic Young's modulus (E) were determined by measuring the slope of the line connecting the extreme points of the hysteresis loops obtained at the tenth load cycle. The same loop was used to calculate the hysteretic damping.

Since the behavior of soils is strain dependent, these modulus and damping values are related to the single amplitude vertical strain (εv), which is defined as the value measured from the origin to the peak value of strain. Values for modulus of rigidity and shear strain presented on Figure 2.5-92 were calculated from the values of modulus of elasticity using Poisson's ratio. The value of Poisson's ratio required for these calculations is generally estimated, because accurate measurement of Poisson's ratio is difficult to accomplish experimentally. The tests were performed in general conformance with the procedures recommended in the NRC Regulatory Guide 1.138.

2.5.4.2.1.5 Other Tests

2.5.4.2.1.5.1 Swell Load Tests on Soil Samples

Swell load tests were performed by Dames & Moore and by Geotesting, Inc. The test procedures are described in USAR Section 2.5.6.4.1.4.1.9.

The results of the swell load tests are indicated on Figures 2.5-96a through 2.5-96d.

2.5.4.2.1.5.2 Shale Analyses

Dr. F. Michael Wahl of Gainesville, Florida, was contracted to perform X-ray diffraction analyses, swelling tests, and slake durability tests on selected shale samples obtained from drilling operations.

2.5.4.2.1.5.2.1 Clay Mineralogy

The X-ray diffraction analyses were performed on representative samples of shale to evaluate the type and approximate quantity of those clay minerals comprising the clay fraction (less than 2 microns) of the samples. The samples were examined both before and after treatment with ethylene glycol. Three complete X-ray patterns were obtained for each sample. The results of the clay mineralogy studies are presented in Table 2.5-43. The tests were performed in general accordance with the procedures recommended in NRC Regulatory Guide 1.138.

2.5.4.2.1.5.2.2. Slake-Durability Tests

The slake-durability index for all samples was determined by the slake-durability test apparatus developed by Franklin (Reference 95) and Chandra (Reference 37), using the procedures outlined by Gamble (Reference 99). This test is intended to assess the resistance offered by a rock sample to weakening and disintegration when subjected to changes in water content due to a standard drying and wetting cycle.

A description of the slaking durability of the sample was obtained from a comparative scale based upon the slake durability index (I_d) for a two-cycle test. The descriptive slaking durability scale, supplied by Dr. F. Michael Wahl, is as follows:

TWO-CYCLE TEST (I_d)	DESCRIPTIVE SLAKING DURABILITY
<30	very low
30-60	low
60-85	medium
85-95	medium high
>95	high

The results of the slake-durability tests are presented in Table 2.5-43, and I_d values for the two-cycle test are shown on the boring logs. The tests were performed in accordance with the procedures outlined in "The slake durability test," International Journal of Rock Mechanics and Mineral Science (Reference 96).

2.5.4.2.1.5.2.3 Swelling Pressure Tests

A potential volume change (P.V.C.) meter was used to test the shale samples for swelling characteristics. The P.V.C. meter was developed for the Federal Housing Administration by T. William Lambe (Reference 142).

The equipment consists of a typical consolidometer sample unit; that is, a sample ring with porous stones above and below the sample. A metal plate with a depression in the center to accommodate a piston with an oval end is placed above the porous stone. A joining ring is bolted in place above the sample, and a piston, attached to the proving ring, is lowered into the depression in the loading plate with a screw jack. Deflections of the ring are measured on a dial calibrated in ten-thousandths of an inch. The tests were performed in general accordance with the procedures recommended in NRC Regulatory Guide 1.138.

The test results, showing swelling pressure in psf versus time, are presented in Table 2.5-44.

2.5.4.2.2 Subsurface Materials

2.5.4.2.2.1 Materials Underlying the Plant Site

The plant site was covered by residual soils developed on and into the underlying Pennsylvanian strata. The interface between the soil and bedrock was a gradational contact, but the soil blanket was generally 4 to 8 feet thick. The soil profile showed wide variations in properties and composition, ranging from high plasticity clays to low plasticity clayey silty sand. Geologic cross sections for the plant site are shown on Figures 2.5-45 and 2.5-46.

Design soil properties listed in Table 2.5-45 are based on average representative test results. Tangent modulus values were calculated according to Janbu (Reference 121). Results of soil testing are presented in Section 2.5.4.2.1 and accompanying tables and figures.

Comparison of the dynamic shear moduli from the dynamic triaxial tests with the shear moduli obtained from the field geophysical surveys shows good agreement, considering the difference in strain levels (USAR Sections 2.5.4.4 and 2.5.4.2.1. The design shear modulus value presented in Table 2.5-45 is based on an average of the moduli obtained from the dynamic triaxial tests. The relationship between the strain level and the dynamic modulus of rigidity is discussed in USAR Section 2.5.4.2.1.4.3 and accompanying tables and figures.

The underlying bedrock consists of alternating limestones, shales, and sandstones which dip gently to the south and southwest. The plant is on a small anticline which locally modifies the normally west to northwest dipping strata at the plant site area (Figures 2.5-53 to 2.5-61). The evaluation of parameters for the rock members is described below. However, the resonant column testing yielded results that were too low, particularly for stronger rock. The value of the resonant column tests was, therefore, limited in the evaluation of dynamic properties of rocks.

The Jackson Park Shale Member, which is the uppermost bedrock unit at the site, is a yellowish brown, fine-grained, thin- to medium-bedded sandstone. The upper portion of this member is highly weathered, but the lower portion is moderately weathered with some highly weathered lenses. Jointing in the plant site borings in the Jackson Park Shale Member show 30- to 60-degree weathered fractures in the lower portion of this member. The core recovery and RQD ranged from 12 to 100 percent and 0 to 59 percent, respectively, which reflects the variability of the degree of weathering in this unit. Due to erosion, the thickness of this unit across the plant site ranges from 1.4 feet to 11.5 feet with an average thickness of 8 feet. Its average upper surface elevation is approximately 1,100 feet, and its contact with the underlying Heumader Shale Member occurs at an average elevation of approximately 1,092 feet.

The elastic moduli and strength parameters of the Jackson Park Shale Member were determined by both static and dynamic testing. The results show uniform properties across the plant site. Design properties are presented in Table 2.5-45. The static and dynamic test results are presented in USAR Section 2.5.4.2.1 and accompanying tables and figures.

The Heumader Shale Member, underlying the Jackson Park Shale Member, is a medium dark gray shale that weathers to a pale to dark yellowish brown. It is thinly laminated to medium bedded with a basal calcareous facies that extends through approximately 14 feet of its total average thickness of 27 feet. Stiff to very stiff clayey layers and zones averaging 1-inch thick, are common throughout the member, and slight to moderate weathering is present mainly in the upper facies. Infrequent jointing ranging from 30 to 60 degrees was found in the plant site borings through the upper portion of the Heumader Shale Member. Core recovery averaged 99 percent and RQD averaged 89 percent. The thickness of this unit across the plant site ranges from 23.6 to 30.7 feet. Its average upper surface elevation at the plant site is 1,092 feet.

The elastic moduli and strength parameters of the Heumader Shale Member were determined by static and dynamic testing and by field geophysical surveys. The wide range of elastic and strength properties across the plant site are attributable to variations in the degree of weathering and to the condition of the sample at the time of testing since this unit has a low to medium potential for slaking (USAR Section 2.5.4.2.1). Other factors that adversely affect the strength and elastic parameters are composition, degree of fracturing in a sample, and coring procedures.

The strength parameters are based on average values of the unconfined compression tests that provided a conservative value for compressive strength, considering the above factors that affect the strength. Included in the evaluation of the unconfined compression strength for the Upper Heumader Shale Member were samples from the highly weathered shale in Boring B-4 at depths of 10.5 and 13.5 feet (Table 2.5-25). These unconfined compression strength values for design values were selected at 70 and 140 psi for the Upper and Lower Heumader shale members, respectively. The static and dynamic moduli presented as design properties in Table 2.5-45 and on Figures 2.5-97a and 2.5-97b were obtained by evaluating results determined by the following tests and methods:

a. Static and dynamic laboratory tests;

b. Considering RQD as a measure of quality;

c. Field geophysical techniques;

d. Evaluating available literature on Pennsylvanian shales.

Both shear and compressional velocities from the field geophysical tests were considered. However, since both the Upper and Lower Heumader Shale members at the plant site are below the water

table, evaluation of moduli based on the compressional wave velocities is difficult. However, shear wave velocities from the Heumader Shale members at the plant site indicate average velocities at 1,400 to 1,500 fps. These velocities are considered quite reliable. On the other hand, shear wave velocities obtained by the resonant column testing were 500 to 750 fps and 900 to 1,000 fps for the Upper and Lower Heumader Shale Members, respectively. Considering the uncertainty regarding the stiffness of the resonant column test apparatus, these velocities may be low although the relative difference in velocity may be valid. The shear moduli (low shear strain) for the Upper Heumader Shale was, therefore, chosen based on an average shear wave velocity of 1,000 fps, while that for the Lower Heumader Shale Member was chosen as 1,800 fps. Shear moduli for high shear strains were selected close to those of the static moduli.

The static elastic values obtained from the testing were considered too low, based on one or more of the above-mentioned factors that had an adverse effect on the strength properties. Therefore, a ratio of the dynamic [resonant column (Table 2.5-38), in situ seismic (USAR Section 2.5.4.4)] to static moduli was compared to previously published values on shales (Reference 279), and the static moduli were adjusted accordingly. Ratios of modulus of elasticity and unconfined compression strengths for similar material were also considered (Reference 178). Comparison of the in situ seismic and resonant column moduli showed close agreement.

Underlying the Heumader Shale Member is the Plattsmouth Limestone Member which consists of a light to medium gray, fine-grained, thin- to thick-bedded limestone. This limestone is interbedded with 0.25- to 8.4-inch partings of calcareous, clayey shale and is generally weathered. Investigation of jointing in the Plattsmouth plant site borings shows infrequent 30- to 60-degree joints. These borings also show calcite-lined vugs very infrequently, averaging 0.75 to 1.0 inch in size. Core recovery at the plant site averaged 90 percent, and RQD averaged 85 percent. The thickness of the Plattsmouth Limestone Member across the plant site ranges from 11.8 to 13.7 feet. This unit's average upper surface elevation at the plant site is 1,065 feet.

The elastic moduli and strength parameters of the Plattsmouth Limestone Member were determined by static and dynamic testing and by field geophysical surveys. A summary of geophysical properties of subsurface materials at the plant site is presented in Table 2.5-46. The elastic moduli are presented in Table 2.5-45. The strength was determined by taking the lower bound of the unconfined compression tests (USAR Section 2.5.4.2.1.1.2) and reducing the obtained value based on RQD and the effect of shale partings (USAR Section 2.5.4.10.1.1). The value used for design was, thus, 170 psi. The dynamic moduli are in close agreement with those

values obtained from both shockscope (USAR Section 2.5.4.2.1.4.2) and geophysical tests, considering the effect of RQD. Dynamic values obtained from resonant column tests were considerably lower than those obtained from both dynamic and static tests. Their values are considered invalid since the rigidity of the resonant column testing apparatus was not sufficient for testing high strength rock. For results of the static and dynamic tests, see USAR Section 2.5.4.2.1.

The Heebner Shale Member, underlying the Plattsmouth Limestone Member, consists of a grayish black, thinly laminated, carbonaceous shale which contains lenses of yellowish brown, calcareous siltstone. Across the plant site, the top of the Heebner Shale Member is found at an average elevation of 1,053, and the thickness of this unit ranges from 2.1 to 4.1 feet with an average thickness of 3 feet. Core recovery and RQD in the plant site borings averaged 97 and 88 percent, respectively. These borings show no weathering and only occasional vertical joints.

The elastic moduli of the Heebner Shale Member and underlying Leavenworth Limestone and Snyderville Shale Members were grouped together to form a single lithologic unit, but the strength parameters were determined for each member individually. Elastic properties were determined by static and dynamic testing and by geophysical testing . Static properties were determined by analyses of unconfined compression tests. The design elastic properties are presented in Table 2.5-45, and the strength properties are found in USAR Section 2.5.4.2.1 and accompanying tables and figures.

The static and dynamic elastic moduli were determined by taking a weighted average of the three members so that the moduli for the equivalent member would reflect the same deformation characteristics as the individual units treated separately.

Strength properties were determined directly from unconfined compression tests. The static elastic properties of the Snyderville Shale Member show wide variation due to loss through slickensiding, and poor samples because of low slaking durabilities (USAR Section 2.5.4.2.1.5.2.2).

The Leavenworth Limestone Member, underlying the Heebner Shale Member, consists of a 2-foot thick, fine-grained, thin- to medium-bedded limestone which is shaley in its basal 1.0 foot. The top of the Leavenworth Limestone Member is found at an average elevation of 1,050 at the plant site. Core recovery and RQD in this unit averaged 97 and 88 percent, respectively. No evidence of jointing or weathering is found in the plant site borings that encounter the Leavenworth Limestone.

Underlying the Leavenworth Limestone Member is the Snyderville Shale Member, which is a light gray to olive-gray, thinly laminated to medium-bedded, nonweathered, calcareous, clayey shale that contains lenses of limestone up to 3 1/2 inches in thickness. Numerous clayey shale zones, reaching thicknesses of approximately 6 inches, occur throughout this unit. The Snyderville Shale Member contains numerous 20- to 60-degree fractures, many of which are slickensided. These fractures and slickensides are the result of internal adjustments in the Snyderville Shale Member that probably occurred during minor folding. Borings at the plant site show an average core recovery of 97 percent and an average RQD of 75 percent. The top of this unit is found at an average elevation of 1,048 and has a thickness that ranges from 8.2 to 12.8 feet across the plant site and an average thickness of 10 feet.

The Toronto Limestone Member, underlying the Snyderville Shale Member, consists of a light gray, fossiliferous, unweathered limestone. This limestone is fine grained, thin to thick bedded and has interbeds of greenish gray, calcareous shale up to 3 1/2 inches in thickness. Borings in this unit have an average core recovery of 98 percent and an average RQD of 86.5 percent. These borings also show occasional vertical joints and infrequent 30- to 60-degree joints. Pinpoint vugs were noticed in isolated, localized areas. The top of the Toronto Limestone Member is found at an average elevation of 1,037 and has a thickness that ranges from 4.0 to 18.8 feet across the site and an average thickness of 16 feet.

The elastic moduli and strength parameters of the Toronto Limestone Member were determined by static and dynamic testing and by field geophysical surveys. The elastic moduli are presented in Table 2.5-45 and the strength results, which were determined by an average of the unconfined compression tests (Table 2.5-32), are in close agreement and are presented in USAR Section 2.5.4.2.1.1.2. The dynamic moduli are in close agreement with those values obtained from both shockscope and geophysical tests. Dynamic values obtained from resonant column tests were considerably lower than those obtained from both dynamic and static tests and were considered invalid since the rigidity of the testing apparatus was not sufficient for testing high strength rocks. For results of the static and dynamic tests see USAR Section 2.5.4.2.1 and accompanying tables and figures.

Compacted structural backfill (crushed limestone) was used under some structures in the power block area. Properties for crushed limestone were obtained from Dames & Moore tests and available literature on similar material (Reference 236). Pertinent parameters for this material are shown in Table 2.5-45 and on

Figures 2.5-97d and 2.5-97e. The coefficient of sliding friction for lean concrete against different types of subgrade material is shown in Table 2.5-47.

2.5.4.2.2.2 Materials Underlying the Essential Service Water System Pumphouse

The residual soil at the location of the ESWS pumphouse is developed on the Heumader Shale Member (Figure 2.5-47). Its thickness averages 14 feet and ranges between 10 and 16 feet (Figures 2.5-38, 2.5-47, and 2.5-50). The soil consists of clayey silts, silty clays, plastic clays, and fat clays with stiff to hard consistencies. There are no granular soils at the ESWS pumphouse site.

The design soil properties (Table 2.5-48) are based on average representative test results. Results of the various soil tests are annotated on the boring logs (Figures 2.5-36a to 2.5-36ee) and summarized in the tables referenced in USAR Section 2.5.4.2.1. Recommended dynamic properties are also shown in Figure 2.5-97a. The underlying bedrock of the Oread Formation consists of alternating limestones and shales to a depth of about 77 feet. These units dip to the southwest (Figures 2.5-53 to 2.5-61) as a result of the gentle folding of otherwise west to northwest regional dipping of strata.

Geologic cross section G-G' (Figure 2.5-47) graphically correlates the stratigraphic units at the plant site with the same units at the ESWS pumphouse. A detailed cross section at the pumphouse is presented on Figure 2.5-50.

To the east of Boring ESW-8 (Figure 2.5-47), the Jackson Park Shale Member has been removed by erosion. The uppermost unit in this area is the Heumader Shale Member. The top of the Heumander is found at elevations ranging between about 1,082 and 1,076 feet. This unit is thinly laminated to medium bedded with a basal calcareous facies that extends through most of its total average thickness of 18 feet at the ESWS pumphouse. The Heumader Shale Member has properties that are similar to those reported in USAR Section 2.5.1.2.2.2.1.1.1.3.1 for the plant site (Tables 2.5-47 and 2.5-48). These properties were evaluated using the same procedures outlined in USAR Section 2.5.4.2.2.1.

Similarly, the stratigraphic units that underly the Heumader Shale at the ESWS pumphouse have physical properties that are almost identical to those of corresponding units found at the plant site some 2,500 feet to the west. The minor differences that do exist are discussed below.

Shale partings and clay seams within the Plattsmouth Limestone Member were observed in the rock samples obtained at the plant site and the ESWS pumphouse. Three-quarter inch to 1-inch vugs were found at the other locations within the UHS, but were not observed in the borings at the ESWS pumphouse. The largest vugs observed at this location were about 0.25 inch in size.

Resonant column tests were performed on limestone specimens from the Plattsmouth Limestone, Leavenworth Limestone, and Toronto Limestone Members that underlie the ESWS pumphouse. Dynamic modulus values obtained from these resonant column tests are considered invalid, because the rigidity of the testing apparatus was not sufficient for high strength rocks.

Although the average core recovery of the Heebner Shale and Leavenworth Limestone Members was the same at the plant site and ESWS pumphouse, the RQD values at the pumphouse averaged about 14 percent less than corresponding plant site values (74 versus 88 percent). However, within the Snyderville Shale Member, which underlies these two units, the average core recoveries and RQD values were similar to those measured at the plant site. The RQD values for the Toronto Limestone Member were lower than at the plant site (59 versus 86.5 percent), although the core recovery at the two sites was almost identical.

The lower RQD found at the ESWS pumphouse is probably related to drilling procedures. The ESWS pumphouse borings were drilled by Hemphill Drilling Company, while the majority of those taken at the plant site were drilled by Raymond International, Incorporated.

Properties for structural fill and sliding coefficents of friction are discussed in USAR Section 2.5.4.2.2.1.

2.5.4.2.2.3 Materials Underlying the Category I Pipelines

Twenty-five, ESW-Series borings were drilled along the alignment of the original ESWS pipelines at the locations shown on figure 2.5-30. Due to corrosion the original underground ESWS piping was replaced and rerouted. The stratigraphic units which occur along the pipeline routes and the pipe invert grades are shown in Figures 2.5-47 and 2.5-51. The original ESWS borings are retained because of similarity to the new ESWS routing and to maintain site geologic information. Detailed descriptions of substructure materials are provided on the logs of borings (Figures 2.5-36hh through 2.5-36zzzz). Routes for both the discharge and intake lines are parallel from the plant to junctions southwest and northwest of the ESWS pumphouse (figure 2.5-98). As seen on Figure 2.5-47, the invert of the intake pipeline is founded primarily in clay with CLSM and residual soil used as backfill.

The discharge pipeline lies parallel to the intake pipeline and is founded in the same material as the intake piping from the power block to the ESWS pumphouse, between boring locations B-105 and B-140. From that location routed north and east around the cooling lake and then south to an access vault, the discharge pipeline is founded in clay with CLSM and residual soil used as backfill. From access vault AV6 to the discharge location the discharge pipelie is encased in tremie concrete and mainly founded in silty clay near the surface of the lake bed and finally the discharge point is founded in exposed Leavenworth Limestone member (Figures 2.5-98, 2.5-47, and 2.5-51).

Between Borings ESW-1 and ESW-5, B-101 and B-102, and in the vicinity of ESW-8, the basal sandstone unit of the Jackson Park Shale Member overlies the Heumader Shale Member. Traces of very highly weathered Jackson Park Shale were found within the soil samples from most of the other borings along the intake route.

At locations where a full section of the Heumader Shale Member is present, its average thickness is approximately 30 feet. From near boring B-107 following the ESWS discharge route to B-148. The Heumader Shale Member is the surface bedrock unit. The Plattsmouth Limestone Member is the surface bedrock unit between B-148 and the ESWS Discharge Point. Along the pipeline alignments, the average core recovery was 87 percent, and the average RQD was 65 percent in the Heumader Shale Member. The corresponding values for the Plattsmouth Limestone Member were 96 and 46 percent, respectively.

The general characteristics of the overburden and rock units encountered during the excavation for the ESWS pipelines are discussed in USAR Sections 2.5.1.2.2.2, 2.5.4.2.2.1, and 2.5.4.2.2.2. No significant variations in these properties were noted along the ESWS pipeline alignments.

Structure contour maps of the Plattsmouth, Leavenworth, and Toronto Limestone members along the pipeline alignments are provided in Figures 2.5-58 through 2.5-61. Soil thickness maps of the Category I area and plant site are shown on Figures 2.5-38 and 2.5-39, respectively.

The natural slopes along the pipeline routes are generally flatter than one vertical to ten horizontal. USAR Section 2.5.5 discusses the slope stability for the UHS. Dynamic properties for the pipe bedding materials are shown on Figure 2.5-97c and 2.5-97e. These properties were obtained as discussed in USAR Section 2.5.4.2.2.1.

2.5.4.2.2.4 Materials Underlying the ESWS Discharge Point

One boring, B-130, was drilled nearest the location of the ESWS discharge point at the locations shown on Figure 2.5-98 Sht. 2. A geologic profile is presented on Figure 2.5-51. Detailed descriptions of subsurface materials are provided on the logs of borings (Figures 2.5-36eee, 2.5-36fff, 2.5-36ggg, and 2.5-36cccc).

Figure 2.5-30 shows the topography to be relatively flat at the site of the ESWS Discharge Point. The present ground surface elevation Is approximately 1,069 feet at the discharge point.

The soil in this area is generally less than 9 feet in thickness. It consists of about 1.5 feet of organic silty clay that is underlain by residual medium plastic clays developed by weathering of the underlying Plattsmouth Limestone Member. The moisture content of these soils is quite high and the area is very poorly drained.

The general characteristics of the rock units that underlie the ESWS Discharge Point are described in USAR Section 2.5.1.2.2.2 and in 2.5.4.2.2.1 for the plant site. Structure contour maps of the near-surface Plattsmouth, Leavenworth, and Toronto Limestone Members are presented on Figures 2.5-58, 2.5-60, and 2.5-61, respectively.

As shown on Figures 2.5-23 and 2.5-51, the uppermost bedrock unit is the Plattsmouth Limestone Member. This unit is slightly weathered and has an average core recovery of 93 percent and an average RQD of 69 percent. It extends in depth to an elevation of about 1,058 feet and is approximately 12 feet in thickness.

Underlying the Plattsmouth Limestone Member is the Heebner Shale Member which extends in depth to about elevation 1,054 feet. The upper portion of the unit is moderately weathered and the lower portion is essentially unweathered. The thin Leavenworth Limestone Member separates the Heebner Shale Member and the Synderville Shale Member, which extends in depth to about elevation 1,042 feet. An average core recovery of 95 percent and an average RQD of 55 percent were obtained for the combined Heebner Shale, Leavenworth Limestone, and Synderville Shale Members in the three borings at the original ESWS discharge structure. This information is applicable to the new discharge point due the close proximity of its location. Boring B-115, drilled for the ESWS below ground pipe replacement project, provided similar results as well.

A description of the lower stratigraphic units is provided on the log of Boring B-130 (Figure 2.5-36oooo).

2.5.4.2.2.5 Materials Underlying the UHS

The subsurface conditions at the UHS are discussed in USAR Section 2.5.6.2.

2.5.4.3 Exploration

This section presents a complete discussion of the techniques and results of the field explorations and laboratory tests used in determining the properties of the soil and rock units at the site of the Wolf Creek Generating Station, Unit No. 1. The soil and rock properties which are presented in this section have been determined by the boring program, field tests, geophysical explorations, and laboratory tests.

2.5.4.3.1 Test Borings and Test Pits

Twenty-one widely spaced geological borings were drilled at the site by the Hemphill Drilling Company under the supervision of Dames & Moore. An additional 37 borings were drilled in the area of the plant site, and 57 borings were drilled in the ESWS area. These borings were drilled by the Hemphill Corporation and by Raymond International, Inc., under the supervision of Dames & Moore. The boring program was performed from May 1973 to October 1974. To support replacement of the ESW below ground piping due to corrosion of the original piping, 40 borings were drilled in the area of the new ESWS area. The borings were drilled by Fugro Consultants Inc. under te supervision of Bechtel Power Corporation. Additional borings were drilled in non-Category I components (see USAR Section 2.5.1.2.2). The purpose of the borings was to determine the details of the lithology, stratigraphy, structure, physical properties, and ground-water characteristics of the subsurface strata. The borings ranged in depth from 2.5 to 453 feet below the ground surface and were drilled at the locations shown on the various plot plans (Figures 2.5-28, 2.5-30, 2.5-31, and 2.5-98 Sht. 2). In addition, 16 test pits were excavated in the area of the UHS and at the plant site in order to visually inspect the in situ soil and to obtain representative bulk samples with which to determine the compaction characteristics of the various soil types in the area. The locations of these test pits are shown on Figures 2.5-30 and 2.5-31. An additional eight test pits were excavated in the area of the new ESWS piping. These test pits are shown on figure 2.5-98 Sht. 2. Eight roller bit borings were also drilled along the axis of the UHS dam to help define the boundaries of the buried alluvial channel. The location of these borings is shown on Figure 2.5-30.

The borings were advanced using truck-mounted and trackmounted rotary drill rigs. Water was used for fluid circulation during the drilling operation. The holes were cased to the top of the bedrock before the coring operations commenced. The soil and rock units encountered during the drilling operations are described in the boring logs (Figures 2.5-34a through 2.5-34u for the B-Series borings; Figures 2.5-35a through 2.5-35kk for the P-Series borings; Figures 2.5-36a through 2.5-36zzzz for the HS-, ESW- and B-100-Series borings; and Figures 2.5-37a through 2.5-37g for the test pits). Figure 2.5-32 presents an explanation of the symbols and terminology used on the logs.

Several methods for obtaining soil samples were employed. Undisturbed soil samples were obtained using a 3-inch Shelby tube and by drilling using a Denison, double-tube core barrel with a 2-3/8 inch I.D. and 3 1/2 inch 0.D.. Soil samples were also obtained by using the Dames & Moore Type U Sampler which is approximately 3.25 inches in 0.D. and approximately 2.42 inches in I.D. Disturbed soil samples were obtained utilizing a standard split spoon sampler, which has an 0.D. of approximately 2 inches and an I.D. of approximately 1 3/8 inches.

The Shelby tubes were advanced by hydraulic pushing. Immediately after withdrawing the Shelby tube from the borehole, the open ends of the Shelby tube were sealed with paraffin to preserve the natural moisture content of the sample. The samples were shipped to the laboratory in an upright position and remained sealed until laboratory testing was initiated.

Undisturbed samples obtained with the Denison, double-tube, core barrel were contained in 2-foot liners, which were located in the inner, nonrotating barrels. Immediately after sampling, the liners containing the undisturbed samples were sealed at both ends with paraffin to preserve the moisture content of the samples. These samples were shipped to the laboratory bottom side up in a vertical position. The samples remained sealed until they were tested in the laboratory.

The Dames & Moore Sampler was advanced by driving with a 340-pound hammer falling 24 inches. Samples extracted with the Dames & Moore Sampler were packaged in plastic bags and placed in plastic containers. The samples were transported in cushioned containers fabricated from metal or heavy fiber-board. Some samples were also obtained using the Dames & Moore Sampler by fitting a thin wall extension on the end of the bit and pushing the sampler hydraulically. The thin wall extension has an I.D. of approximately 2 1/2 inches and is 6 inches long. Samples obtained by this latter method were stored and transported in the same method as other samples obtained with the Dames & Moore Sampler.

The Standard Penetration Test procedure was utilized in obtaining the split spoon samples. To provide Standard Penetration Test data and soil samples for soil classification, a 2-inch, 0.D., split spoon sampler was advanced by dropping a 140-pound hammer 30 inches. The disturbed samples obtained from the split spoon sampler were stored in sealed glass jars. Bulk samples obtained from the test pits were sealed in large plastic bags. These samples were then shipped to the laboratory for testing.

The soil samples extracted from the borings were examined to determine their geologic significance and classified in the field in accordance with the Unified Soil Classification System (Figure

2.5-33). Soils engineers verified field classifications in the laboratory by visual examination and testing. Results of index property tests were used to confirm these classifications.

Rock was cored utilizing NX-wireline core barrels 10 feet in length. Rock core obtained by the drilling was approximately 2 inches in diameter. Representative samples of each shale member were sealed in plastic bags and plastic containers for laboratory testing. The lithology, physical characteristics, recovery, and RQD of the core were logged in the field. Stratigraphic correlation of rock units and checking of the field logs were completed in a field office in New Strawn, Kansas.

2.5.4.3.2 Ground-water Explorations

2.5.4.3.2.1 Water Pressure Tests

To help evaluate the mass permeability and transmissivities of the subsurface formations, water pressure testing was performed in many of the borings in the site area under the supervision of Dames & Moore personnel during the period from May 1973 through January 1974. Double-inflatable packers with packer spacings ranging from 4.5 to 13.0 feet were used. The interval between the packers consisted of perforated pipe. The very low permeabilities encountered in the strata at the site required modification of the pressure testing apparatus from a pump/flow gage system to a calibrated bottle/nitrogen system. The calibrated bottle/ nitrogen system was much more accurate in the measurement of small water losses. Tests were performed at the effective overburden pressure and at 0.75 times the effective pressure. The effective pressure at the center of the packer was 1 psi per foot of depth from ground surface to the center of the zone being tested. The results of the test are presented as permeability in cm/sec, k, which is computed according to the formula (Reference 78):

$$k = \frac{Q}{2\pi LH} \log_e \frac{L}{r} \qquad [2.5\text{-}19]$$

where:

H = Total head in feet;

Q = Water loss in gpm;

L = Interval distance between packers in feet; and

r = Radius of borehole in inches.

The information was plotted on a nomograph that converted the final results to cm/sec. The results are presented in USAR Section 2.4.13, Tables 2.4-34 and 2.5-34, and on the boring logs.

2.5.4.3.2.2 Piezometers

To determine the ground-water conditions at the site, 92 piezometers were installed in the boreholes under the supervision of Dames & Moore between July 1973 to January 1974. The piezometers consisted of 0.75-inch, I.D., PVC pipe, perforated throughout the length of the zone being monitored.

Gravel was placed around the piezometers in the monitored zones, and the zones were sealed above and below with bentonite pellets or cement grout. The remainder of the borehole was filled with cement grout or gravel. When more than one piezometer was installed in a boring, this procedure was repeated for each piezometer. A summary of the depths at which piezometers were installed, the zones monitored, and the water levels recorded are presented in Table 2.4-32. The locations of the piezometers are shown on Figures 2.4-54 and 2.4-55.

2.5.4.3.2.3 Field Permeameter Tests

Field permeameter tests were conducted in the piezometers by Dames & Moore. The results of the tests are shown in Tables 2.4-34 and 2.5-34. The methods of testing were as follows:

a. Falling Head Permeameter Tests

   1. Initial water level readings were recorded to determine the static water level before testing;

   2. The piezometer was rapidly filled to the top with water. The volumes of water used and time for filling were recorded;

   3. Over a period of 20 to 50 minutes, the rate that the water level dropped in the piezometer was recorded by determining the water level readings at even-minute intervals;

   4. Water levels in other piezometers within the boring were rechecked to determine if the piezometers were properly sealed; and

5. The field observations permitted calculation of the permeabilities of the zones monitored by each piezometer.

b. Constant Head Permeameter Tests (Modified)

1. Initial static water levels in the piezometers were recorded;

2. The piezometer was filled with water. The volume of water required for filling and the filling time were recorded;

3. The water level in the piezometer was recorded versus time to determine the rate of outflow of water into the interval tested;

4. The piezometer was refilled with water to the same level as in Step 2. The amount of water used for refilling was recorded;

5. Steps 3 and 4 were repeated for a total of 20 to 50 minutes; and

6. These records enabled the calculation of the permeability of the monitored zone.

2.5.4.3.3 Geophysical Explorations

The following geophysical studies were conducted in the area of the plant site and UHS:

a. A seismic refraction survey was conducted to establish the compressional wave velocities of the near-surface soil and bedrock materials. The results of this survey were used to determine the depths to the various seismic units under the site;

b. An uphole compressional wave velocity study was performed to further establish the compressional wave velocities of the soil and bedrock materials;

c. Uphole shear wave velocity surveys were completed to establish the shear wave velocities in near-surface soil and bedrock materials;

d. Crosshole shear wave surveys were used to determine the shear wave velocities in the bedrock;

e. Surface shear wave studies were conducted to establish shear wave velocities in the soil and shallow bedrock;

f. Surface wave studies were performed to determine the types and characteristics of surface waves generated at the site;

g. Ambient vibration measurements were completed to determine the predominant frequencies of ground motion of the site due to background noise levels;

h. Borehole geophysical logs were run to provide detailed density values and compressional and shear wave velocities of bedrock.

The locations at which the above studies were conducted are shown on Figures 2.5-98 and 2.5-99.

The field work for these studies was conducted by Dames & Moore in two phases. The initial phase of activity, from June 11, 1973 to June 26, 1973, consisted of refraction surveys and compressional and shear wave studies in the plant site area. The remainder of the field work was conducted from November 12, 1973 to December 5, 1973 and consisted primarily of work in the UHS area (USAR Section 2.5.6).

2.5.4.3.3.1 Seismic Refraction Survey

The seismic refraction survey was conducted along five profiles, Seismic Profile 1 through Seismic Profile 5, positioned at the locations shown on Figure 2.5-98. A total of 11,350 linear feet was profiled using refraction techniques.

In addition to the above survey, a total of 2,100 linear feet of detailed seismic refraction profiling was conducted along portions of Profiles 1 through 5. This detailed profiling was conducted to establish velocity control within the near-surface weathered zone and to examine more closely any anomalous conditions encountered along Profiles 1 through 5.

Seismic energy used in the refraction survey was produced by explosive charges placed in shallow, drilled holes. The energy released by detonation of the explosive charges was detected by

vertically oriented geophones spaced at either 10-, 25-, or 50-foot intervals along the profiles. The geophones had a natural frequency of 14 Hz and were fitted with a spike to assure proper coupling with site materials. The signal detected by the geophones was input to either an SIE RS-44 refraction recording system (an SIE RA-44 seismic amplifier coupled with an SIE R-6 recording oscillograph) or an Electro-Tech Labs ER-75A-12 "Porta-Seis." Permanent seismic records were obtained on Kodak Direct Print linagraph paper or Polaroid film.

2.5.4.3.3.2 Uphole Compressional Wave Velocity Surveys

Compressional wave velocities were determined using uphole techniques at Borings B-4, HS-1, and HS-14. This technique provided a check against compressional wave velocities obtained from the seismic refraction survey.

Small explosive charges were detonated in shallow, drilled holes located around each boring. The energy released by the explosive charges was detected by a series of geophones affixed at intervals of 25 feet to a special cable suspended in each boring. The signal detected by the geophones was recorded using the SIE refraction system. The geophone cable was raised in the boring between recordings to provide geophone intervals of 5 feet in Borings B-4 and 2.5 feet in Borings HS-1 and HS-14. Recordings were made to a total depth of 275 feet in Boring B-4, 102 feet in HS-1 and 104 feet in HS-14.

2.5.4.3.3.3 Uphole Shear Wave Velocity Surveys

Shear wave velocity measurements were made in Borings B-4 and HS-1 using an uphole velocity technique. The uphole shear wave technique provides vertical travel time data that are not affected severely by velocity inversions.

Two energy sources were used for the recordings made at Boring B-4. The first method consisted of impacting an 8-pound sledgehammer against a plank placed in a shallow trench. Both vertical and horizontal impacts were recorded with the horizontal impacts occurring along a tangent to the boring. The second method made use of a detonating cord set in trenches on opposite sides of the boring. Both charges were detonated simultaneously to provide horizontal ground motion around the boring in opposing directions. In recordings made at Boring HS-1, only the detonating cord source was used.

Detection of the energy was accomplished using a three-component, 4.5-Hz borehole geophone (Mark Products L-1-3DS) and the SIE RS-44 refraction recording system. The position of the geophone was

changed between each series of recordings to provide the time-depth data from which velocities were determined.

2.5.4.3.3.4 Crosshole Shear Wave Velocity Surveys

Two crosshole shear wave studies were performed within the plant site and UHS areas. The studies in the plant site area made use of Borings B-4 and B-5. Borings HS-1 and HS-15 were used for this study in the UHS area. The locations for these studies are shown on Figure 2.5-98.

Explosive charges were detonated in shallow, drilled holes at distances varying from 500 to 2,500 feet from Boring B-4, and at distances between 500 and 1,750 feet from Boring HS-1. The shot holes were located in line with both borings in each set used for the crosshole surveys. A three-component, 4.5-Hz borehole geophone (Mark Products L-1-3DS) was suspended at the same elevation in each borehole. Recordings were made using the SIE RS-44 system. The borehole geophones were placed at various elevations during the course of the surveys to provide representative data from the various formations encountered in the boreholes. The interval travel time between shear wave arrivals at each boring was used for shear wave velocity determinations.

2.5.4.3.3.5 Surface Shear Wave Velocity Studies

Two shear wave velocity studies, designed to obtain velocity values for near-surface materials, were conducted in the vicinity of Borings B-4 and B-5 and in the area near Borings HS-1 and HS-15. The recordings made in the vicinity of Borings B-4 and B-5 used two, 4.5-Hz, three-component geophones (Mark Products L-1-3DS) coupled to the SIE RS-44 recording system. Four Sprengnether S-6000 seismometers with a natural frequency of 2 Hz, coupled with a multiple-station Sprengnether System VS-1200-4 amplifier and an Electro-Tech Labs SDW-100 recording oscillograph, were used in the vicinity of Borings HS-1 and HS-15.

The oriented detectors used were placed in a profile array extending away from a shallow trench. Vertical and horizontal impacts initiated by an 8-pound sledgehammer against the sidewalls and base of the trench were recorded for each array. The horizontal impacts were made in opposing directions transverse to the detector line. Following each set of recordings, the array was extended outward to a greater distance from the energy source.

Reversals of secondary transverse motion were plotted as time-distance data for each geophone. Shear wave velocities were obtained by applying best-fit line segments through this data.

2.5.4.3.3.6 Surface Wave Studies

Recordings of surface waves generated by an explosive source were made in the plant site area and in the UHS area. Figure 2.5-98 shows the locations of these surface wave studies.

Surface waves generated by detonating small explosive charges in shallow drilled holes at one end of each surface spread were detected by four, oriented, three-component, 2-Hz, Sprengnether S-6000 seismometers spaced at intervals of 100 feet. The signal detected by the seismometers was fed to the VS-1200-4 amplifier coupled with the Electro-Tech Labs SDW-100 recording oscillograph. Recordings were made of seismometer response at distances of 500 to 2,300 feet from the energy source at the plant site and at distances of 500 to 2,000 feet in the UHS area.

2.5.4.3.3.7 Ambient Vibration Measurements

Measurements of the ambient background motion of the site and its response to natural motion generators are indicative of the site dynamic properties. These measurements were made in two locations as shown on Figure 2.5-98.

An oriented, three-component, 2-Hz, S-6000 Sprengnether seismometer coupled to the VS-1200-4 amplifier and the Electro-Tech Labs SDW-100 recording oscillograph was utilized to record the ambient ground motion. Motion was recorded in three modes: displacement, velocity, and acceleration. In each mode, ground motion was recorded in three components (radial, vertical, and transverse).

The seismograph had gain characteristics as follows: 20,000 in the displacement mode; 2,000 in the velocity mode; and 200 in the acceleration mode.

2.5.4.3.3.8 Borehole Geophysical Logging

The Birdwell Division of the Seismograph Service Corporation was contracted to perform borehole geophysical logging. During the period of May through June 1973, a suite of logs consisting of gamma ray, neutron, density, three-dimensional velocity, caliper, and temperature logs was completed in Borings B-4, B-5, B-6, B-7, B-11, and B-16 (Figure 2.5-99). The results of the Birdwell logging are presented on Figures 2.5-100a through 2.5-100f.

2.5.4.4 Geophysical Surveys

Geophysical investigations at the site consisted of seismic refraction surveys; compressional, shear, and surface wave surveys; and ambient vibration measurements. The studies were conducted at the following locations:

a. Seismic refraction surveys in the plant site area (Profiles 1 and 2), in the UHS area (Profiles 4 and 5), and near the area connecting the plant site and UHS area (Profile 3);

b. Uphole compressional wave velocity surveys in the plant site area (Boring B-4), in the UHS area (Boring HS-1), and near the ESWS pumphouse (HS-14);

c. Shear wave velocity studies in the plant site area along Profile 2 and in the UHS area along Profile 4, including uphole and crosshole shear wave surveys, Birdwell three-dimensional velocity logging and surface shear wave studies;

d. Surface wave studies in the plant site area along a north-south line through the Category I area and in the UHS area along a line normal to the UHS dam;

e. Ambient vibration measurements in the plant site area at a location northwest of the Category I area and in the UHS area along the axis of the UHS dam.

Figure 2.5-98 presents these locations. Survey procedures are presented in USAR Section 2.5.4.3.3 and the results are summarized below.

2.5.4.4.1 Seismic Refraction Surveys

Compressional wave velocities of the various subsurface layers under the site were evaluated by plotting the first arrival times of the seismic energy at each geophone location against the distance of each geophone from the source of the seismic energy. Compressional wave velocity computations and layer determinations were made by applying best-fit line segments through the time-distance data. Corrections for shot depth and offset were applied to each record. Topographic corrections were applied to the data when applicable.

Time-distance plots for Profiles 1 through 5 are presented on Figures 2.5-101a through 2.5-101e. Time-distance plots of the detailed profiling are presented on Figures 2.5-101f and 2.5-101g. Computations of depths to identifiable velocity interfaces were made using time-intercept and/or critical distance methods at each shot point. A variation of the time-intercept method for a shot buried in various layers was followed for depth computations when the shot occurred at or near a refracting interface (Reference 139).

The interpretive cross sections shown below each of the time-distance plots represent a compilation of all available data, both from the refraction data itself and from all available boring information. In addition to the information from the borings, information from the shot hole drillers was utilized in interpreting the refraction data.

The refraction studies indicate that four basic velocity units are present at most of the areas investigated. A thin, near-surface, low velocity zone, indicated by velocities in the range of 700 to 1,800 fps, is representative of the residual soil zone and alluvial soil areas. A second velocity unit, indicated by velocities in the range of 2,000 to 4,000 fps, represents weathered bedrock and unsaturated shales. This second unit generally consists of the Jackson Park Member and the Heumader Member (Figure 2.5-41). A higher velocity unit, represented by velocities ranging from 5,000 to 8,000 fps, indicates saturated shales. At the plant site, this unit generally corresponds to the Heumader Shale Member. This velocity unit is not encountered at some locations at the UHS where the Heumader Shale Member has been eroded away. The highest velocity unit recognized, having velocities in the range of 11,000 to 14,700 fps, corresponds to the various limestone units (the Plattsmouth Limestone, Leavenworth Limestone, and Toronto Limestone Members) found at the site.

Between the top of the Plattsmouth Limestone Member and the base of the Toronto Limestone Member, five separate lithologic units are present throughout most of the plant and UHS area. The three limestone members, the Plattsmouth, Leavenworth, and the Toronto Limestone Members, are separated by two shale members, the Heebner and Snyderville Shale members. The occurrence of these shale members beneath limestone members caused velocity inversions that prevented the determination of additional velocity and depth information from the refraction studies.

Some of the apparent velocities, such as along Profile 1 from Stations 0+00 to 11+50 and along Profile 2, appear to be anomalous when comparisons of varying shot distances are made. The apparent velocities along the segment of Profile 1 decrease from a high of 17,300 fps for near-shot distances to 12,750 fps for long-shot distances. The amplitude of the first arrival energy decreased significantly with increasing shot-to-detector distances. Identification of real first arrival times was impossible, and the picks had to be made on the first trough of the refracted wave train. An additional arrival, which is interpreted to be a wave guide (channel-wave) arrival, apparently occurs within the limestone section. These arrivals were indicated on the refraction records as secondary, relatively high frequency waves with an apparent velocity between 8,000 and 12,000 fps. These channel-waves were of high amplitude and arrived

at the same time as the first trough of the real refracted head-wave. This produced interference between the two wave systems and resulted in the observed apparent velocities being indicative of true head-wave arrivals at the short, shot-to-detector distances and channel-wave arrivals at the longer shot-to-detector distances. Thus, the apparent velocities are slower for longer shot-point-to-detector distances than for the nearer shot distances.

The seismic refraction profiling conducted along Profile 4 indicates the existence of an additional, possibly anomalous, zone from Stations 4+95 to 12+05 and from 14+95 to 18+55. An initial 25-foot geophone spacing employed for the survey along Seismic Profile 4 did not permit detailed evaluation of conditions within those areas. To provide the necessary detail, a 10-foot spacing was used. Adjustments to the data for topography and the incorporation of drilling information permitted a thorough evaluation of these areas. The results obtained indicate that these anomalous velocity plots can be attributed to erosion and thinning or thickening of refracting members along the segment from Stations 4+95 to 12+05 (Figure 2.5-101f). A monoclinal flexure of the refracting members is indicated between Stations 14+95 and 18+55 (Figure 2.5-101g). The velocities shown on the time-distance plot indicate this flexure and the loss of the Leavenworth Member to the south of the fold. Field reconnaissance and the results of the boring program have also confirmed the presence of this flexure.

No reliable determination of the depth to the top of the high velocity refractor, the Plattsmouth Limestone Member, can be made along the north-northeastern portion of Profile 2 (Figure 2.5-101b). The occurrence of near-surface, well-cemented, calcareous sands and carbonate layers within the Jackson Park Shale Member cause anomalous refraction information to be generated. Use of the data presented on the time-distance plots for this portion of Profile 2 to determine layer velocities and depths results in computed depths greater than those determined by drilling and in shale velocities higher than observed elsewhere. The Jackson Park Member is interpreted as the source of the 7,700- to 8,100-fps layer with no underlying shale velocity indicated. Velocity determinations only for the Plattsmouth Limestone Member were made for this portion of the profile, and these velocity values are in agreement with other observed limestone velocities.

The depression of the top of the Plattsmouth Limestone Member, as determined by refraction studies along Profile 1, Stations 2+00 to 8+00 (Figure 2.5-101a), is not considered to be a representation of the actual top of that member. The depression is considered to be related to a lowering of the water table in this vicinity.

Boring logs from Borings P-7 and P-26 indicate that the top of the Plattsmouth Member is above the velocity interface shown along Profile 1 at this point.

Several apparent, total travel time mis-ties on reversed profiles, such as exhibited along Profile 4 from Stations 6+95 to 8+05, result from topographic and weathering corrections applied to the field data (Figure 2.5-101f). In these cases, the corrections were made to each shot point elevation rather than to a common datum. Corrections applied to the time-distance data for Profile 3 were made using elevation 1,081 as datum. Adjustments for elevation were made to the time-distance data for Profile 2 to remove effects caused by the topographic low occurring at Station 18+50.

No additional indications of possible anomalous conditions are encountered along the remainder of the refraction profiles. The computed depths of velocity units along the refraction profiles compare very favorably with the depths that various members are found in borings at the site.

2.5.4.4.2 Uphole Compressional Wave Velocity Surveys

The uphole compressional wave velocity survey data from Borings B-4, HS-1, and HS-14 were evaluated by plotting the travel time from the shot to each geophone against depth in each boring. The travel times were corrected to a vertical path. The resulting time-depth plots are presented in Figures 2.5-102a through 2.5-102c.

The occurrence of velocity inversions is confirmed by the uphole compressional wave velocity surveys conducted in Borings B-4, HS-1, and HS-14. The results of these surveys (Figures 2.5-102a through 2.5-102c) confirm the velocities determined by the refraction studies. Additional units encountered on the uphole surveys are primarily shale members below the Toronto Limestone Member having velocities of 6,800 to 7,800 fps. The determinations of velocities ranging from 10,000 to 14,000 fps correspond to the occurrence of the Plattsmouth and Toronto Limestone Members. The shale members occurring between the Plattsmouth and Toronto members are indicated as a single, lower velocity unit by the slowdown in travel times measured at those depths. The uphole survey in Boring B-4 indicates the presence of a high velocity unit, approximately 18,000 fps, at a depth of approximately 255 feet. A Birdwell, three-dimensional log was run in this boring, and the integrated travel time from this log is also plotted on Figure 2.5-102a. The data from this three-dimensional survey indicates that the above-mentioned velocity of approximately 18,000 fps is spurious. The low 2,625-fps velocity

encountered in the upper 33 feet of Boring HS-14 represents the unsaturated Jackson Park and Heumader Shale members.

2.5.4.4.3 Shear Wave Velocity Surveys

The uphole shear wave survey and the surface shear wave survey are considered the best methods for obtaining these shear wave velocities for the subsurface conditions encountered. Due to the occurrence of the Plattsmouth and Toronto Limestone Members near the surface, little useful velocity data can be discerned from the crosshole shear wave surveys conducted at both locations.

Shear wave velocity values for the members occurring between the top of the Plattsmouth Limestone and base of the Toronto Limestone cannot be established individually for each member. The five separate lithologic units encountered within this 45- to 46-foot thick interval are each less than 20 feet in thickness. Due to these thicknesses and the velocity contrasts between the limestones and shales, shear wave velocities for each of the individual members were not measured. Crosshole and uphole shear wave results, however, do indicate a velocity of 6,000 to 6,200 fps for these strata. This shear wave velocity range is considered to be representative of the limestone members.

Actual shear wave arrivals on the Birdwell three-dimensional logs were observed only within the Plattsmouth, Toronto, Haskell, and South Bend Members. All other shear wave velocities reported by Birdwell were computed from the compressional wave velocity, and the bulk density was computed by an empirical formula. A comparison of compressional and shear wave velocity values obtained from the Birdwell three-dimensional logs and from the other geophysical surveys shows very similar results in all units with the exception of the Jackson Park and Heumader Shale Members. The compressional wave velocity results for those members are in close agreement; however, the shear wave velocity values differ significantly. The 1,400- to 1,500-fps shear wave velocity determined from the surface shear wave surveys are considered more reliable than the Birdwell results for these members because of the empirical nature of the Birdwell shear wave formula.

2.5.4.4.4 Surface Wave Surveys

Surface wave types and characteristics determined by the surveys conducted in the plant site and UHS area are summarized in Table 2.5-49. The values presented are indicative of surface waves generated by a small explosive source.

Particle-motion analysis indicated that the M_1 and M_2 type Rayleigh waves are most clearly defined. Indications of Love wave motion are not as well developed. The results obtained are presented in Table 2.5-49.

Examination of surface wave arrivals recorded during the crosshole surveys indicate the possibility of frequencies lower than those reported from the surface wave records. A Rayleigh wave with a frequency content in the range of 5 to 7 Hz, in addition to the 11- to 20-Hz range observed on the surface wave records, is indicated on the records.

Possible shear wave arrivals noted on the surface wave records yield velocities in the range of 6,000 to 7,000 fps. These velocities may be indicative of shear arrivals through the Plattsmouth or Toronto Limestone Members.

First arrival energy observed on surface wave records showed velocities in the range of 10,000 to 12,000 fps. Particle motion indicated on these records was reversed from the motion that would be anticipated for refracted head-wave arrivals. The velocities and observed particle motion is interpreted to be the result of the channel-wave system previously discussed in USAR Section 2.5.4.4.1.

2.5.4.4.5 Ambient Ground Motion Surveys

The results of the ambient vibration measurements are presented in Table 2.5-50. No significant frequency content was noted on the ambient records. The inclusion of motion values during operation of a bulldozer at a distance of approximately 750 feet from the recording site is provided to contrast the conditions displayed on the recordings taken at the plant site and in the UHS area when activity was at a minimum

2.5.4.4.6 Summary of Results

The summary of geophysical properties of subsurface materials at the plant site are presented in Table 2.5-46 and in Table 2.5-51 for the UHS. The values presented in these tables are considered to be the best representative values for the materials at the plant and UHS sites.

The velocity values determined by all of the various methods are in agreement, except for the variances previously discussed. Compressional and shear wave velocity values that could not be determined by other site geophysical studies are based on the Birdwell Elastic Property Logs for Borings B-4, B-5, and B-11 (Figures 2.5-100a through 2.5-100f).

2.5.4.5 Excavations and Backfill

2.5.4.5.1 Plant Site

The topography at the plant site was generally flat with ground elevations ranging from Elevation 1,102 to 1,109 feet. Because of

the absence of strong relief, no major grading was required to achieve the final grade of 1,099.5 in the plant area. Quality assurance was performed according to Sargent & Lundy specifications and is discussed in USAR Section 2.5.4.5.5.

2.5.4.5.1.1 Excavations

All excavations in the Heumader Shale at the plant site were conducted with conventional excavation equipment, except for minor blasting required in the circulating water intake and discharge trenches, reactor building, and the auxiliary building areas. All excavations in the Plattsmouth Limestone required blasting. Blasting was monitored (USAR Section 2.5.4.13), and the results of the blast monitoring program are presented in the Dames & Moore blast evaluation report (Reference 71). No blasts were considered to have generated particle velocities that would prove damaging to the foundations.

Slopes greater than 20 feet in height were generally cut at two horizontal to one vertical, while slopes less than 20 feet high were cut at one horizontal to one vertical. Slopes below Elevation 1,072 were cut vertical. An excavation plan is shown on Figure 2.5-103. Profiles of the power block excavation are shown on Figure 2.5-104.

2.5.4.5.1.2 Dewatering

No ground-water accumulation due to seepage was ever recorded; however, water accumulation from precipitation was significant at times. Water accumulation in the excavations was removed by sump pumps. The foundation surfaces in the shale member were protected by application of gunite and therefore were not exposed to cooled water.

2.5.4.5.1.3 Protection of Exposed Surfaces

After excavation, vertical surfaces were protected by application of gunite, while horizontal surfaces were covered with a minimum 6-inch thick concrete mud mat to preserve the integrity of the foundation material while the foundation was being constructed. Excavation slopes were also protected when expected to be exposed for long periods of time. Application of gunite was conducted according to Sargent & Lundy specifications. The mud mats and gunite were placed only after thorough cleaning with compressed air. The locations of gunite protection and mud mats are shown in Figure 2.5-105c.

2.5.4.5.1.4 Inspection and Mapping

The foundation excavations were carefully inspected, monitored, and mapped by experienced engineering geologists. The results of the mapping study and the inspection program are presented in Dames & Moore final reports (Reference 72 and 74). General features are discussed in USAR Section 2.5.1.2.4.

2.5.4.5.1.5 Backfill

The locations of lean concrete fill, granular fill, and cohesive fill are shown on Figures 2.5-105a, 2.5-105b, and 2.5-105c, respectively. Cohesive fill was used as backfill only, while grandular fill was used as both structural fill and backfill. Sources for structural granular fill and backfill were crushed limestone from off-site quarries in the Plattsmouth Member Limestone. Compaction and placement data will be presented upon completion of the fill and back-fill operation.

All fill and backfill were compacted and tested according to the requirements outlined in Sargent and Lundy's specifications for sitework, miscellaneous sitework, and earthwork testing.

A summary of the results of field density and moisture content tests used for quality control during construction of structural fill under and backfill around Category I structures is provided on Figures 2.5-105d through 2.5-105v.

2.5.4.5.1.5.1 Material Specifications and Placement Criteria

2.5.4.5.1.5.1.1 Granular Fill

Granular fill used for support of Category I structures consisted of well graded, crushed limestone from approved sources. The material was required to meet the following specifications:

SIEVE SIZE	ALLOWABLE RANGE (PERCENTAGE PASSING)
2 in. (50 mm)	100
1-1/2 in. (37.5 mm)	90-100
1 in. (25.0 mm)	80-100
3/4 in. (19.0 mm)	70-90
3/8 in. (9.5 mm)	52-70
No. 4 4.75 mm)	37-53
No. 10 2.0 mm)	22-37
No. 30 (600 micron)	10-23
No. 40 (425 micron)	7-20
No. 200 (75 micron)	0-10

Granular fill used in Category I areas was of the same specifications as above, except that 15 percent passing number 200 sieve was allowed. The material was placed in lifts not exceeding 12 inches and compacted to 95 percent of the maximum density as determined by ASTM D 1557-70.

2.5.4.5.1.5.1.2 Cohesive Fill

Cohesive fill consisted of inorganic cohesive soils obtained from onsite excavations. Approval of such material was done at the site by the resident geotechnical engineer. Cohesive fill was placed in lifts not exceeding 8 inches and compacted to 95 percent of the maximum density as determined by ASTM D 698-70.

The specification for the cohesive backfill material is provided in USAR Sections 301.2, 301.3 and 301.4 of Table 2.5-37a.

2.5.4.5.1.5.1.3 Bedding Material

The project specifications allowed six different types of granular material to be used for bedding material for support of pipelines. These materials range from gravel with gradations confined within 3/4 inch to the number 8 sieve, to well-graded sands with 2 to 10 percent passing the number 100 sieve. The pipe bedding was placed in lifts not exceeding six inches and compacted to a relative density of not less than 80 percent as determined by ASTM D 2049-69.

2.5.4.5.1.5.1.4 Lean Concrete Fill

Lean concrete fill consisted of granular material stabilized with portland cement in order to achieve a minimum 28-day strength of 2,000 psi.

2.5.4.5.2 ESWS Pumphouse

The location of the ESWS Pumphouse is shown on Figure 2.5-30. The pumphouse is founded partly in the Plattsmouth Limestone Member at Elevation 1,052, and partly on granular backfill at approximately Elevation 1,088.

2.5.4.5.2.1 Excavations

All excavations at the ESWS Pumphouse were performed with conventional excavation equipment. The excavation slopes were cut at a one horizontal to one vertical slope.

2.5.4.5.2.2 Dewatering

No accumulation of water from ground-water seepage was observed; however, removal of water from precipitation runoff was necessary at times. Dewatering was performed using sump pumps.

2.5.4.5.2.3 Protection of Exposed Surfaces

No special measures, such as application of gunite or placement of mud mats, were necessary to protect exposed surfaces.

2.5.4.5.2.4 Inspection and Mapping

The foundation excavations were carefully monitored, inspected, and mapped by experienced engineering geologists. The results of the mapping study and the inspection program are presented in References 72 and 74). Specific features are described in USAR Section 2.5.1.2.4.

2.5.4.5.2.5 Backfill

Granular structural fill and backfill is used at the location of the ESWS pumphouse. The material is placed and compacted according to Sargent and Lundy specifications (see USAR Section 2.5.4.5.1.5).

2.5.4.5.3 Category I Pipelines and Electrical Ducts

The pipeline routes are shown on Figure 2.5-98. The invert elevation of the ESWS intake pipe varies from 1093.5 at the plant interface to 1091.5 at the ESWS pumphouse. The ESWS discharge line invert elevation varies from 1093.5 at the plant interface to 1065 at the ESWS discharge point. The electrical ducts are placed next to the pipes until the pumphouse. Consequently, the pipes and ducts are founded in both the Heumader Shale Member and Plattsmouth Limestone Member.

2.5.4.5.3.1 Excavations

The excavations for the ESW pipeline and electrical ducts were done by conventional excavation equipment. 50 blasting shots were required to allow excavation in the Plattsmouth Limestone for the discharge branch of the ESW pipelines. Blasting was monitored to assure that specified vibration limits were not exceeded for the in-place concrete, as described in USAR Section 2.5.4.13.1. Excavation slopes were cut at a slope of one vertical to one horizontal. Replacement ESW pipelines were installed using conventional excavation equipment. However no blasting was performed for the replacement pipeline excavation.

2.5.4.5.3.2 Dewatering

The excavations for the ESWS pipelines and electrical ducts required only the removal of water accumulated from precipitation runoff. Northeast of the plant the ESW piping crosses beneath the lake. Dikes were installed and these areas were dewatered prior to excavation for the piping.

2.5.4.5.3.3 Protection of Exposed Surfaces

Because of the temporary nature of the excavation, protective coating of the exposed Heumader Shale Member was not required.

2.5.4.5.3.4 Inspection and Mapping

The excavations for the ESWS pipeline and electrical ducts were monitored, inspected, and mapped by experienced engineering geologists. The results of the mapping study and the inspection program are presented in Dames & Moore final reports (References 72 and 74). The excavations for the new ESWS piping are presented in the Fugro final report (Reference 354). General features are discussed in USAR Section 2.5.1.2.4.

2.5.4.5.3.5 Backfill

The ESWS pipelines were primarily placed on controlled low strength material (CLSM) as bedding. CLSM was also used as backfill to a point 12 inches above the pipeline crest elevation. From CLSM above the crest to the surface, cohesive fill was used. A portion of the discharge piping from access vault AV6 to the discharge point was incased in tremie concrete to 24” above the pipeline crest elevation. The electrical ducts were encased in concrete. In some areas the concrete encasement was poured against in-situ materials; in other areas 12 inches of granular bedding material was placed between the encasement and any cohesive fill material at the sides and bottom of the encasement. Cohesive material was used as backfill above the encasement. On the west side of the Control Building and Diesel Generator Building extending west to the road, south to the southwest corner of the Diesel Generator Building and 20' north of the ESW MH-1, approximately 12 inches of the cohesive fill has been removed and replaced of AB-3 crushed rock. The backfill materials were placed, compacted, and tested according to Sargent and Lundy specifications (USAR Section 2.5.4.5.1.5).

Details of the different types of backfill and bedding materials used in the construction of ESWS seismic Category I piping and electrical duct banks are provided in Specification A-3852, (Section 301.5). This specification is reproduced on Table 2.5-54a (sheets 1 through 4).

2.5.4.5.3.6 Seismic Analysis

USAR Section 3.7(B).3.12 addresses the seismic analysis of buried piping and tunnels (such as the electrical duct banks). These components were designed to remain functional after a seismic event which is determined by the SNUPPS design envelope (USAR Table 1.2-1). The WCGS seismological design parameters are an OBE of .12g and an SSE of .2g.

2.5.4.5.4 ESWS Discharge Point

Design considerations call for the ESWS discharge point to be founded at an elevation of about 1,062.5 feet. As shown on Figure 2.5-30, the present ground surface elevation at the discharge point is 1,070 feet. This places the foundation near the base of the Plattsmouth Limestone Member.

The excavation operations were conducted in a manner similar to that outlined in USAR Section 2.5.4.5.1 for the plant site structures. This excavation was performed in the base of the UHS excavation, which is described in USAR Section 2.5.4.5.5.

The plans and typical cross-sections of the excavation limits, backfill and fill materials for the ESWS discharge point are shown in Figures 2.5-105 and 2.5-105z.

2.5.4.5.5 UHS Reservoir

2.5.4.5.5.1 Dewatering

The excavation for UHS Reservoir required only the removal of water accumulated from precipitation runoff.

2.5.4.5.6 Quality Assurance and Quality Control

Quality control and quality assurance organizations at the site performed the inspection and monitoring functions necessary to insure compliance with the project specifications and provided documentation to support that compliance.

Quality control personnel continuously monitored the fill and backfill operations. The prepared subgrade was inspected immediately before placement of fill and backfill materials was initiated and the surface of each lift was inspected for contamination before succeeding lifts were placed. In-place moisture content and density determinations were performed in accordance with rigid frequency requirements given in the project specifications. The in-place moisture and density tests were performed to assure compliance with the density and compaction moisture content criteria given in the specifications.

2.5.4.6 <u>Ground-Water Conditions</u>

A detailed discussion of the ground-water conditions at the Wolf Creek site is presented in USAR Section 2.4.13. Hydrographs of all piezometers are shown on Figure 2.4-56, and water levels are recorded in Table 2.4-32 and 2.4-33.

As discussed in USAR Section 2.4.13.5, water levels measured in piezometers installed in the Heumader Member, Jackson Park Member, and the overburden are generally within about 5 feet of the ground surface; however, some seasonal variations are noted. The shallow water table in the weathered bedrock and soil reflects the amount and frequency of precipitation and is perched on the underlying, unweathered bedrock. The drop in head from the Heumader to the Plattsmouth indicates a downward gradient from the ground surface to the Plattsmouth Member. The water levels in piezometers installed in the Toronto Member are lower than those for the Plattsmouth Member.

Uplift pressures in the Heumader Member due to excess hydrostatic pressures in the Plattsmouth Member will not occur. Also uplift in excavations due to hydrostatic pressures caused by the lack of drainage will not occur. The piezometer readings indicate that the Heumader and Plattsmouth Members have sufficient vertical permeability to allow relief of excess pressure as evidenced by piezometer response to surface infiltration. The hydrostatic pressure in the Toronto Member is not high enough to affect the stability of the base of excavations (USAR Section 2.4.13.5.2).

Water-soluble sulfate concentrations found in soil, rock, and ground-water samples from the Category I area, as well as neighboring water wells, are discussed in USAR Sections 2.4.13.1.1.2 and 2.5.4.1.

2.5.4.6.1 Plant Site

The ground-water table at the plant site is approximately 5 feet below ground surface. Ground-water fluctuations at the site, including a continuous record of water levels in a water table well less than 1/4 mile from the site, are described in USAR Section 2.4.13.2.3.2. Basically, the shallow water table in the weathered bedrock and soil aquifer will reflect the amount and frequency of precipitation. During the operation of the plant, the shallow water table ranges from within a few feet of the ground surface to a depth of less than 10 feet when the cooling lake level is at elevation 1,087 feet.

The low permeability of the soils and weathered bedrock indicated that the amount of seepage into the excavations during construction would be very low. Sump pumps located in the excavations were adequate to remove the seepage and any runoff that occurred after periods of heavy rainfall.

The maximum elevation that the cooling lake may reach during the probable maximum flood (PMF) is 1,095.0 feet. Because of this high elevation during a period of flooding, saturation of the

soils may raise the ground-water level to near the ground surface at the plant site. Thus, the design ground-water level has been conservatively assumed to be at Elevation 1,099.5 for the final plant grade.

The design bases for hydrostatic loadings on subsurface portions of safety-related structures are presented in USAR Section 2.4.13.5.

2.5.4.6.2 Ultimate Heat Sink

The present hydraulic gradient of the ground water in the soil and weathered bedrock slopes towards the creek bottom at the base of the UHS area. This gradient would be reestablished should the cooling lake be lost, causing water from saturated material of the lake bottom along the sides of the UHS to drain into the UHS.

Results of permeameter and pressure tests show that the materials underlying the UHS are sufficiently impermeable to prevent significant leakage through its sides and base (Table 2.4-40). Thus, the UHS will provide adequate containment of water for the ESWS. Minor leakage, is balanced in part by ground-water flow into the UHS.

Normal dewatering methods, such as pumping from sumps, were used during the construction of the UHS, because the permeability was very low within the material excavated.

Hydrogeologic conditions at the UHS are discussed in USAR Section 2.5.6.2.1.2.3.

2.5.4.6.3 ESWS Pumphouse

The shallow ground-water level in the vicinity of the ESWS pumphouse is marked on geologic cross sections J-J' on Figure 2.5-50.

The base of the ESWS pumphouse is designed such that it is placed near the base of the Plattsmouth Limestone Member. No other dewatering methods than pumping from sumps were anticipated during construction, because the permeability determined from field measurements in rock and laboratory tests on soil is very low within the strata to be excavated (Table 2.5-34).

The maximum design elevation of the cooling lake is 1,095.2 feet, about 3 feet above the present ground surface at the ESWS pumphouse. The design basis for hydrostatic loadings on subsurface portions of the ESWS pumphouse is presented in USAR Sections 2.4.13.5 and 2.5.4.10.2.

2.5.4.6.4 Category I Pipelines

Geologic cross section, Figure 2.5-47, indicates that the shallow ground-water table along the Category I pipeline routes will be in the overburden. The depth to ground water varies along the ESWS pipeline route. It is closer to ground surface near the plant site than near the ESWS pumphouse and ESWS discharge point. Laboratory permeability test values for the natural soils and field permeability test values for the Heumader Shale and Plattsmouth Limestone members are very low, which suggested that normal dewatering techniques, such as pumping from sumps, could be used during pipeline construction in these units (Table 2.5-35).

2.5.4.6.5 ESWS Discharge Pipe Encasement and Discharge Point

The ESWS discharge pipe encasement and discharge point lies in the eastern arm of the UHS. Ground-water conditions are similar to those described in USAR Section 2.5.4.6.2 for the UHS.

2.5.4.7 Dynamic Soil and Rock Properties

The design dynamic soil and rock properties at the site are listed in Tables 2.5-45 and 2.5-48 and Figures 2.5-97a through 2.5-97h for the plant site and ESWS pumphouse. These values are based upon the following:

a. A review of all available field and laboratory tests performed during this investigation;

b. A review of the geophysical surveys performed during this investigation; and

c. A review of the latest available literature.

Descriptions and results of the field investigations and the laboratory testing program which provided background information for the investigation of the dynamic soil and rock properties are presented in USAR Sections 2.5.4.2.1 and 2.5.4.2.2. Soil structure interaction analyses are described in USAR Section 3.7.2.4. Dynamic analysis of buried pipelines and duct banks is described in Section 6.0 of Bechtel Topical Report, BC-TOP-4A.

No dynamic tests were performed on the pipe bedding material, since several alternative materials were to be used as pipe bedding. The pipe bedding materials ranged in gradation from gravelly sand to medium sand with little or no fines. The shear modulus range and strain degradation curves (Figure 2.5-97c) were, therefore, chosen as those for dense sands and gravelly sands as

presented in Reference 236.

Dynamic triaxial tests on the Heumader shale were not performed due to problems with slaking during coring and high fissility of the core. Resonant column tests were attempted on some samples (Table 2.5-38), however, due to uncertainty regarding the applicability of the resonant column tests on rock samples (insufficient apparatus stiffness) and the problems with slaking and fissility of the core samples, these test results were not regarded as reliable and were only used for evaluation of a possible lower bound shear modulus. The strain degradation curves on Figure 2.5-97a and b, were, therefore, based on the geophysical test results for anchor points at 10^{-4} percent shear strain, the strain degradation curves for the residual soils (Figure 2.5-97f), and judgment.

The shear wave velocities at the plant site, measured along an open end line using a sledgehammer for impact energy, indicated an average shear wave velocity for the Upper and Lower Heumader shales in the range of 1400 to 1500 feet per second. Since the strength of the Lower Heumader shale (being calcareous in nature) is higher than the Upper Heumader shale, the shear wave velocity in the Upper Heumader shale should be lower than that in the Lower Heumader shale. The resonant column tests on samples from the Upper Heumader shale showed shear wave velocities in the range of 500 to 800 feet per second. Considering that these tests results would be too low (insufficient testing apparatus stiffness and shale fissility), the shear wave velocity for the Upper Heumader shale at the plant site was estimated to be 1000 feet per second. Thus, since the average velocity for the Heumader shale was measured in the range of 1400 to 1500 feet per second, the shear wave velocity of the Lower Heumader shale was estimated to be 1800 feet per second. These velocities correspond to shear moduli of approximately 5×10^6 and 15×10^6 pounds per square foot for the Upper and Lower Heumader shales, respectively.

The strain degradation curves for the Upper Heumader shale was selected as that of the upper bound for the residual soils at the site (Figure 2.5-97f). However, the shear modulus for the Lower Heumader shale due to its calcareous nature and higher strength, was considered less strain dependent, and a flatter strain degradation curve was estimated for this material.

The compressional wave velocity in the Heumader shale near the ESWS Pumphouse (Boring HS-14, Figure 2.5-102c) was measured by an uphole compressional wave velocity survey. The average compressional wave velocity obtained was approximately 2625 feet per

second for both the Upper and Lower Heumader shales. The Upper Heumader shale at Boring HS-14 is highly weathered and soil-like, and would, with a Poisson's ratio of 0.4 to 0.45, have a shear wave velocity in the range of 1050 to 800 feet per second. However, the Upper Heumader shale at the ESWS Pumphouse (Borings ESWS-28 and ESWS-29) is slightly less weathered than at Boring HS-14. The shear wave velocity for the Upper Heumader shale at the ESWS Pumphouse was, therefore, estimated to be the same as that at the plant site, namely 1000 feet per second. The Lower Heumader shale at the ESWS Pumphouse is also weathered to a lesser degree than at HS-14. The shear wave velocity for the Lower Heumader shale was, therefore, estimated to be 1300 feet per second, giving a shear modulus of 8×10^6 pounds per square foot at a strain of 10^{-4} percent and lower. This shear modulus corresponds to a Poisson's ratio of approximately 0.40 using a compressional wave velocity of 3200 feet per second. The strain degradation curves were taken as those for the Heumader shale at the plant site.

Since similar materials tend to have comparable strain degradation characteristics, the strain degradation curves obtained from dynamic triaxial tests on shale samples taken in Illinois (Maquoketa Shale) are shown on Figure 2.5-97i (Carroll County Station Site Suitability, Site Safety Report Docket Nos. S50-599 and S50-600). Also shown are the strain degradation curves for the Heumader Shale from Figure 2.5-97b. The Maquoketa Shale contains the same type clay mineral constituents as the Heumader Shale, and, in addition, the fractional clay contents are within 10 to 20 percent of those of the Heumader Shale. The Atterburg Limits for both shales are between 30 and 40 percent for the Liquid Limit and between 15 and 20 percent for the Plastic Limit. No measurable swelling clay minerals were detected in either shale, and both shales exhibit similar strength properties. Figure 2.5-97i presents the mean strain degradation curve for 13 tests for the Maquoketa Shale and the test results for a sample from the Maquoketa Shale with the highest unconfined compressive strength (460 pounds per square inch as compared to 300 pounds per square inch obtained for the Lower Heumader Shale). As shown, the strain degradation characteristics for the Maquoketa Shale are quite similar to those estimated for the Heumader Shale. Therefore, the estimated strain degradation curves for the Heumader Shale are considered representative.

2.5.4.8 Liquefaction Potential

All safety-related structures (Figure 2.5-30), except portions of the Category I pipelines, are founded on rock, concrete fill, or granular structural fill. Analysis of existing subsurface data show that all soils under the Category I pipelines are clayey with the plasticity index exceeding 10 percent and would, therefore,

not be subject to liquefaction (Reference 82). The granular structural fill and pipe bedding are compacted to relative densities in excess of 80 percent. Analyses based on Seed and Idriss (Reference 230) indicate that no liquefaction will take place for the postulated SSE.

2.5.4.9 Earthquake Design Basis

An SSE corresponding to a maximum, horizontal, seismically induced motion of 0.12 times the acceleration of gravity (0.12g) has been selected for the site. However, a seismic evaluation using the Lawrence Livermore Laboratories spectrum has been performed. This spectrum is enveloped by a Regulatory Guide 1.60 spectrum anchored at 0.15g. Discussions of the SSE and the seismic evaluation using the Lawrence Livermore Laboratories spectrum are presented in USAR Section 2.5.2.6 and Appendix 3C.

However, all seismic Category I power block structures are designed for an SSE of 0.20 g maximum horizontal and vertical ground acceleration. The OBE is a minimum of one-half the ground acceleration of the selected SSE. All seismic Category I power block structures are designed for an OBE of 0.12 g maximum horizontal and vertical ground acceleration.

2.5.4.10 Static Stability

2.5.4.10.1 Plant Site

All Category I and other major structures are supported on mat foundations with the exception of portions of the turbine building, which is founded on conventional spread footings. Foundation levels, dimensions, and static loads for the power block are listed in Table 2.5-52. Final plant grade is at Elevation 1,099.5. The foundations of the powerblock structures and systems are designed for the subsurface conditions that result in the most conservative foundation thickness and reinforcing steel.

2.5.4.10.1.1 Bearing Capacity

Static bearing capacity of the foundation bedrock was evaluated on the basis of shear strengths and unconfined compression strengths determined from the unconfined compression tests (USAR Section 2.5.4.11). Due to slaking of the shale members samples, the values for shear strength and, hence, bearing capacity are considered to be conservative. Unconfined compression strengths obtained from the limestone samples are considered to be representative for rock with an RQD of 100 percent. The in situ strength of

the rock mass was, therefore, adjusted by applying a reduction factor to the shear strength based on measured RQD and the effect of joints and thin shale partings. Based conservative on the lowest obtained RQD for the Plattsmouth Limestone Member (50 to 60 percent), the elastic modulus was reduced according to Deere and others (Reference 79). Assuming a linear relationship between modulus of elasticity and unconfirmed compression strength, the latter was reduced by a factor of 10. The unconfined compressive strength was reduced by an additional factor of three to consider the effect of shale partings.

The ultimate bearing capacity and allowable static and dynamic bearing capacities for the plant site buildings are presented in Table 2.5-53. Factors of safety in all cases exceed three for static loads. A factor of safety in excess of two will be maintained for dynamic loading. Bearing capacities for structures resting on compacted granular fill or the Upper Heumader Shale Member were calculated using a multilayer system (Reference 264) and by neglecting the beneficial effect of the underlying Plattsmouth Limestone Member. Bearing capacity for structures resting on the Lower Heumader Shale Member were based on the strength of the shale only.

Bearing capacity of the granular structural fill was based on a conservative estimate of an internal angle of friction of 40 degrees. This angle was based on Dames & Moore test results for similar material.

Lean concrete fill was used at the power block area in places where it was difficult to place structural backfi1l properly or where sufficient quantities of structural backfill were unavailable during the early stages of construction.

2.5.4.10.1.2 Settlement

The settlement calculations are based on structures supported directly on bedrock exposed at foundation grade, except for the areas shown on Figure 2.5-105a where lean concrete was placed. Also, the fuel building and tanks, portions of the auxiliary building, and some footings in the turbine building are supported on granular structural fill.

The compressibility characteristics of the foundation subgrade materials were evaluated based on the results of laboratory tests, field geophysical measurements, and published data. The results are summarized in Table 2.5-45.

Due to slaking and softening during coring, the values for static elastic moduli for the shales were modified and evaluated on the basis of the dynamic modulus adjusted according to the measured RQD, the effect of clayey layers, shear strength from unconfined compression tests, and staticdynamic modulus ratios for similar rock obtained from available literature (Reference 279).

Settlements of plant site structures were calculated based upon static loads using the methods of settlement analysis described in USAR Section 2.5.4.11. The calculated settlements for static loads at various locations are shown in Figure 2.5-106. Any reduction in effective foundation loads from buoyancy was not included. Maximum computed settlement was 1.5 inches in the fuel building. The maximum differential settlement was 1.1 inch and occurred within the fuel building. Estimated maximum and minimum settlements are presented in Table 2.5-54.

Following excavation, rebound was assumed to be elastic and will amount to approximately 1/4 inch. The settlements will be elastic and will occur essentially upon application of the dead load.

Differential settlements between adjacent structures were evaluated on the basis that the significant differential movements are those that occur after the connections between structures are made. It is anticipated that the differential settlements between adjacent structures will be on the order of 1/8 inch after the structures are interconnected.

Settlement versus time plots for Category I structures are presented on Figures 2.5-106a through 2.5-106h. The maximum total and differential settlements measured are presented in Table 2.5-54b and Figures 2.5-106i and 2.5-106j. It appears that most of the settlements have been completed, therefore, only negligible settlements are expected in the future. The measured total and differential settlements compare well with these predicted for all structures, with only minor differences. These differences were small and well within the allowable ranges (Table 2.5-54b). The impact of these differences should, therefore, be negligible.

2.5.4.10.1.3 Earth Pressures

All structures were designed to resist full hydrostatic ground-water pressure, assuming a ground-water level of Elevation 1,099.5 feet. All mat foundations were designed to resist hydrostatic uplift pressures.

The earth pressure coefficients were applied using an equivalent fluid pressure for static conditions and assuming that undrained

conditions will prevail during an earthquake. The force distribution on the walls due to the static component of the lateral earth pressure was assumed to be triangular with the resultant force acting at one-third of the height of the wall above the base. The incremental difference in forces between the static and dynamic cases will have an inverted triangular distribution with the resultant assumed to act at two-thirds of the height of the wall above the base.

The dynamic lateral earth pressures are for at-rest conditions only. They will be assumed to act at one-third the height of the wall above the base. Lateral earth pressures from surcharge loading will act at midheight between the elevation of the load and the base of the wall. The earth design pressure diagrams are shown on Figure 2.5-107a & 107b for Wolf Creek site and Figure 2.5-152 for the SNUPPS design. Methods of calculation are discussed in Section 2.5.4.11.

The plots of the magnitude and distribution of lateral earth and water pressures as well as dynamic lateral pressures are provided in Figures 2.5-107c through 2.5-107h.

2.5.4.10.2 ESWS Pumphouse

The ESWS pumphouse is supported by a mat foundation within the lower Plattsmouth Limestone Member at an elevation of about 1,053 feet.

2.5.4.10.2.1 Bearing Capacity

The static bearing capacity of the bedrock supporting the main portion of the ESWS pumphouse was evaluated on the basis of unconfined compression test results (USAR Section 2.5.4.11). Unconfined compression tests were performed on representative samples from the Plattsmouth, Leavenworth, and Toronto Limestone Members as well as the interbedded Heebner and Snyderville Shale Members; results of these tests are presented in USAR Section 2.5.4.2.2. The bearing capacity of the granular fill was estimated on an internal angle of friction of 40 degrees, which gave an ultimate bearing capacity in excess of 60,000 psf for both static and static plus dynamic loads. Since the static and static plus dynamic loads on the structural fill are 6,600 psf and approximately 12,500 psf, respectively, the factors of safety are on the order of 5 or higher for both loading conditions.

From USAR Section 2.5.4.2.2, it is apparent that the bearing capacity of the lower pumphouse foundation is controlled by the strength of the Snyderville Shale Member. Calculations show that the net ultimate bearing capacity of the Snyderville is approxi-

mately 60,000 psf when based on the mean value of all unconfined compression tests performed on the Snyderville Shale (except the high value obtained from Boring B-5, Table 2.5-32). If only tests from the UHS are used to determine the bearing capacity of the Snyderville shale, a value of close to 75,000 psf is obtained. As pointed out in USAR Section 2.5.4.10.1.1, the ultimate bearing capacity value is considered conservative because of slaking of the shale during sampling operations. Therefore, a factor of safety of approximately 10 is obtained for the static load of 6,600 psf. The static plus dynamic load is distributed over an area (the northeast corner of the structure) in a prismatic fashion with a maximum intensity at the northeast corner of 23,000 psf. Therefore, the maximum load intensity will decrease with depth and be reduced to less than one half of the maximum at the top of the Synderville shale. Therefore, the factor of safety under static plus dynamic load is on the order of 5 or greater.

2.5.4.10.2.2 Settlement

Settlement calculations for the ESWS pumphouse are based on direct founding on the Plattsmouth Limestone Member and structural fill at foundation grade. These calculations were performed in the same manner as described in USAR Section 2.5.4.10.1.2.

Employing the design gross static bearing value of 6,600 psf, the analysis showed that the maximum probable settlement of the ESWS pumphouse will be less than 0.25 inches. The maximum probable differential settlement will be less than 0.15 inches. These settlements are elastic and will occur essentially upon application of the load.

2.5.4.10.3 Category I Pipelines

The locations of Category I intake and discharge pipes are provided on Figure 2.5-98 Sht. 2. The pipe invert elevations are shown on Figures 2.5-47 and 2.5-51.

2.5.4.10.3.1 Settlement

The Category I pipe inverts are established in rock and residual soil. The base of the pipeline trench consists of hard residual clay, highly to moderately weathered Heumader shale, and slightly weathered to unweathered Plattsmouth Limestone. The materials underlying the base of the pipe trenches are subjected to greater stress than previously existed only where the discharge pipe extends under the cooling lake. The cooling lake water imposed an added stress on foundation materials until the ground-water system attained equilibrium with the cooling lake.

Geologic residual stresses, elastic rebound and swelling of foundation materials during excavation, swelling of foundation materials after inundation by the cooling lake, effective stress changes in foundation materials from preconstruction to post-construction conditions, and deformation properties of foundation and backfill materials were evaluated to determine total and differential settlements along the pipeline routes.

Residual stresses remaining in the rocks are believed to be minimal (USAR Section 2.5.1.2.5.4). The site area has not been glaciated, and the observed joints suggest relief of stresses due to erosion of overlying sediments and to local structural adjustment. Therefore, the potential for heave associated with geologic stresses during or after excavation is considered to be minimal.

Some minor elastic rebound of the shales occurred as the trenches were excavated. Most of this expansion was taken up as elastic settlement when pipelines, bedding material, and backfill were placed in the trench. The test results (Tables 2.5-43 and 2.5-44) indicate that the swelling potential of these members was not appreciable.

Uplift pressures in the Heumader Shale Member during construction due to lack of drainage or to excess hydrostatic pressures in the underlying Plattsmouth Limestone and Toronto Limestone members was not significant (USAR Sections 2.4.13.5 and 2.5.4.6).

The maximum change in effective stress from preconstruction to postconstruction conditions was estimated to be less than 2,000 psf where the discharge line underlies the UHS Pond. This stress change resulted in negligible settlement of foundation materials.

Compacted granular or CLSM backfill material is provided beneath the pipelines and extends to 1 foot above the invert of the upper-most pipe in the pipeline trench. Tremie concrete is provided beneath the discharge piping between access vault AV6 and the discharge point and extends 2 feet above the piping. On-site excavated cohesive soils were utilized above the pipeline and bring the trench to final grade. Any swelling of the cohesive backfill will have a negligible effect on the pipelines.

The typical transverse cross-sections of the excavation limits, backfill and fill materials for the ESWS pipeline are shown in Figure 2.5-105w.

Details of the typical longitudinal section and cross-section of the interface between the ESWS pipes and structures are provided in Figures 2.5-105x through 2.5-105z. The settlements for the ESWS pipeline have been calculated near the connection points at the control building and the ESWS pumphouse. At the control building, the static settlement caused by the structures is cal-

culated to be 0.2 inch. The calculation also shows that the settlement at a distance of 20 feet from the control building is approximately 0.1 inch. Settlement of the pipe close to the building from backfilling above the pipe was computed to be on the order of 0.1 inch. Therefore, it is concluded that the total and differential settlements of the ESWS pipeline caused by static loads will be less than the total settlement of the control building (i.e. less than 0.2 inch). Settlements of the pipeline from dynamic loads are negligible. Settlements of the control building during dynamic loadings will be elastic and recoverable with maximum deflection computed to be less than 0.1 inch.

The settlement computations for the ESWS pumphouse show that the settlements of the ESWS pumphouse structure will be less than 0.25 inch. The settlement of the ESWS pipe next to the ESWS pumphouse is computed to be on the order of 0.1 inch. Total and differential settlements of the pipe at the ESWS pumphouse structure will, therefore, be on the order of 0.1 inch. The settlement of the ESWS pipe under dynamic loads will be negligible. The settlement of the pumphouse during dynamic loading will be less than 0.1 inch. Total and differential settlements of the ESWS pipe and the ESWS pumphouse structure will, therefore, be less than 0.1 inch.

Total and differential settlement at the ESWS discharge point will be negligible under both static and dynamic loads.

The ESWS pipeline is founded on a maximum of 12 inches of pipe bedding over bedrock or structural fill. Since the combined weight of the piping and the backfill is approximately equal to the removed overburden, any settlement occurring from static loads will be due to the compression of the underlying material from the weight of the backfill. On this basis settlements along the pipeline are negligible.

Settlements close to the structures (control building and ESWS pumphouse) where the thickness of the structural fill underlying the pipe is between 10 and 20 feet is calculated to be on the order of 0.1 inch.

The pipe bedding is compacted to 80 percent relative density. The structural fill is placed at 95 percent of the maximum dry density as determined by ASTM-D1557 (Modified Proctor). Recent correlations between relative density and Modified Proctor tests show this density corresponds closely to 100 percent relative density (see Table 2.5-48). No settlement due to compaction from dynamic load was, therefore, anticipated for the structural fill.

Any settlements due to dynamic loads arose from compaction of the granular pipe bedding under the pipeline. Settlement calculations were, therefore, performed in accordance with Silver and Seed (Reference 242) and Pyke, et al (Reference 217). These calculations show that the settlements of the ECCS pipeline from dynamic loads was negligible.

It is concluded that heave of rock or soil units due to geologic residual stresses, rebound during excavation, swelling of foundation materials upon inundation by the cooling lake, or excess ground-water pressures will not affect the function nor pose a hazard to the Category I ESWS pipelines. The maximum net settlement of the pipelines is estimated to be less than 1/8 inch.

2.5.4.10.4 ESWS Discharge Point

The location of the ESWS discharge point is shown on Figure 2.5-98 Sht. 2. The discharge point will be founded on the Plattsmouth Limestone Member at Elevation 1064. Maximum bearing pressures are estimated on the order of 0.8 kips per square foot, whereas the maximum static plus dynamic bearing pressure will be on the order of 1.0 kips per square foot.

The bearing capacity of the stratigraphic column below the foundation grade, including the Plattsmouth Limestone Member, is well in excess of the applied static and dynamic loads and provides factors of safety well in excess of the required minimum (USAR Section 2.5.4.10.1.1). Settlements resulting from the applied loads are negligible.

2.5.4.11 <u>Criteria and Design Methods</u>

The subsurface walls for the seismic Category I power block and ESWS structures are designed as rigid, restrained walls to resist static at-rest and dynamic pressures. The lateral earth pressures used in the design of these walls were based on the maximum pressures developed. The equations developed, as shown in Figure 2.5-152 for the power block and Figures 2.5-107a & 107b for the Wolf Creek site related Category I structures, are used in conjunction with the soil parameters and the enveloping earthquake loads to compute the lateral pressures at the top and bottom of the subsurface walls. The maximum earth pressures thus computed are taken as the enveloping pressures and are used in design. In addition, a minimum surcharge of 250 pounds per square foot is assumed to act over the backfill surface, and the resulting pressures on the subsurface walls are included in the design loads. Similarly, the surcharge loads of foundations located near the subsurface walls are included in the design of the walls.

The design criteria are based on established soil and rock mechanics principles discussed in the references cited below. Bearing capacity values were established using the Meyerhof bearing capacity factors as defined in Terzaghi and Peck (Reference 253), D.F. Coates (Reference 41), U.S. Department of the Navy (Reference 264) and on results of shear strength tests.

Settlements were computed using the tangent modulus method after Reference 121 and the Dames & Moore ECP-10 computer program, "Analysis of Settlements Due to Areal Loads" with a modification for the tangent modulus method. The ECP-10 computer program was developed by Dames & Moore and uses the Boussinesq stress distribution theory assuming flexible foundations.

Static earth pressures were computed using Rankine's and Jaky's earth pressure theory (Reference 253) and the total stress concept. Dynamic earth pressures were computed according to Seed and Whitman (Reference 235) and Sabzevari and Ghahramani (Reference 223).

Factors of safety were chosen according to accepted procedures and practice (Table 2.5-53), using a minimum factor of safety of 3.0 for static loads and 2.0 for dynamic loads.

2.5.4.12 Techniques to Improve Subsurface Conditions

No special techniques, such as pressure grouting, were required to improve subsurface conditions beneath Category I structures. The results of comprehensive boring programs at each of the Category I facilities established that competent bearing materials are present beneath foundation grades at the plant site ESWS pumphouse, and ESWS pipelines (USAR Section 2.5.4.2). At the UHS dam, soil and highly weathered rock was removed to competent rock, as described in USAR Section 2.5.6, to attain the foundation surface for the earthfill UHS dam. Therefore, techniques to improve subsurface conditions consisted of normal foundation preparation for placement of fill or concrete on rock bearing surfaces.

The foundation preparation for the UHS dam is described in USAR Section 2.5.6. Foundation preparation for ESWS pipelines was provided as discussed in the Dames & Moore essential service water system report for the original ESWS pipelines (Reference 69). Bechtel essential service water system report (Reference 355) used the Dames & Moore report and Fugro (Reference 354) for foundation preparation for the replacement ESWS pipeline and discharge point. Foundation preparation for the Category I plant structures and ESWS pumphouse, consisted of removal of foundation materials disturbed by excavating equipment, cleaning of the bearing surfaces, and placement of mud mats.

The preparation of foundation surfaces included removal of unsatisfactory material resulting from disturbance by excavation operations. Hard rock promontories were removed using careful blasting techniques to avoid damaging the foundations. Loose blocks

of rock were removed by hand picking and wedging techniques. Localized seams of weathered rock exposed at bearing surfaces were removed by hand shoveling. Bearing surfaces were thoroughly cleaned with air jets to provide a clean surface for concrete placement. Foundation preparation was inspected by a qualified engineer or engineering geologist who determined that competent rock was attained at foundation bearing grades and that unsatisfactory material was removed.

2.5.4.13 Subsurface Instrumentation

2.5.4.13.1 Blast Monitoring

During the last evaluation program, all blasts were monitored using Sprangnether Engineering Seismographs, Models VS-1100 and VS-1200. These instruments measured ground motion in terms of particle velocity in three orthogonal directions (longitudinal, transverse and vertical).

The seismographs obtained from each blast recorded were analyzed by measuring peak to peak amplitudes. The amplitudes were converted to representative particle velocities and summed to obtain the actual ground motion for each seismogram.

The vibrational criteria used at the site were specified by Bechtel Power Corporation and by Sargent & Lundy specifications. These documents established allowable maximum particle velocity in the vicinity of concrete up to 11 hours old as 0.1 inch per second, in the vicinity of concrete from 11 hours to 7 days old as 0.5 inch per second, in the vicinity of concrete from 7 to 28 days old as 2.0 inches per second, and in the vicinity of concrete older than 28 days as 2.5 inches per second. Any blast estimated to yield less than 10 percent of the permissible particle velocity did not require monitoring.

No blasts were found to cause particle velocities that would be detrimental to the concrete structures.

2.5.4.13.2 Settlement Monitoring

No settlement monitoring program was required.

2.5.4.14 Construction Notes

No significant construction problems arose during the excavation and backfilling of the Category I areas. During the excavation of the circulating water pipe trench (non-Category I), local instability was noticed. Slopes were cut in the Upper Heumader

Shale at one horizontal to one vertical. The slopes exceeding 20 feet in height in the Heumader Shale at the power block were revised from one horizontal to one vertical to two horizontal to one vertical. No problems were noticed with the slopes in the power blocks excavations.

Upon installation of the emergency fuel oil vaults for emergency fuel oil tanks, the coating for the tanks was discovered to be peeling; the tanks were uncovered to allow recoating of tanks. A retaining wall was installed between the Reactor Makeup Water Tank Foundation and the Fuel Oil Tanks to provide slope protection for Reactor Makeup Water Tank and for personnel safety. The retaining wall was cut off at elevation 1086' and left in place.

2.5.5 STABILITY OF SLOPES

Unit No. 1 at the Wolf Creek site is located within a very gently sloping open area. There are no natural slopes surrounding the Category I power block structures whose failure could adversely affect the safety of the unit. In addition, there are no cut or fill slopes in this area whose postulated failure could adversely affect the safe shutdown of the unit following the SSE.

Slopes of interest to the safe operation and shutdown of the unit are the slopes, both natural and manmade, forming the UHS that is part of the ESWS.

2.5.5.1 Slope Characteristics

The UHS is shown schematically on Figure 2.5-108, and consists of a 95-acre Category I submerged pond with an average depth of 5 feet (also see introduction to 2.5.6). It was formed by excavating and damming a portion of the 5,090-acre main cooling lake. The maximum design elevation of the cooling lake is 1,095.0 feet, and the normal operating level is 1,087 feet. The UHS dam crest elevation is 1,070 feet. The UHS bottom elevation is 1,065 feet.

The thickness of the natural soil cover above the bedrock in the UHS area averages about 6 feet and ranges from 0.3 foot near the UHS dam to a maximum of about 18 feet near the ESWS pumphouse.

2.5.5.1.1 Description of UHS Slopes

The natural slopes surrounding the UHS pond are very flat, ranging from one vertical to 15 horizontal to one vertical to 60 horizontal. The rolling topography gradually slopes toward Wolf Creek and varies in elevation from approximately 1,087 feet at the edge of the cooling lake to 1,054 feet at the location of the UHS dam.

The topography of the natural ground and the limits of cuts and fills are shown on Figure 2.5-108.

The man-made slopes forming the periphery of the UHS were excavated from Elevation 1,070 to 1,065 at grades varying from 1.0 to 6.7 percent. The slopes between the existing grade elevation and 1,070 are designed to be five horizontal to one vertical. Figure 2.5-109 presents details of the typical man-made slopes forming the UHS. Figure 2.5-108 shows the plan view of the locations of these slope cross sections.

The ESWS intake channel is located in the northwestern portion of the UHS. The details of the intake channel slopes are presented on Figures 2.5-108 and 2.5-110. The excavated slopes on the channel consist of five horizontal to one vertical, from existing grade to Elevation 1,070, and slopes of three vertical to one horizontal, from Elevation 1,070 to 1,065 feet. A 55-foot bench is provided at Elevation 1,070 along the intake channel to protect against blockage by sheet ice. The benching details are shown on Figure 2.5-110. The icing conditions are described in Reference 134.

Filter bedding and riprap was placed on the slopes of the intake channel adjacent to the ESWS pumphouse. On the south side of the channel, the protection consisted of 3-foot thick riprap and 3-foot thick underlying filter bedding. On the north side of the slope, 2-foot-6-inch thick riprap and 3-foot thick bedding was provided. The details of the protection are shown on Figure 2.5-111.

The ESWS discharge point is in the eastern arm of the UHS. The excavated slopes near the discharge point are very flat, having a maximum slope of 1 percent below Elevation 1,070. The slopes between existing grade and Elevation 1,070 are five horizontal to one vertical. A typical cross section of the slope at the location is shown on Figure 2.5-110.

2.5.5.1.2 Exploration

The exploration program at the site of the UHS is discussed in USAR Section 2.5.6.2.1.

2.5.5.1.3 Ground-Water Conditions

The ground-water conditions at the site of the UHS are discussed under USAR Section 2.5.6.2.1.

2.5.5.1.4 Subsurface Conditions

2.5.5.1.4.1 Stratigraphy

The stratigraphy and geologic features at the UHS site are discussed in USAR Section 2.5.6.2.1.

2.5.5.1.4.2 Laboratory Testing Program

Undisturbed samples of soil and rock were tested in order to evaluate the in situ properties of soil and rock at the site of the UHS. The following tests were performed:

a. Tests On Soil

1. Particle-Size Analysis;
2. Atterberg Limits Test;
3. Moisture and Density Determination;
4. Specific Gravity Determinations;
5. Consolidation Tests;
6. Unconfined Compression Tests; and
7. Consolidated Undrained Triaxial Tests.

b. Tests On Rock

1. Moisture and Density Determination;
2. Unconfined Compression Tests;
3. Resonant Column Tests; and
4. Wave Propagation Tests (Shockscope Tests).

The results of the laboratory tests on the soil and rock at the site of the UHS are presented in Reference 59. The Laboratory Testing program is also discussed in USAR Section 2.5.6.4. Soil properties selected for use in the slope stability analysis are presented in Table 2.5-55.

2.5.5.2 <u>Design Criteria and Analyses</u>

As stated previously, the slopes of interest to the safe operation and shutdown of the unit are the natural and manmade slopes forming the UHS. The design criteria and analyses of these slopes are described below.

2.5.5.2.1 Natural Slopes

The natural slopes in the UHS area are quite flat, ranging from one vertical to 15 horizontal to one vertical to 60 horizontal.

The loss of water in the cooling lake would drain water to the top elevation of the UHS dam at Elevation 1,070 feet. Even though the soils in the natural slopes would be saturated, the residual strength of the natural soil is more than adequate to forestall any slides from occurring on such flat slopes. Any minor sloughing that may occur at the head of the small valleys would not travel more than a few feet, definitely not affecting the UHS storage. Due to the characteristics of the residual soils, the creation of subaqueous flows is not deemed possible.

In addition to the above factors, there is no evidence of slides having occurred in the area. For a discussion of siltation within the UHS, see USAR Section 2.4.11.6.

2.5.5.2.2 Excavation of Slopes

The profiles of the excavated slopes in the UHS, the intake channel, and near the outlet structure are given in USAR Section 2.5.5.1.1. The slope protection required for the slopes near the pumphouse in the intake channel is also discussed in USAR Section 2.5.5.1.1.

2.5.5.2.2.1 Ultimate Heat Sink Slopes

The UHS slopes forming the periphery of the UHS are designed to be five horizontal to one vertical between the existing grade and elevation 1,070 feet. From elevation 1,070 to 1,065 feet, the grades vary from 1.0 to 6.7 percent. The typical cross sections of these slopes are shown on Figure 2.5-109.

The water table for the end-of-construction condition is at elevation 1070 feet at the toe of the 5:1 slope.

The soil cover in the excavated UHS slopes is thin and weaker than the bedrock existing at shallow depth. For those slopes, a circular failure arc would not develop, and, therefore, their stability has been investigated using the wedge method of analysis. In this method, it is assumed that if failure should occur, it would do so by a sliding-block type of mechanism with a vertical boundary between the blocks. The potential failure mass is broken up into two or three wedges. The shear resistance along the several segments of the failure surface is expressed in terms of the applicable strength parameters and a safety factor which is the same for all segments.

A computer program was not used for the stability analysis. The method of analysis used is the procedure outlined in Figures 7-5 and 7-6 of the March 1971 Department of the Navy Design Manual, NAVFAC DM-7.

The soil properties used in the stability analyses are shown in Table 2.5-55. The cross section analyzed is shown on Figure 2.5-112. The conditions analyzed are:

a. The end of construction;

b. Steady state seepage; and

c. Steady state seepage plus SSE (0.12 g).

The end of construction case was examined using a total stress analysis in which parameters C_{cu} and ϕ_{cu} corresponding to the consolidated-undrained condition are used to evaluate the shear strength of the soil.

For steady-state seepage condition, an effective stress analysis was used.

The minimum safety factors computed and those required for various cases are summarized in Table 2.5-56. It can be seen that there is an ample margin of safety for all the cases considered. In each of these analysis, the water level was assumed to be at the ground level along the slope and a hydrostatic water pressure was included in the driving force on the sliding failure wedge.

Additional analysis of the UHS slopes, using the Lawrence Livermore Laboratories spectrum, is located in Appendix 3C.

2.5.5.2.2.2 ESWS Pumphouse Intake Channel Slopes

The excavated slopes in the channel consist of five horizontal to one vertical slopes from existing grade to Elevation 1,070 feet, and have slopes of three horizontal to one vertical from Elevation 1,070 to 1,065 feet. There is a 55-foot bench at Elevation 1,070 feet.

The water table for the end-of-construction condition is at elevation 1065 at the toe of the 3:1 intake channel slope.

The two slopes (upper slope five horizontal to one vertical and lower slope three horizontal to one vertical) have been analyzed for the following conditions:

a. Submerged with water level in cooling lake at Elevation 1087 ft;

b. Submerged with SSE of 0.12g;

c. Rapid drawdown of cooling lake from Elevation 1087 ft to 1070 ft;

d. End of construction-short-term using undrained strength parameters;

e. End of construction-long-term using drained strength parameters; and

f. End of construction with SSE of 0.12g.

The BISHOP computer program was used to investigate the stability of slopes for all the above design conditions (Figures 2.5-113a through n). The details of this program are given in USAR Section 3.12. The soil properties used in the analyses are given in Table 2.5-55. The shale was conservatively assumed to have the properties of residual clay for the stability analyses.

The 3H:1V side slopes of the ESWS Intake Channel are cut into the Heumader Shale material. During early stages of design and as presented in the PSAR these slopes were specified to be 1H:1V. During the excavation of the power block, it was discovered that this material weathers rapidly if it is not protected from exposure. Subsequently, the slopes of the ESWS Intake Channel were flattened to 3H:1V and the material was conservatively assumed to have the properties of residual clays which had been derived from weathering of similar shale material found where the Heumader Shale formation was exposed along the Wolf Creek Valley.

The residual strength is much less than the strength of unweathered shale. When the material is assumed to be soil in and below the slope, the slip circle method of analysis is applicable.

The effective stress method of analysis was used for evaluating the steady state condition with and without an SSE of 0.12g. The minimum factors of safety obtained for the static case are 7.13 for the three horizontal to one vertical slope and 3.37 for the five horizontal to one vertical slope; the minimum factors of safety with SSE effects are found to be 3.37 and 1.86, respectively. These factors are higher than required, as indicated in Table 2.5-57.

For the cross-section presented in Figures 2.5-113a through 2.5-113h the minimum factor of safety for the stability of the 3H:lV slope is higher than the minimum factor of safety for the 5H:lV slope because the height of slope above the toe of the 3H:lV slope is 5 feet and the height of slope above the toe of the 5H:lV extends from elevation 1070 to existing grade and is much greater than 5 ft. The height of the 3H:lV slope is limited to 5 ft. because of the 55 ft. wide bench provided at elevation 1070.

The results of the stability analysis are shown in Table 2.5-57 which shows the minimum factor of safety for each condition as well as the minimum required factor of safety. Figures 2.5-113a through n show the geometry, soil properties, and critical failure circles for the various conditions analyzed.

The slopes were analyzed using effective stress (drained) soil strength parameters for the submerged conditions with and without an SSE of 0.12g. As shown in Table 2.5-57 the factors of safety obtained were well in excess of the minimum required.

Total stress (undrained) soil strength parameters were used to analyze the short-term end of construction condition which would occur immediately after excavation. As time passes and the slopes are exposed, drainage occurs. This condition was analyzed using both effective stress and total stress soil strength parameters and both with and without an SSE of 0.12g.

As shown in Table 2.5-57 the factors of safety obtained were well in excess of the minimum required.

Additional analysis of the ESWS Pumphouse Intake Channel slopes, using the Lawrence Livermore Laboratories spectrum, is contained in Appendix 3C.

The intake channel section analyzed for stability is Section C-C. This section is shown in Figure 2.5-110. The slope analyzed by the wedge method, Figure 2.5-112, is located near the UHS dam where the soil overburden is shallow. Slopes cut at 5:1 shown in Sections A-A and B-B (Figure 2.5-109) have a lesser height than the 5:1 slope at Section C-C and, would thus have a greater stability.

Rapid drawdown effects on the 5:1 slopes above elevation 1070 ft were analyzed using effective stress soil strength parameters. This condition was analyzed as a sudden removal of the water acting against the downstream slope that was present in the submerged condition with the same available shear resistance existing on the failure plane. Table 2.5-57 shows that the factor of safety is in excess of the minimum required. A drawdown from the normal cooling lake level 1087 ft to top of UHS dam elevation at 1070 ft would not affect the 3:1 slopes of the ESWS intake channel between elevations 1070 and 1065 ft because these slopes would still remain submerged and no increase in driving force would occur.

2.5.5.2.2.3 Slopes Near the Discharge Point

The excavated slopes near the discharge point are very flat, having a maximum slope of 1 percent below Elevation 1,070. The slopes between the existing grade and Elevation 1,070 are similar to those in the UHS. Stability analyses of these slopes are described in USAR Section 2.5.5.2.1.

Based on the results of the analyses described above, it is concluded that the excavated slopes of the UHS, the intake channel slopes, and the slopes near the outlet structure are stable under all extreme design loading conditions.

2.5.5.2.3 Excavated Slopes

The results of slope stability analyses of excavated slopes have shown that the slopes have factors of safety well in excess of the minimum required. In these analyses the material within which the slopes were excavated was assigned soil strength parameters for residual clay soils. Much of the excavated slopes are within shale which has not weathered in residual clay. Thus, the strength parameters for the slope material have been conservatively selected. Based on the relatively large factors of safety and conservatively selected strength parameters, a dynamic slope stability analysis using finite elements is not required.

2.5.5.2.4 Liquefaction

The UHS slopes and ESWS intake channel slopes have been excavated into shale deposits and overlying residual soil deposit. These materials do not contain any sand or granular soil layers or deposits which could be subject to liquefaction.

2.5.5.3 Log of Borings

The location of all borings performed for the evaluation of subsurface conditions at the UHS site are shown on Figure 2.5-30. The logs of borings are presented on Figures 2.5-34a through 2.5-34u.

Detailed field procedures are discussed in Appendix A of the above-referenced report (Reference 59).

2.5.5.4 Compacted Fill

UHS dam structure fill material is described in USAR Section 2.5.6.4.1.4.

2.5.6 EMBANKMENTS AND DAMS

Cooling water for the Wolf Creek Generating Station is provided by impounding water in a cooling lake on Wolf Creek. Figure 2.5-114 shows the general arrangement of facilities for the cooling lake. The maximum design water elevation of the lake is 1095.0 feet for the probable maximum flood (PMF).

To create the cooling lake, an earth dam (main dam) was constructed across Wolf Creek. Five saddle dams along with the natural topography of the ground serve as the perimeter of the cooling lake. Two baffle dikes and three channels are provided within the lake to provide circulation of water between the discharge and intake. The main dam and the saddle dams have a crest elevation of 1,100 feet and the baffle dikes have a crest elevation of 1,094 feet. The normal operating water level of the main cooling lake is 1,087 feet.

The UHS is formed by constructing a Category I UHS dam in one finger of the main cooling lake and excavating to provide a 5 foot minimum depth pond behind the UHS dam. This dam has a crest elevation of 1,070, and is submerged during normal plant operation. In the event of loss of main cooling lake dam, the UHS will provide storage capacity sufficient for safe plant shutdown.

Cooling water for post-accident and post-fire safe shutdown is circulated by means of the Category I ESWS which consists of ESWS pipelines and duct banks, an ESWS pumphouse, and an ESWS discharge point. The locations of these facilities are shown on Figure 2.5-114.

2.5.6.1 General

The main dam is constructed across Wolf Creek at a point about 4 miles upstream of the Creek's confluence with the Neosho River, about 3 miles east of Burlington and about 3 miles south of the plant. The dam impounds water of Wolf Creek to form a 5,090-acre cooling lake to provide cooling water required for the plant operation.

The main dam is designed to be stable under all conditions of reservoir operation. The stability of the slopes was investigated under the following loading conditions:

a. End of construction;

b. End of construction plus horizontal OBE = 0.06g;

c. Steady seepage with pool at the crest of the service spillway Elevation 1088 feet, normal operating pool Elevation 1,087 feet;

d. Steady seepage with pool at the crest of the service spillway Elevation 1088 feet, normal operating pool Elevation 1,087 feet plus horizontal OBE = 0.06g; and

e. Sudden drawdown from pool at the crest of the service spillway Elevation 1,088 feet to Elevation 1,030 feet.

The simplified Bishop method is used in the static stability analyses. In this method, the failure surface is assumed to be an arc of a circle. The factor of safety is defined as the ratio of the moment of the available resisting forces along the failure arc to the moment tending to cause sliding. The pore pressures that may develop in the embankment during construction were also considered in the analysis.

The slopes of the main dam are designed to ensure, under static loading conditions, a minimum factor of safety of 1.4, 1.5, and 1.2, respectively, for the loading conditions listed previously in items a, c, and e. Under seismic loading conditions, a minimum factor of safety of 1.0 is applied to the loading conditions listed previously in items b and d.

The stability analyses results presented in Figure 2.5-115b through 2.5-115d indicate that side slopes of three horizontal to one vertical are adequate for the upstream and downstream slopes of the main dam to ensure its stability under both static and seismic loading conditions.

The soil used for the main dam embankment is a silty clay alluvium which is placed as a homogeneous earth fill. A typical section of the main dam showing the riprap layers, rock toe, and drainage blanket is shown in Figure 2.5-115a. The blanket drain under the downstream portion provides for controlled seepage and uplift pressures.

A crest width recommended by the Bureau of Reclamation has been used in the design, and a service road has been provided along the crest of the main dam.

The riprap for the slope protection was designed for the wind wave activity as described in USAR Section 2.5.6.4. Two filter layers (fine and coarse), 18 inches thick, measured perpendicular to the slope face, and a rock blanket, 3 feet thick (2 feet below Elevation 1,070), also measured perpendicular to the face of the slope, provide the necessary slope protection. This is placed only on the upstream slope. Riprap is also provided in the downstream portion of the dam below Elevation 1,025 to protect it from flood levels in lower Wolf Creek. The downstream slopes are covered with topsoil and seeded to prevent surface erosion. Figure 2.5-115a shows the main dam geometry.

The locations of the five saddle dams are shown on Figure 2.5-114. These dams fill in the natural topography of the ground to serve as the perimeter of the cooling lake. With the exception of saddle dam IV, all are founded above the normal operating level of the cooling lake. Nevertheless, the selected slopes of the dams are the same as those of the main dam. The crest of the saddle dams is at Elevation 1,100 feet. The maximum height for each dam varies from 5 to 38 feet above the bedrock level. The geometry of the saddle dams is a homogeneous section of cohesive materials. Slope protection on the lakeside consists of riprap placed on a filter bed of granular material with controlled gradation. The downstream slopes are covered with topsoil and seeded to prevent surface erosion. Internal filters and drains are not required for saddle dams, except for saddle dam IV, because these dams are generally not subject to unbalanced hydrostatic pressures during the normal operating levels of the cooling lake. All other design features of saddle dams are similar to those described above for the main dam.

Two baffle dikes are provided to guide the circulation of water between discharge and intake. The locations of these dikes are shown on Figure 2.5-114.

The geometry of the baffle dikes is similar to the main dam. Each dike is either a homogeneous section composed of cohesive materials or a section with a rock core covered with a minimum of 10 feet of cohesive material. The rock is excess from the site excavation. The crest is at Elevation 1,094 feet. The crest also serves as a service road for future maintenance and project access.

Riprap of the same quality as for the main dam is placed on both faces of the baffle dikes. The riprap extends below the minimum operating levels of the cooling lake. This provides adequate protection against erosion from wave action.

Blanket drains are not required for the baffle dikes since they will normally function under balanced hydrostatic pressures.

All other design features of the baffle dikes are similar to those described above for the main dam.

The UHS dam is a submerged Category I dam located in one finger of the main cooling lake as shown in Figure 2.5-114. In the event of loss of the main cooling lake water, the UHS dam will retain a sufficient volume and surface area of water to provide cooling for post-accident and post-fire safe shutdown of the plant.

The UHS dam is an earthfill dam approximately 1,700 feet in length and 18 feet in height above the Leavenworth Limestone foundation rock surface at the maximum section. The crest of the dam is at Elevation 1,070. Predominantly clayey soils excavated during the construction of the UHS were utilized to build the UHS Dam.

The slope configuration of four horizontal to one vertical is used for the UHS dam. The downstream slope was designed for instantaneous drawdown with pore pressures equal to the maximum level of the cooling lake. The width of the UHS dam is designed to provide a safe percolation gradient through the embankment at full UHS reservoir level of Elevation 1,070. A crest width of 20 feet was used. Camber was provided along the crest of the dam to insure that the freeboard will not be diminished by the embankment consolidation. The dam height is designed to provide storage necessary to allow the UHS to meet design bases stated in USAR Section 9.2.5 and to account for losses from evaporation and seepage.

The rock slope protection for the UHS dam is designed for scour and embankment erosion potential during the hypothetical main dam and baffle dike break which creates a flow corresponding to an overtopping condition of the dam. The erosion protection consists of two filter layers (fine and coarse) 18 inches thick measured perpendicular to the slope face and a rock blanket 4 feet thick also measured perpendicular to the face of the slope. Longitudinal and transverse sections of the dam are included on Figures 2.5-116 and 2.5-117. The slope protection also protects the UHS dam from wave action when the UHS reservoir elevation is at 1,070 feet.

2.5.6.2 Exploration

2.5.6.2.1 Ultimate Heat Sink

2.5.6.2.1.1 Exploration Program

The exploration program described below is a summary of the field exploration program performed in the UHS area. A detailed description of the program and procedures are provided in Reference 59.

2.5.6.2.1.1.1 Test Borings and Test Pits

The subsurface soil, rock, and ground-water conditions at the Category I UHS dam for the Wolf Creek site were investigated by drilling exploratory test borings and by excavating test pits (see Figure 2.5-30 and Figures 2.5-36a through 2.5-36cc).

A total of 59 test borings were drilled and 12 test pits were dug during the period, spring 1973 through summer 1974.

The borings ranged in depth from 3.1 to 402.9 feet below existing ground surface. The test pits were excavated to bedrock.

Soil samples were obtained using 3-inch diameter shelby tubes, 2 3/8-inch diameter Denison samplers, and the Dames & Moore Type U sampler both with and without a thin-wall attachment (2 3/8-inch I.D.). Bulk type soil samples were obtained from the test pits. Rock cores were obtained with NX-wireline equipment.

2.5.6.2.1.1.2 Ground-Water Exploration

Water levels were recorded in open boreholes and test pits. In addition, pressure meter tests were performed in 17 borings. The water levels are noted on the logs of borings, Figures 2.5-36a through 2.5-36lll and 2.5-37a through 2.5-37g.

Piezometers were installed in a total of 15 borings in the UHS area (Figure 2.5-118), and both falling and constant head permeability tests were performed in a total of nine boreholes. The results of the permeability tests are shown on the logs of borings, and the piezometer readings are presented in the Dames & Moore ultimate heat sink report (Reference 59).

2.5.6.2.1.1.3 Engineering Geophysical Exploration

The field work for the geophysical exploration was conducted during November and December 1978 and included the following studies in the vicinity of the UHS:

a. A seismic refraction survey to establish compressional wave velocities of bedrock and the materials overlying bedrock;

b. Uphole compressional wave velocity studies to further establish the compressional wave velocities of bedrock and materials overlying bedrock;

c. Uphole shear wave velocity surveys to establish shear wave velocities in near-surface materials and the underlying bedrock;

d. Crosshole shear wave surveys to establish shear wave velocities in bedrock;

e. Surface shear wave studies to establish shear wave velocities in near-surface materials;

f. Surface wave studies to determine the types and characteristics of surface waves generated at the site;

g. Ambient vibration measurements to determine the predominant frequencies of ground motion of the site due to background noise levels; and

h. Borehole geophysical logs to provide detailed values of compressional and shear wave velocities of bedrock.

The locations at which the above studies were conducted are shown on Figure 2.5-98. The results of the studies are shown on Figures 2.5-101a through 2.5-101g and 2.5-102a through 2.5-102c and in Tables 2.5-58 through 2.5-60.

2.5.6.2.1.2 Summary of Geologic Conditions

2.5.6.2.1.2.1 Soil Conditions

Except for the alluvial soils in the tributary to Wolf Creek, the soils in the UHS are interpreted to be residual soils developed through the weathering of the underlying parent bedrock. The principal parent rock units are the Heumader Shale, Plattsmouth Limestone, and the Heebner Shale members.

The alluvial soils encountered in field explorations are predominantly silts and silty clays, although some silty sands with clay and gravel were noted overlying the Plattsmouth Limestone Member.

Based on data from test borings and test pits, the thickness of soil at the UHS area averages about 6 feet at the boring locations and ranges from 0.3 foot at HS-4 to 16.0 feet at HS-28. However, scattered rock outcrops are present, particularly in the creek bottom which crosses the alignment of the UHS Dam.

A generalized soil thickness contour map (Figure 2.5-38) was prepared based on the results of site explorations and shows that, in general, the soil cover is thickest along slopes and thinnest in the creek valleys and hill tops. This is a reflection of the underlying lithology as the shales tend to be the slope-forming units.

Alluvial deposits are present along the small tributaries to Wolf Creek. In the area of the UHS, the channel of a preexisting tributary has been buried by alluvial deposits. The configuration of this buried channel generally parallels the existing tributary and is delineated on the bedrock contour and soil thickness maps (Figures 2.5-38 and 2.5-25, respectively).

2.5.6.2.1.2.2 Rock Conditions

A bedrock topographic map for the Category I area is presented on Figure 2.5-25. The bedrock geology is shown on Figure 2.5-23. Rock underlying the UHS area belongs to the Heumader Shale, Plattsmouth Limestone, and Heebner Shale members of the Oread Limestone Formation. These units are discussed below in stratigraphically descending order (see USAR Section 2.5.1.2 for more detail). The uppermost rock unit in the UHS is the Heumader Shale Member. As shown on Figure 2.5-23, the Heumader Shale Member is present along the western abutment of the UHS Dam, but is absent at the eastern abutment (Figures 2.5-23 and 2.5-48). In the vicinity of the UHS, the thickest section of the Heumader Shale Member is about 33 feet thick, where completely penetrated at Boring ESW-8. The upper Heumader Shale is approximately 23 feet thick and is medium dark gray to dark yellowish brown, thickly laminated, clayey, calcareous, and, normally, moderately to highly weathered. The lower Heumader Shale, approximately 10 feet thick, is medium dark gray, thinly laminated, clayey, calcareous, fossiliferous, and slightly to moderately weathered with numerous limestone fragments and nodules. Rock core samples contained frequent joints with inclinations ranging from 30 to 60 degrees. Core recovery of the Heumader Shale Member, evaluated from the logs of borings for the UHS area, averaged about 80 percent. Overall RQD of the Heumader Shale Member generally decreases as section thickness decreases.

The Plattsmouth Member is continuous in the subsurface in the area of the UHS and ESWS pumphouse. Figures 2.5-23 and 2.5-51 show that the Plattsmouth Limestone is, in general, the uppermost bedrock unit within the two arms of the UHS east of a point between Boring HS-7 and ESW-15. Along the UHS dam alignment, the Plattsmouth has been locally removed by erosion between Borings E-5 and HS-4 (see Figures 2.5-23 and 2.5-48). Undercutting of the Heebner Shale Member by the creek has caused minor slumping of the overlying Plattsmouth Limestone Member at and near Boring HS-4 (Figure 2.5-48).

Test borings (Figure 2.5-50) indicate the Plattsmouth Limestone is approximately 13 feet thick. The Plattsmouth is light olive-gray, fossiliferous, thin to thick bedded with clay to clayey shale seams in the upper 7 feet. Except for the uppermost 4 to 10 inches, which is moderately weathered, the upper 7 feet of this limestone is slightly weathered. The remainder of the section is generally unweathered. Throughout the UHS area, the borings encountered clay to clayey shale seams, which are up to 0.7-foot thick within the upper 7 feet, and infrequent joints (ranging from 45 to 75 degrees). Structural contours for the top of the Plattsmouth Limestone Member are presented on Figure 2.5-58. Rock

quality properties for the Plattsmouth Limestone Member are summarized in Table 1 of the ultimate heat sink report (Reference 59).

The Heebner Member is a grayish black, thinly laminated, very calcareous shale. This member crops out in the creek bed that crosses the alignment of the UHS Dam (Figure 2.5-48) and has been locally removed by erosion at Borings E-7 and E-8 (Figure 2.5-48) and by weathering and/or erosion south of the UHS dam (see logs of Borings HSA-1 and HSA-2). However, field explorations indicate that the Heebner Shale is continuous beneath the UHS and ESWS pumphouse and intake channel. The Heebner Shale Member is unweathered, except between Boring E-5 and about 100 feet southeast of Boring HS-16 where it is slightly to highly weathered. The average thickness of the Heebner in the UHS area is 3.0 feet.

The Leavenworth Member is a light bluish to medium gray, thin-to thick-bedded, and fine-grained limestone. The average thickness of the Leavenworth in the UHS area is 1.2 feet. A structural contour map of the top of the Leavenworth Limestone Member is presented on Figure 2.5-60. Field exploration indicates that the Leavenworth Limestone is unweathered and continuous beneath the entire UHS and alignment of the UHS dam. The Leavenworth is the stratigraphically lowest unit which crops out in the UHS area and is the uppermost rock unit where the overlying Heebner Shale has been removed by erosion beneath the UHS Dam (Figure 2.5-48).

The Snyderville Member is a greenish to olive-gray, mottled, laminated to medium-bedded, very calcareous shale and is also unweathered and continuous throughout the UHS area. Core samples of the Snyderville Shale often contain numerous closed to open fractures with inclinations ranging from 20 to 60 degrees. Some fractures contained slickensides. The average thickness of this unit in the UHS area is 10.0 feet. The Snyderville Member does not crop out in the UHS area.

Due to the thinness of the Leavenworth Limestone Member, the latter three members of the Oread Limestone Formation may be considered as a single unit with nearly uniform engineering and seismic properties. The average core recovery and RQD calculated from borings penetrating this engineering unit in the UHS area were 95 and 65 percent, respectively. Other core recovery and RQD values at specific locations within the UHS area are presented in Table 1 of the Dames & Moore ultimate heat sink report (Reference 59).

The Toronto Limestone Member that underlies the Snyderville Shale Member is light gray, thin to thick bedded, fine grained, fossiliferous and contains interbeds of calcareous shale up to 0.6 foot thick. The core samples contained occasional vertical joints and

other less frequent joints with inclinations which varied from 30 to 60 degrees. The Toronto Limestone Member does not crop out in the UHS area.

For a detailed description of the stratigraphic units underlying the Toronto Limestone Member of the Oread Limestone Formation, see USAR Section 2.5.1.2 and the logs of borings presented on Figures 2.5-34a through 2.5-34u.

2.5.6.2.1.2.3 Hydrogeologic Conditions

The hydrogeologic conditions within the entire Category I area have been determined by evaluating data from pressure and permeability tests, water-level measurements in 103 piezometers and 115 open boreholes, and from continuous monitoring of water levels in the (former) Bemis well located approximately 1/3 mile northeast of the site. Of the many piezometers installed in the entire Category I area, 31 are located near the UHS. Their locations are shown on Figure 2.5-118. Hydrographs for those piezometers isolated in the overburden or in members of the Oread Formation are provided in Dames & Moore's ultimate heat sink report (Reference 59 Appendix A, Figure A-60). Hydrographs for deeper units are presented on Figure 2.4-56. In addition to the permanent piezometers, temporary piezometers were installed and field permeability tests were conducted at the HSSP-Series borings shown on Figure 2.5-118. Those piezometers were removed following testing.

Measurements of water levels in open borings and piezometers tapping near-surface materials within the UHS area indicated that the water table is near the surface. The ground water contained within the soil and the Heumader Shale Member is under water-table conditions. The ground water contained in the shallow soil and in the moderately to highly weathered shale bedrock is commonly perched on the less weathered bedrock. The position and altitude of the water table is dependent on the amount and frequency of precipitation, the topographic relief, and the permeability of the materials. After periods of intense precipitation, the water table in the soil and weathered shale rises at a rate faster than that in the unweathered rock units. In particular, the lower calcareous unit of the Heumader Shale Member is believed to be relatively impermeable and to retard water percolating downward through the upper units into the Plattsmouth Limestone Member. Further, the hydraulic gradient of the water table generally follows and is a subdued reflection of the topography and slopes towards the creek bottom in the UHS area. The UHS is a local area of ground-water discharge from the soil and Heumader Shale Member.

The ground-water in the Plattsmouth Limestone Member is under semi-artesian to water-table conditions. Water levels measured in piezometers during the spring of 1976 indicate that the Plattsmouth Limestone had an artesian head of approximately 20 feet (above top of the member) at the power block (Reference 59, Figure A-60, Appendix A) and tapping the Plattsmouth Limestone Member near the ESWS discharge point. However, water levels measured in piezometers near Boring HS-29 and the UHS Dam suggest that the Plattsmouth Limestone Member has little or no artesian head at those locations. The UHS is locally an area of ground-water discharge from the Plattsmouth Limestone Member.

Although the piezometer readings indicate that the Toronto Limestone Member possesses an artesian head of approximately 15 feet at the location of the UHS, the difference in water levels between the residual soil overburden and the Toronto Limestone Member indicates a decreasing head with depth. Both the Heebner Shale and Snyderville Shale members, for the most part, hydraulically insulate the ground water contained in the Toronto Limestone Member from ground-water conditions occurring in the overlying Plattsmouth Limestone.

2.5.6.2.2 Main Dam

2.5.6.2.2.1 Exploration Program

The information provided below presents a summary of the field exploration and the geologic conditions along the main dam site. Detailed description of the subsurface investigations and the geologic condition are provided in Reference 60.

2.5.6.2.2.1.1 Test Borings and Test Pits

The subsurface conditions along the main dam and service spillway alignments were investigated by drilling a total of 92 exploratory test borings and excavating a total of 15 test pits.

The borings range in depth from 6.7 to 76.5 feet. The test pits were excavated to depths ranging from 1.5 to 12.0 feet. The boring locations are shown on Figure 2.5-119.

Soil samples were obtained using the Dames & Moore Piston and Type U Samplers, both having an I.D. of 2.4 inches. Bulk soil samples were also obtained from the test pits, and rock samples were obtained from the borings utilizing NX-wireline equipment. The

test pits were dug to evaluate limestones exposed near the surface and to further evaluate the alluvium within the valley. Graphical presentation of the soil and rock encountered in the borings and test pits is presented on the logs of borings and logs of test pits in the Dames & Moore main dam report (Reference 60).

2.5.6.2.2.1.2 Ground-Water Exploration

Ground-water levels were observed in the borings and test pits during the field exploration and are noted on each log of borings. Water pressure tests were also performed in selected boreholes to help evaluate the mass permeabilities of the subsurface formations.

2.5.6.2.2.2 Summary of Geologic Conditions

2.5.6.2.2.2.1 Soil Conditions

Overburden along the Main Dam alignment consists of topsoil, Quaternary and Tertiary alluvium, and residual soils. Topsoil varies from brown, organic, silty clay to clayey silt and has an average thickness of approximately 0.8 foot on ridges and valley slopes and an average thickness of approximately one foot in Wolf Creek Valley. Quaternary alluvium is present within Wolf Creek Valley and generally consists of yellowish brown and gray silty clays and clayey silts that are plastic to highly plastic. This alluvium is locally sandy and contains silt lenses and occasional basal deposits of chert gravel. The alluvium ranges in thickness from 10 feet along Wolf Creek Valley margins to 36 feet in a buried (former) Wolf Creek channel. Tertiary alluvial deposits are reddish brown to gray, clayey chert gravels. The percentage of clay varies with depth and location. Residual soils, which have developed from underlying bedrock, consist of low plasticity to high plasticity clays. Thickness of the residual soil varies and reflects the composition of the underlying bedrock. These soils have generally developed to depths of less than 15 feet over shale and generally less than 5 feet over limestone. Subsurface profiles are shown on Figure 2.5-119.

2.5.6.2.2.2.2 Bedrock Conditions

Rock which forms the bedrock surface of the main dam belongs to the Kanawaka Shale and underlying Oread Limestone and Lawrence Shale Formations. Characteristics of these members as mapped or observed in borings along the main dam alignment are discussed below. Subsurface conditions are shown on Figure 2.5-119.

The sandstone facies of the Jackson Park Shale Member of the Kanawaka Formation forms part of the bedrock surface and foundation slopes of the main dam foundation in the vicinity of Station 0+00. This facies is a light brown, laminated to thin-bedded, very fine-grained, calcareous, silty sandstone. The Jackson Park Member is moderately to highly weathered at this location and is absent from the rest of the main dam alignment due to erosion.

The Heumader Member of the Oread Formation is a medium gray, thinly laminated to thin-bedded, calcareous, silty shale. Generally, this unit is moderately weathered at the bedrock surface and becomes less weathered and increasingly calcareous with depth. The Heumader is a relatively impermeable unit and was mapped in the main dam foundation from Station 0+00 to Station 4+60 and from approximately Station 15+00 to Station 37+06.

The Plattsmouth Limestone Member is light to medium gray, thin to thick bedded, and fine grained. The limestone is interbedded with gray, thin, discontinuous shale layers and also contains one continuous, medium gray, clayey, calcareous shale bed that is approximately 0.5 to 0.7 foot thick. Relatively unfractured Plattsmouth serves as the main dam foundation from Station 4+60 to Station 8+00. At most locations where the Plattsmouth occurs near ground surface, the bedrock is broken by numerous, irregular joints (open and clay-filled). At those locations, the limestone is generally slabby and moderately weathered, and the shale interbeds and partings are weathered to clay. [Keytrenches were excavated along the main dam axis (Stations 8+00 to 18+00, Stations 37+06 to 41+70, and Stations 86+30 to 105+10) and filled with compacted clay in order to reduce seepage through these fractured, more weathered, near-surface zones.]

The Heebner Member is a grayish black, thinly laminated, fissile, carbonaceous shale. This unit was exposed in the walls of keytrench excavations from Station 8+00 to 18+00, Station 37+06 to 39+50, and Station 85+50 to 105+10. The Heebner is often crosscut by closed or calcite-filled, N50-60E joints. These keytrenches were excavated to the top of the underlying Leavenworth Limestone due to the high fissility of the Heebner. This shale unit was exposed in the main dam foundation from approximately Station 41+75 to 42+20 and from approximately Station 85+80 to 86+20 (and partly to Station 89+30).

The Leavenworth Member is a light bluish gray to medium gray, thin-to thick-bedded, fine-grained limestone. The top of the Leavenworth was utilized as the floor of the keytrenches where fractures in the limestone were widely spaced (Station 8+00 to 18+00, Station 37+06 to 39+50, and Station 85+50 to 105+10).

Where the Leavenworth occurs close to the ground surface, it is frequently jointed and the rock appears to have weathered to reddish brown clay in fracture zones (Reference 326).

The Synderville Member is an olive-gray, laminated to medium-bedded, locally clayey, calcareous shale. Where overlying Leavenworth Limestone was highly jointed or absent due to erosion, the main dam keytrench was excavated into the relatively impermeable Synderville Shale. The Synderville was mapped on the main dam foundation from approximately Stations 42+25 to 43+50 and from Station 85+50 to approximately Station 87+00. This member is moderately weathered in the vicinity of Stations 42+00 to 43+50, where it occurs close to the surface.

The Toronto Limestone Member forms the bedrock foundation of the main dam on portions of the east and west slopes of Wolf Creek Valley (Stations 43+00 to 47+75 and Stations 79+00 to 85+50, respectively). This limestone is light gray, thin to thick bedded, and fine grained and also contains interbeds of greenish gray calcareous shale. Where the Toronto occurs close to the surface, shale interbeds are weathered to clay, and the weathered limestone contains both open and clay-filled joints. In the latter locations, keytrenches were excavated and filled with compacted, cohesive clay in order to reduce seepage beneath the dam (Stations 41+95 to 47+75 and approximately Station 79+00 to Station 81+00).

The Unnamed Member of the Lawrence Formation consists of greenish gray to medium dark gray, thinly laminated, locally carbonaceous, calcareous shale with sandstone and siltstone interbeds. The Williamsburg Coal Bed within the Unnamed Member is a black, thin-bedded, shaley coal which was exposed in the low-level outlet tunnel excavation and in a supplementary exploration trench in the east abutment. The Unnamed Member was also exposed in the keytrench from approximately Stations 42+75 to 48+00 in the west abutment. A keytrench was excavated from Stations 48+70 to 52+00 and filled with compacted, cohesive clay fill in order to reduce seepage through the coal.

The Amazonia Member consists of an upper, greenish gray, thin- to medium-bedded, very calcareous, clayey shale and a lower, greenish gray, thin- to medium-bedded fossiliferous limestone. The Amazonia Member was exposed in the discharge channel excavations west of Wolf Creek, locally in the main dam excavation across Wolf Creek Valley, and in both the east and west abutments. This unit was highly weathered or absent due to erosion at the discharge channel and main dam excavations.

The Ireland Member of the Lawrence Formation contains shale, sandstone, siltstone, and coal facies. The Ireland Member was exposed in the low-level channel excavations and in the main dam excavation across Wolf Creek Valley. This unit was highly weathered to partly absent at channel and main dam excavations. The presence of coal within the Ireland required excavation of keytrenches at the base of the upstream (north) excavation slope from Station 60+75 to Station 64+05 and from Station 73+10 to Station 77+40.

2.5.6.2.2.2.3 Hydrogeologic Conditions

The ground-water levels recorded during the field exploration program are shown on the subsurface sections, Figure 2.5-119, and on the logs of borings. These observations were made in open borings several days after completion of the borings. The ground-water elevations generally reflect the topography as shown on the subsurface sections and are interpreted to represent a water-table condition in the soil and weathered rock zone. The direction of ground-water flow generally parallels the surface drainage. Recharge is accomplished primarily by infiltration of precipitation into the soil and weathered rock zone.

2.5.6.2.3 Saddle Dams

2.5.6.2.3.1 Exploration Program

The exploration program outlined below is a summary of the exploration program performed along saddle dams I through V during the period, May 7, 1974 through August 13, 1974. The exploration program is described in detail in Reference 66.

2.5.6.2.3.1.1 Test Borings and Test Pits

The field exploration program included a total of 51 exploratory borings and nine test pits. The test borings ranged in depth from 13.5 to 76.9 feet below the existing ground surface; the test pits were excavated to depths ranging from 4.2 to 11.5 feet. The locations of all test borings and test pits performed during the field exploration program are indicated on the plot plans, Figures 2.5-120 through 2.5-124. Saddle dam VI was not required for the design of the cooling lake and was, therefore, eliminated from

construction; however, the borings have been included for general information. The logs of borings and test pits are shown in the Dames & Moore saddle dam report (Reference 66).

Soil samples were obtained using the Dames & Moore Type U Sampler and the Standard Split Spoon [Standard Penetration Test Procedures (ASTM D 1586-67)]. Bulk soil samples were also obtained from the test pits. Rock samples were obtained utilizing NX-wireline core barrels.

2.5.6.2.3.1.2 Ground-Water Exploration

Ground-water seepage was observed in several of the test pits during the exploration and is noted on each log of test pits (Reference 66). Water levels were recorded in the borings, and pressure meter tests were performed in selected boreholes. The results of these tests and the ground-water levels are recorded on the logs of borings (Reference 66).

2.5.6.2.3.2 Summary of Geologic Conditions

2.5.6.2.3.2.1 Soil Conditions

Three types of overburden were encountered along the saddle dam alignments. The topsoil consists of brown, organic silty clay and clayey silt. The average thickness of the topsoil is approximately 1.0 foot on ridges and valley slopes. Tertiary gravel deposits cap ridge tops along the alignment of saddle dams IV and V. These alluvial deposits consist of gravel within a clay matrix. Because the percentage of clay within the matrix varies with depth and location, permeability varies considerably. Residual soils have developed through weathering of underlying parent rock along all saddle dam alignments. These soils generally vary from plastic to highly plastic clays. Residual soil thickness reflects the composition of the underlying bedrock. Saddle dams I and II are founded on residual soils that vary from clays to silty clays. Subsurface sections along the saddle dams are shown on Figures 2.5-120 through 2.5-124.

2.5.6.2.3.2.2 Bedrock Conditions

Rock present in the saddle dam foundations belongs to the Kanawaka Shale and underlying Oread Limestone Formation. These formations are subdivided into members which are described below in stratigraphically descending order. Subsurface sections along the saddle dams are shown on Figures 2.5-120 through 2.5-124.

The Stull Shale Member of the Kanawaka Formation forms the bedrock surface underlying the residual soil foundation for saddle dam I and for the northern half of saddle dam II. The Stull Member consists of interbedded shale, sandstone, and some siltstone. This relatively impermeable shale is predominantly medium light gray, weathers to yellowish brown or light olive-brown, and is also thinly laminated, calcareous, and silty with some fine-grained sandstone. Some interbeds of siltstone to fine-grained sandstone are often present. This member is generally moderately weathered at the bedrock surface and becomes less weathered at depth.

The Clay Creek Limestone Member forms the bedrock surface underlying residual soil in the southern half of saddle dam II and the entire length of saddle dam III. This limestone is predominantly light gray, medium to thick bedded, and fine-grained. The relatively impermeable Clay Creek Limestone is moderately to slightly weathered where the overburden is less than 10 feet thick and generally unweathered where the overburden is thicker than 10 feet.

The Jackson Park Member forms the bedrock surface at the north ends of saddle dams IV and V. The facies mapped in both saddle dams is a light brown to yellowish orange, laminated to thin-bedded, fine-grained, calcareous, silty sandstone. This sandstone is moderately weathered and relatively impermeable. Light gray, sandy limestone is interbedded with Jackson Park Sandstone in the northern keytrench of saddle dam IV.

The Heumader Shale Member of the Oread Formation forms the bedrock surface along most of saddle dams IV and V. This member is a medium to olive-gray, thinly laminated to thin-bedded, silty shale. The Heumader contains siltstone and limestone interbeds and grades more calcareous towards its base. The Heumader Shale generally is moderately weathered at the bedrock surface, becomes less weathered with depth, and is also relatively impermeable.

The Plattsmouth Member is light gray, thin- to thick-bedded, fine- to very fine-grained, fossiliferous limestone and is interbedded with medium gray, calcareous shale. The top of the Plattsmouth serves as part of the saddle dam IV foundation.

2.5.6.2.3.2.3 Hydrogeologic Conditions

The ground-water levels recorded during the field exploration program are shown on the subsurface sections, Figures 2.5-120 through 2.5-124, and on the logs of borings (Reference 66). These observations were measured in open borings several days after

completion of the borings. The ground-water elevations generally reflect the topography as shown on the subsurface sections and are interpreted to represent a water-table condition in the soil and weathered rock zone. The direction of ground-water flow generally parallels the surface drainage. Recharge is accomplished primarily by infiltration of precipitation into the soil and weathered rock zone.

2.5.6.2.4 Baffle Dikes

2.5.6.2.4.1 Exploration Program

The exploration program described below is a summary of the field exploration program performed for baffle dikes A and B during the period of March 24 to April 15, 1975. The complete exploration program is described in Reference 58.

2.5.6.2.4.1.1 Test Borings and Test Pits

The subsurface conditions for baffle dikes A and B and related channels were investigated by drilling a total of 33 exploratory test borings, 20 along the alignment of dike A and 13 along the alignment of dike B. The test borings ranged in depth from 4.5 to 21.5 feet below the existing ground surface. In addition, a total of five test pits were excavated along channel alignments, four at dike A channels, and one at dike B channel. The test pits ranged in depth from 3.0 to 11.0 feet and were approximately 10 feet in length and 2 feet in width. The locations of the borings are shown on Figures 2.5-125 through 2.5-129.

Soil samples from the borings were obtained with the Dames & Moore Type U Sampler. Samples were also obtained utilizing the Standard Split Spoon Sampler. Bulk samples were obtained from the test pits. Rock cores were obtained using NX-wireline equipment.

Graphical representation of the soil and rock encountered is shown on the logs of borings and logs of test pits (Reference 58).

2.5.6.2.4.1.2 Ground-Water Exploration

Ground-water levels were observed in the open boreholes and test pits during the course of the investigation and are noted on the bottom of each log of borings and log of test pits (Reference 58).

2.5.6.2.4.2 Summary of Geologic Conditions

2.5.6.2.4.2.1 Soil Conditions

Overburden along the alignment of both baffle dikes consists of topsoil, Quaternary alluvium, and residual soils. The topsoil has an average thickness of approximately 1.2 feet, but is locally absent due to erosion or disturbance by man. Topsoil is generally thicker in valleys where it overlies alluvial deposits. Quaternary alluvium generally consists of brown and gray, stiff to very stiff, silty clays. Alluvial deposits which occur along Wolf Creek and its tributaries are derived from the erosion of residual soils and highly weathered rock. Alluvial soils were mapped in the foundation of baffle dike A from Stations 18+10 to 21+20 and along margins of the excavation from approximately Stations 93+10 to 98+20. Alluvium was mapped in the foundation of baffle dike B from Stations 17+30 to 17+75, Stations 19+40 to 25+80, and from Stations 43+00 to the northwest end.

Residual soils which are derived from underlying bedrock consist of low to high plasticity clays with local traces of sand and gravel. The thickness of residual soil deposits varies and reflects the composition of underlying bedrock. (In general, these soils may reach a depth of 15 feet above shales and 10 feet above limestones.) Residual soils were mapped in the foundation for baffle dike A from Stations 0+00 to 18+10, Stations 33+00 to 66+60, Stations 70+55 to 77+35, and in other intervals noted in the following section. Residual soils were mapped in the foundation for baffle dike B from Stations 0+00 to 13+00, Stations 17+75 to 18+40, Stations 25+80 to 28+00, and Stations 37+00 to 93+00. See USAR Section 2.5.1.2.2 and Reference 351 for a complete description of soils. Boring logs are included in the appendix of the Dames & Moore baffle dike report (Reference 351). Geologic cross sections are shown on Figures 2.5-125 through 2.5-129.

2.5.6.2.4.2.2 Bedrock Conditions

Rocks which underlie the baffle dikes belong to the Kanawaka Shale and underlying Oread Limestone and Lawrence Shale formations. Characteristics of these rocks as mapped in baffle dike foundation excavations and logged in borings are discussed below in stratigraphically descending order (see USAR Section 2.5.1.2.2 for a more complete description). General characteristics of these rock members are discussed in USAR Section 2.5.4. Geologic cross sections are shown on Figures 2.5-125 through 2.5-129.

The sandstone facies of the Jackson Park Shale Member of the Kanawaka Formation forms the bedrock and residual soil surface at the north end of baffle dike A and the eastern end of baffle dike

B. At baffle dike A, this facies is a medium to yellowish gray, laminated to thin-bedded, very fine-grained, calcareous, silty sandstone that is highly weathered. From Station 0+00 to Station 15+00, the Jackson Park at baffle dike B consists of the same highly weathered facies and residual orange-brown sandy clay.

The Heumader Shale Member of the Oread Formation forms the bedrock surface for part of baffle dike A, most of baffle dike B, and the channel adjacent to baffle dike B. This member is a medium gray (weathering to light yellowish or olive-gray), thinly laminated to thin-bedded, calcareous, silty shale. The Heumader contains limestone interbeds and becomes more calcareous toward its base. At the northern end of baffle dike A, the Heumader is highly weathered to brown silty clays that locally contain some fine sand.

The Plattsmouth Limestone Member underlies parts of baffle dike A and is also present along the middle portion of the northern baffle dike A channel, where it outcrops near a tributary to Wolf Creek. This unit is medium to light gray, thin- to thick-bedded, fine-grained limestone with occasional partings and interbeds of gray, thinly laminated, calcareous shale. Although the Plattsmouth Member generally is moderately to slightly weathered, shale interbeds are weathered to clay where exposed near ground surface. The Plattsmouth was mapped in the foundation excavation for baffle dike A from approximately Stations 21+20 to 22+50, at Station 36+00, and from approximately Stations 85+65 to 87+00.

The Heebner Member is a grayish black, thinly laminated, very calcareous shale. This unit was exposed in a ledge at approximately Station 22+50 in the foundation excavation of baffle dike A. The Heebner has weathered to gray-brown silty clay approximately between Station 33+00 and Station 36+00. Residual soil derived from the Heebner Member occurs southeast of Station 36+10 but contacts between this and other residual soils could not be discerned (Reference 326). The Heebner Member is deeply weathered to gray-brown, clayey residual soil from approximately Stations 84+70 to 85+65 and Stations 87+00 to 88+00 in the foundation of baffle dike A.

The Leavenworth Member is a light bluish gray to medium gray, thin- to thick-bedded, fine-grained limestone. This 1-foot thick unit was exposed in a subvertical face at approximately Station 22+50 in the excavation for baffle dike A. The Leavenworth Member was mapped in the foundation excavation of baffle dike A from Station 31+00 to approximately Station 34+50 and at both Stations 84+60 and 88+00.

The Snyderville Shale Member is olive-gray, laminated to medium bedded, locally clayey, and calcareous in the foundation excavation for baffle dike A. Although this unit is slightly weathered approximately between Stations 26+00 and 31+00, it is highly weathered approximately between Stations 22+50 and 24+00. Olive-gray to brown clayey residual soils, which appear to have been derived from the Snyderville Member, occur in the vicinity of Station 56+00 to approximately Station 61+00, in the vicinity of Station 76+00, between Stations 83+70 and 84+55, and between Stations 88+00 and 89+10.

The Toronto Limestone Member is light gray, thin to thick bedded, and fine grained and also contains interbeds of greenish-gray, calcareous shale. This limestone forms portions of the baffle dike A foundation from approximately Stations 22+60 to 28+00, Stations 45+00 to 46+20, Stations 66+60 to 70+55; Stations 77+35 to 83+70, Stations 88+70 to 94+60, and Station 97+65 to the southeast end of the structure. This unit generally is slightly to moderately weathered, but is moderately to highly weathered approximately between Stations 92+00 and 94+60 and southeastwards from Station 97+65.

The Unnamed Member of the Lawrence Formation consists of greenish gray to medium dark gray, thinly laminated, locally carbonaceous, calcareous shale with sandstone interbeds. The Williamsburg Coal Bed is a black, thin-bedded, shaley coal that occurs within the Unnamed Member. The Unnamed Member and coal bed were exposed in the baffle dike A foundation approximately between Stations 94+60 and 97+65. (The shale is moderately weathered above and slightly weathered below the slightly weathered Williamsburg Coal.)

Rocks underlying baffle dikes A and B generally strike north-northeast and dip gently to the west-northwest at 20 to 30 feet per mile. This general structural trend is modified beneath the baffle dike A alignment by an anticline-syncline sequence which plunges to the southwest (USAR Section 2.5.1.2.4.2 and Figures 2.5-53 and 2.5-54; Reference 351).

2.5.6.2.4.2.3 Hydrogeologic Conditions

The ground-water levels recorded during field explorations are indicated on the logs of borings (Reference 58). Measurements were made in open borings upon and after completion of drilling operations. Ground-water elevations generally reflect the topography and are interpreted to represent water table conditions in the soil and weathered rock zone. The water tables are generally perched in the soil and weathered rock zone, and the ground-water flow parallels the surface drainage. Ground-water

flow is very slight and is concentrated at joints and fractures in the rock. Recharge is accomplished primarily by infiltration of precipitation into the soil and weathered rock zone.

2.5.6.3 Foundation and Abutment Treatment

2.5.6.3.1 Ultimate Heat Sink Dam

Piezometers HS-1, HS-3, and HS-5 have been grouted fully in the UHS dam foundation area. The location of the piezometers is presented on Figure 2.5-118. No other foundation treatment procedures were performed on the UHS dam foundation. Piezometer grouting data for the UHS dam are presented in Table 2.5-61.

2.5.6.3.2 Main Dam and Main Dam Spillways

The foundation treatment at the main dam and main dam spillways was comprised of the following:

a. Dental treatment by hand compaction of cohesive material against irregular surfaces of the keytrench walls on the main dam, on the main dam abutment, and against concrete surfaces of the low-level outlet;

b. Piezometer and well plugging;

c. Lean concrete mud mat on foundations of low-level outlet and service spillway; and

d. Application of gunite to excavated walls of low-level outlet.

2.5.6.3.2.1 Dental Treatment

Dental treatment was performed by hand compaction of select cohesive material against irregular surfaces in the key-trenches and on the abutment between Stations 79+00 to 79+50 from the centerline to the downstream toe of the dam. The purpose of the dental treatment was to provide better control of the compaction effort in areas inaccessible to machinery and to provide a good seal between the irregular rock surfaces and the embankment fill.

2.5.6.3.2.2 Piezometer and Well Plugging

Piezometer and well plugging was performed in order to minimize or eliminate seepage of impounded water into the deeper foundation zones (Table 2.5-61).

2.5.6.3.2.3 Mud Mat

Concrete mud mats on the foundations of the low-level outlet and service spillway were used to level and protect the foundation from deterioration by weathering during construction. The level surface provided a better base for concrete forming and a better surface for final cleaning prior to concrete foundation placement. The slower construction process of placing and tying reinforcing steel for these structures dictated the need for longer protection from the weather.

2.5.6.3.2.4 Gunite

Gunite was used on the excavated walls of the low-level outlet to protect the wall face from deterioration by weathering. The slow construction process, as described above, justified the need for gunite treatment of the walls.

2.5.6.3.3 Effectiveness of Treatment

2.5.6.3.3.1 Dental Treatment

Compaction of cohesive material by hand-operated compaction equipment was observed by Daniel International Corporation Quality Control (DIC-QC) personnel. To further assure an effective seal between the cohesive material and the walls, abutments, or concrete surfaces, the best available material was selected for this use. The material used was as free of clods and as close to optimum moisture content as possible.

During the compaction process, in-place field density tests were performed by DIC-QC personnel. The results of all density tests are presented Table 2.5-62.

2.5.6.3.3.2 Piezometer and Well Plugging

The effectiveness of piezometer and well plugging was evaluated by visual observation by D&M geotechnical staff. Well plugging data are presented in Table 2.5-61.

2.5.6.3.3.3 Mud Mat

Visual observation was used to evaluate the effectiveness of mud mats. Prior to the placement of concrete foundations on mud mats, an inspection was performed by D&M geotechnical staff. Documentation of these inspections is presented on D&M Surveillance Reports available at the WCGS site.

2.5.6.3.3.4 Gunite

Gunite placement on the walls of the low-level outlet was visually observed by D&M geotechnical staff. Prior to fill placement, the walls were geologically mapped, inspected, and approved.

2.5.6.3.4 Construction Procedures

2.5.6.3.4.1 Dental Treatment

Cohesive material to be compacted by hand-operated equipment was selected from the best material available. The material was placed in 3-inch thick loose lifts and compacted with "Whacker" or "Powder Puff" type, hand-operated compactors.

The quantity of cohesive material compacted by hand-operated equipment is unknown. In the keytrenches, abutment Stations 79+00 to 79+50, and at the low-level outlet, the hand-compacted material became part of the main dam embankment. Quantity records for these specific areas are not available.

2.5.6.3.4.2 Piezometer and Well Plugging

Three wells and one piezometer in the main dam, spillways, and saddle dam were scheduled for plugging, as presented in Table 2.5-61.

Piezometer LK-8 was grouted by inserting a 1/2-inch diameter pipe to the bottom of the piezometer and pumping grout while raising the pipe until the piezometer was filled.

Well D-61c was removed by excavation for the main dam foundation. Information on type and quantity of material used for well plugging is shown in Table 2.5-61. Well D-61b was not located. A systematic and diligent search for this well was made using graders and scrapers to carefully excavate the well location and adjacent area. When the final cleaning of the main dam foundation was completed, another unsuccessful search was made for the well during the geologic mapping of the foundation. It can only be postulated that the well is either mislocated or had been previously destroyed.

2.5.6.3.4.3 Mud Mat

Low-level outlet and service spillway foundations which were covered with a concrete mud mat were cleaned both by hand and by air blower equipment. These areas were inspected and approved for mud mat placement by D&M geotechnical staff. The documentation of approval is presented on D&M Surveillance Reports available at the WCGS site.

2.5.6.3.4.4 Gunite

Excavated walls at the low-level outlet, which were to receive gunite, were cleaned by hand prior to gunite placement. Gunite was mixed on location and applied to the wall with standard air-blown mortar equipment. The quantity of gunite placed at the low-level outlet was 6.4 cubic yards.

2.5.6.3.5 Saddle Dams

No special foundation treatment and construction procedures were required at the saddle dams.

2.5.6.3.6 Baffle Dikes

The only foundation treatment required on the baffle dikes was the plugging of Wells XC-2, XD-3, and XD-4. Well XC-1 was scheduled for plugging but was removed by foundation excavation for Baffle Dike B. The need, justification, effectiveness, and construction procedure for the baffle dike wells were the same as described in USAR Section 2.5.6.3.1 for the main dam, spillways, and saddle dams. The location of the wells is presented on Figure 2.5-118.

Quantities and type of material used for plugging is presented in Table 2.5-61.

2.5.6.4 Embankment

2.5.6.4.1 Embankment Features

The embankment features of the main dam, saddle dams, baffle dikes, and the UHS dam are described below.

2.5.6.4.1.1 Main Dam

The main dam is about 12,260 feet long and is a homogeneous earth embankment from its base at unweathered rock to a crest elevation of 1,100 feet. Keytrenches totaling about 2,000 feet in length were excavated from the base of the dam into the rock at three portions of the axis of the dam and back-filled with compacted cohesive soil to reduce any possible seepage. The trenches have a width of 10 feet at their base. These trenches are provided where the limestone foundation rock is slabby or broken to cutoff any potential seepage path along joints.

A service spillway with a crest elevation of 1,088 feet and an auxiliary (emergency) spillway with a crest elevation of 1,090.5 feet is provided on the east abutment of the cooling lake dam to pass floods up to and including the probable maximum flood (PMF).

An outlet structure is provided to release the blowdown discharge. The blanket drain provides for controlled seepage and uplift pressures.

The maximum height of the main dam is 100 feet above the bedrock. Stability analyses discussed in USAR Section 2.5.6.5 demonstrate that side slopes of three horizontal to one vertical will insure slope stability throughout its life. A typical section of the main dam showing the riprap layers, rock toe, and drainage blanket is shown in Figure 2.5-115a.

The subsurface materials encountered at the main dam site include alluvial soil, residual soil, and rock materials. For the portion of the dam where the height of the dam is less than 10 feet, the subsurface materials are proofrolled before embankment construction with unsuitable areas excavated to suitable materials. For the portion of the dam between 10 and 20 feet in height, a keytrench 10 feet minimum width at the bottom with one horizontal to one vertical side slopes is excavated to rock and backfilled with compacted cohesive soil. For other areas where the height of the dam is greater than 20 feet, the soil materials have no relevance to the foundation conditions because they have been excavated and removed to an unweathered rock surface.

The rock materials underlying the main dam site have been thoroughly investigated by detailed geologic studies, a number of borings, and test pits. The bedrock is mainly a thinly laminated siltstone with interlaminations of shale and sandstone. Near the abutments, alternating layers of limestone and shale appear with a few thin coal seams. The extent of solutioning and weathering of the limestone can be related to the amount of calcium in the water, the amount of calcium that can be retained in solution by the water, and the amount of calcium present in the limestone. At the Wolf Creek site, there is no evidence of solutioning in the limestone. For a discussion of subsurface conditions at the main dam, see USAR Section 2.5.6.2.2.

The soils for the compacted embankment fill to construct the main dam are alluvial soils from on-site borrow areas located in the reservoir upstream of the dam (Figure 2.5-130). The excavated soil profile begins with a thin layer (up to 30 inches) consisting of brown and black organic clayey silt having a Unified Soil Classification of ML or OL. This layer is stripped and wasted or stockpiled for later use as landscape and downstream seeding. Beneath this topsoil is a layer of mottled gray and yellowish brown silty clay alluvium of medium to high plasticity and of low permeability, having a Unified Soil Classification of CL. The cohesive material used for the Main Dam was drawn from borrow

areas C, D, E, F, G, H, I, J and K, as well as the Main Dam excavation across the Wolf Creek Valley, as shown on Figure 2.5-130. Bulk samples were obtained from the test pits for laboratory testing of the structural fill material. The grain-size distribution curves obtained for the material are shown on Figure 2.5-90, sheets 5 through 7.

The filter materials in the main dam were selected as described in USAR Section 2.5.6.4.1.4. The bulk of the material for the blanket drain is obtained from the Plattsmouth Limestone; is produced from the on-site quarries; and is the quality specified for fine riprap filter materials. The material for the blanket drain in the Main Dam closure area is a mixture of natural sand and crushed Limestone, supplied by the Fogle Quarry at Ottawa, Kansas.

For designing the riprap for the main dam, methods similar to those outlined in the 1973 U.S. Army Corps of Engineers "Shore Protection Manual" were used. The riprap for the upstream slope protection on the main dam varies by elevation, as follows: At elevation 1060' and above, 1700 pound riprap from the Toronto Limestone Member meeting the gradation outlined in Table 2.5-98; from elevation 1050' to 1060', 755 pound riprap from the Toronto Limestone Member meeting the gradation outlined in Table 2.5-99; and below elevation 1050', 755 pound riprap from the Plattsmouth Limestone meeting the gradation outlined in Table 2.5-99. A wind velocity of 50 mph and a significant wave height or 4.2 feet for the main dam were used for the design criteria, as well as a unit weight of 155 pcf and a K_{RR} (stability coefficient for granular, angular, quarry stone randomly placed) of 2.5 for the graded riprap.

Placement of fill materials is made to densities greater than 95 percent of the maximum dry density at moisture contents ranging from 2 percent below to 2 percent above optimum moisture content as determined from the ASTM Standard Proctor test D698-70. The soil fill materials for the dam are placed in uniform lifts not exceeding 8 inches in loose thickness with each layer compacted to the required density prior to placement of succeeding layers. The granular fill for the blanket drain and the filters beneath the riprap are placed in lifts not exceeding 18 inches and compacted to at least 80 percent relative density with vibratory compaction.

No compaction requirements are required for the dumped riprap blanket.

Laboratory consolidation tests were performed on remolded samples of the borrow material. The results are shown on Figure 2.5-89. Since the embankment is founded on rock, the greater majority of the consolidation takes place within the soil fill. Except

where the height of the main dam is 20 feet or less, a camber of 1.5 percent of the height of the dam is provided throughout the length of the main dam so that the freeboard will not be diminished by the embankment consolidation. The camber is provided when the dam is topped out, and much of the consolidation will have already occurred.

2.5.6.4.1.2 Saddle Dams

Except for the saddle dam IV, all saddle dams are founded above the normal operating level of the cooling lake. The maximum height of these dams varies from 5 feet to 38 feet above the bedrock level. These dams are homogeneous embankments of cohesive materials with crest elevation at 1,100 feet. The selected slopes of the dams are three horizontal to one vertical, the same as those of the main dam. Portions of the lakeside slopes of Saddle Dams I, II, and III are flattened to a five horizontal to one vertical slope. The flattened areas are from stations 10 + 50 to 14 + 50 at Saddle Dam I; stations 15 + 00 to 24 + 50 at Saddle Dam II; and stations 11 + 50 to 21 + 50 at Saddle Dam III. The subsurface conditions at the saddle dams are discussed in USAR Section 2.5.6.2.3.

The properties of the foundation and borrow materials to be used for saddle dams are the same as those for the main dam. Embankment materials are from selected excavation for the saddle dams and borrow areas described in USAR Section 2.5.6.4.1.1. The materials are cohesive clays, compacted to a minimum of 95 percent optimum dry density of the Standard Proctor compaction, ASTM D 698-70.

Filter materials are of the gradation defined for the main dam, and placed as a bedding layer for the riprap slope protection.

A granular drainage blanket is provided for Saddle Dam IV. Internal filters and drains are not required for the other saddle dams, because they are not subject to wetting during cooling lake normal operating levels.

Riprap slope protection design procedure is the same as that required for the main dam. The design wave height is 3.2 feet as determined for Saddle Dam IV. The riprap for Saddle Dams IV and V is from the Toronto Limestone formation and is the 1,700 pound gradations as outlined in Table 2.5-98. It is 2 feet, 6 inches thick for Saddle Dam V and 3 feet thick for Saddle Dam IV. The downstream slopes of all saddle dams are protected by seeding.

The lakesides of Saddle Dams I, II and III are seeded with grass.

The cohesive fill is placed and compacted in accordance with the standards set forth for the main dam. Similarly, the riprap and filter bedding are placed as described for the main dam.

For portions of saddle dams having height greater than 20 feet, a camber of 1.5 percent of the height of dams is provided to account for any settlement of embankment. The other embankment features of the saddle dams are similar to those of the main dam.

2.5.6.4.1.3 Baffle Dikes

The geometry of baffle dikes A and B is similar to that of the main dam. They are a homogeneous section composed of cohesive materials, except Baffle Dike A which has a rock core section. The height of the dikes varies from 10 feet to 82 feet above the bedrock. The subsurface conditions at the baffle dikes are discussed in USAR Section 2.5.6.2.4.

The compacted fill is from suitable excavated materials or from selected borrow areas and consists of cohesive clays. The properties of the foundation and borrow materials are similar to those of the main dam embankment fill. The fill was compacted to 95 percent dry density of the Standard Proctor compaction as defined by ASTM D 698-70. Where a rock core section was used, the rock compaction procedures were developed from on-site test sections. The cohesive soil cover was compacted to the same cohesive fill requirements.

Filter materials are granular, noncohesive, and of the gradations defined for the main dam. They were placed as a bedding for the riprap slope protection. Blanket drain materials were not required for the baffle dikes since they normally function under balanced hydrostatic pressures.

Riprap of the same quality as that for the main dam was placed on both faces of the baffle dikes. The riprap extends below the minimum operating levels of the cooling lake. This provides adequate protection against erosion from wave action.

Based on the 100-year flood and wind-wave runup, the design of the riprap for the lake side of the baffle dikes is the same as that for the main dam. The riprap for the lakeside of Baffle Dike A consists of a 3 foot thick layer of 1,700 pound gradation riprap above the bench at elevation 1070', and a 2 foot thick layer of 755 pound riprap below the bench. The riprap for the lakeside of Baffle Dike B consists of a 3 foot thick layer above the bench at elevation 1070' and a 2 foot thick layer below the bench, of the 1,700 pound riprap, except for a section between stations 28 + 50 to 37 + 00 where a 2 foot thick layer of the 755 pound riprap was used below the bench.

On the landward side of the Baffle Dikes, the design for the riprap has a maximum weight of 185 pounds, a weight of the 50 percent size of 50 pounds, and a minimum weight of 10 pounds, except several areas on the east side of Baffle Dike A, where riprap from the Toronto Limestone, which was lighter than the specified 185 pound riprap gradation, was used below elevation 1075' (msl).

Baffle dikes are provided with a camber of 1.5 percent of the height of the dikes where their heights exceed 20 feet. This camber ensures that the freeboard is not diminished due to consolidation of dikes.

2.5.6.4.1.4 Ultimate Heat Sink Dam

The UHS dam is an earthfill dam approximately 18 feet in height above the foundation rock surface at its maximum section. The side slopes of the dam are designed to be four horizontal to one vertical.

The subsurface materials encountered at the UHS dam site included alluvial soil, residual soil, and rock materials. The soil materials have been excavated and removed to a fresh rock surface. The subsurface conditions at the UHS dam are discussed in USAR Section 2.5.6.2.1.

The bedrock underlying the UHS dam is a series of shales and limestones, identical to that underlying the entire plant site to the northwest. During the exploration, no drill water losses were encountered in any of the soil or rock borings. Variations in foundation conditions under the dam are not abrupt, but occur over large horizontal distances, and the abutments are flat-sloping. The dam is founded on competent rock.

The soils for structural fill to construct the UHS dam will come from on-site excavation upstream of the UHS dam within the excavation limits of the UHS complex as shown on Figure 2.5-130 and are selected so as to provide the most impervious clays available. Laboratory tests on samples taken from test pits and borings within the UHS area indicated that the materials are suitable for embankment construction and are available at a number of locations. These soils consist of deposits of clay of medium to high plasticity and of low permeability. Their character and thickness are variable and reflect the composition of the underlying bedrock. They range from silty sand with traces of rock fragments to plastic clays with traces of sand.

The soil profile excavated for borrow began with a thin (0- to 2-foot) surface horizon of slightly organic clayey silt having a Unified Soil Classification of ML. This layer was stripped and wasted or stockpiled for later use in final grading and landscaping in other portions of the project.

The remaining soil profile is grouped into two predominantly clay materials which have a Unified Soil Classification of CL and CH. The maximum in-place density ranges between 125.8 and 87.3 pcf for the CL soil and between 104.2 and 82.6 pcf for the CH material. A complete list of the in-place densities as determined from undisturbed samples obtained during the drilling program of the UHS is shown as Table 2.5-63. These soils were the predominant source of the potential embankment material.

Both bag and jar samples were obtained from the test pits and borings for laboratory testing. Significant physical properties of representative specimens of these materials are summarized in Tables 2.5-63 and 2.5-64. Grain-size distribution curves are shown in Figure 2.5-90, sheets 1 through 4. The plots indicate little significant variation in the deposits either laterally or with depth. A description of the test procedures used is provided below.

2.5.6.4.1.4.1 Test Procedures

2.5.6.4.1.4.1.1 Sample Processing

Each bulk sample was processed by passing the entire contents through a No. 4 screen and then sorting the gravel sizes retained through use of a mechanical shaker. If the materials were not sufficiently plastic to be forced through the Number 4 screen, air drying was permitted to create a workable condition that facilitated the plus and minus Number 4 size separation.

The sorted material was placed into moisture-proof bags, tied, and marked with identification tags.

2.5.6.4.1.4.1.2 Moisture Content

Determination of moisture content in the laboratory was performed in accordance with ASTM Test Designation D 2216/71.

2.5.6.4.1.4.1.3 Atterberg Limits Test

Liquid and plastic limits were determined in accordance with ASTM Designations D 423-66 and D 424-59, respectively.

2.5.6.4.1.4.1.4 Particle-Size Analysis

Particle sizes larger than 74 microns (No. 200 mesh sieve) were determined by mechanical sieving; sizes finer than 74 microns were determined by hydrometer analysis. All minus Number 4 material was soaked overnight and dispersed using an air jet dispersion apparatus, and hydrometer readings were then taken. After completing the necessary hydrometer readings, the soil slurry was washed on a Number 200 mesh sieve and the retained portion dried to a constant weight for subsequent dry sieving to obtain the percentage of the various sand sizes. The percentages of sizes larger than Number 4 sieve were determined during sample processing.

2.5.6.4.1.4.1.5 Specific Gravity Determinations

Specific gravity values were determined for all materials by the pycnometer method in which an extremely high vacuum was applied to a soil-water mixture of each specimen until all air had been removed. A mechanical shaking apparatus assisted in freeing the soil of absorbed air. The reported values are considered apparent specific gravity, which is defined as a ratio of a mass of unit volume of the impermeable portion of a soil at a stated temperature to a mass of the same volume of gas-free distilled water at the same temperature.

2.5.6.4.1.4.1.6 Compaction Test

Two series of compaction tests were completed for this testing program. Procedures for both series were in accordance with ASTM test method D698-70 (Method A), except for the later "5-point" series wherein the material was reused for the several moisture-density compaction points.

Each compaction point was molded from prebatched soil that was moisture conditioned for at least 16 hours. Soil batches containing overdried material prepared for the second compaction series were moisture conditioned for at least 24 hours at the initial moisture level and for about 1 to 2 hours at each increase in moisture.

Moisture content of each compaction point was determined by oven drying the entire compaction specimen in the initial series and by paring a cylindrical moisture sample for oven drying from the compaction specimens containing reused soil. Compacted soil remaining in the surplus material after molding a compaction specimen was broken down and passed through a Number 4 screen before adding moisture and curing for subsequent test points.

2.5.6.4.1.4.1.7 Consolidated-Undrained Triaxial Compression Test

Test specimens were prepared by remolding moisture conditioned soil directly into a 2 1/2-inch mold. The specimens were then wrapped with prepared filter-paper jackets, encased in latex membranes, and mounted on the triaxial specimen base. After the test chamber was assembled, initial burette data were recorded and saturation by seepage and incremental backpressure were undertaken until a "B" saturation parameter of 0.95 or greater was attained. The designated consolidation pressure was then isotropically applied to the specimen, and time versus volume change measurements were recorded.

Upon completion of primary consolidation, the interior valves were closed and axial stresses slowly applied, maintaining a constant strain rate determined for each specimen from its consolidation behavior. Tests were terminated at specimen failure. The entire test specimen was then removed and dried to a constant weight for moisture content and unit weight determinations. Pore pressure measurements were taken during the stressing phases of all triaxial tests, and the Mohr's diagrams were plotted.

Consolidated-undrained triaxial compression test results on recompacted soil samples are provided in Table 2.5-31. Pore pressures were measured at top and bottom of samples and the average pore pressure taken to compute effective stress from the total stress. Table 2.5-65 shows how effective stress is computed from the total stress.

Borrow material is considered only from the area of TP-1, TP-2, and TP-3, and, hence, the Mohr circle is drawn only for the test results in these areas. Figure 2.5-131 is the Mohr envelope drawn from the results of TP-1, TP-2 and TP-3, respectively. Figure 2.5-131 also shows the Mohr envelope drawn combining all the TP-1, TP-2 and TP-3 test results. From all these Mohr envelopes, a conservative effective stress parameter, c' = 265 psf and ϕ = 20, is chosen for slope stability analysis of the UHS dam.

A modified Mohr diagram is also presented in Figure 2.5-131 on the tests performed for TP-1, TP-2 and TP-3.

2.5.6.4.1.4.1.8 Unconsolidated-Undrained Triaxial Compression Test

Remolded triaxial test specimens were constructed as described in USAR Section 2.5.6.4.1.4.1.7 and were placed in the test chamber. After a saturation "B" parameter of 0.95 or greater was attained, the interior valves were closed and the full confining pressure applied as quickly as possible. Loading was simultaneously begun

with the application of confining pressure. Axial loading was increased at a uniform rate of strain until failure was indicated. Pore pressure was monitored throughout the loading.

After completing the axial loading, the entire specimen was removed and oven dried to a constant weight for moisture content and unit weight determinations.

Results of the unconsolidated-undrained triaxial compression tests on the recompacted samples are provided in Table 2.5-29. Since the borrow materials are considered only from the areas of TP-1, TP-2 and TP-3, a conservative undrained parameter, c = 450 psf and ϕ = 0, is considered.

2.5.6.4.1.4.1.9 Swell Tests

Test specimens for the one-dimensional swell tests were prepared and compacted by kneading the sample into a 2 1/2-inch diameter oedometer ring. Final target density was achieved by slightly compressing the molded soil to the desired specimen height using a circular steel plate. Each specimen and ring was then placed into a standard consolidometer loading frame and subjected to a 0.05 tons per square foot seating load. Stress equilibrium was then created by allowing the specimen to freely strain in the axial direction under the imposed nominal loading before proceeding with the test. Axial loading pressures of 0.31 or 0.62 tons per square foot (tsf) were used on separate specimens of the same sample. Inundation was created during the loading sequence between 2 and 4 minutes, and the tests were continued for 24 hours.

Because of the behavior of the swell test, additional tests were undertaken to verify the original test results with the variable stress fields and saturation conditions likely to be encountered in the construction. The supplemental swell study was undertaken on Sample TP-3 (composite 1 foot to 3 feet and 3 to 5 feet), deemed representative of all soils being tested. In this supplemental study, test specimens were molded in a separate cylinder using only kneading effort, and the soil was then transferred directly into the confining test rings. Two parameters were varied -- stress history and time to inundation -- and the resulting swell or axial strain versus time recorded. Since no significant difference in swell behavior or potential was noted between the initial and supplemental swell test results, further supplemental swell testing was not considered necessary.

2.5.6.4.1.4.1.10 Consolidation Tests

Test specimens for the consolidation tests were prepared directly into the oedometer rings in the same manner as described in USAR Section 2.5.6.4.1.4.1.9. Fixed-ring type consolidometers were

used for all consolidation tests, and loading started with a small seating load of 0.05 tsf maintained for 24 hours or until the specimens ceased to consolidate. At this time, the standard loading sequence of doubling the prior load was started, allowing up to 24 hours between loadings, as appropriate. After completing the 6.4-tsf loading, the specimens were allowed to rebound at loads of 1.6, 0.4 and 0.1 tsf, allowing 24 hours at each rebound load.

Deformation versus time readings were taken for each loading step, and void ratio-pressure curves and time-deformation curves were plotted for each test.

Upon completion of testing, the entire specimen was removed and used to determine moisture, void ratio, and density.

2.5.6.4.1.4.1.11 Permeability Tests

Permeability test specimens from bulk materials were prepared in the same manner as triaxial test specimens, resulting in permeability test specimens with diameters of 2.87 inches and heights of approximately 2 inches.

Following preparation, each specimen was encased in a rubber membrane without a filter jacket, and incremental back-pressure saturation techniques was employed to ensure complete saturation. Following this, density increases, if appropriate, were achieved by increasing the confining pressure and then allowing the specimens to consolidate.

Several test runs were made at each density using different initial hydraulic gradients. Falling-head testing techniques were used in making the permeability determinations, and each value has been corrected to a viscosity at 20°C.

2.5.6.4.1.4.1.12 Stress-Controlled Dynamic Triaxial Compression Test

Triaxial compression tests incorporating cyclic loading under controlled stress conditions were performed on saturated test specimens of remolded soil. Test specimens were prepared by molding the soil directly into a 2.87-inch diameter mold. The specimens were then wrapped in filter paper jackets, encased in latex membranes, and mounted on the triaxial specimen pedestal.

After placing the specimen in the dynamic triaxial chamber, incremental backpressure saturation was applied to assure saturation prior to consolidation and subsequent repeated loading. In all cases, a "B" saturation parameter of 0.95 or greater was attained at the maximum backpressure level prior to consolidation.

Consolidation cycles were performed under the following loading conditions. The specimens were first consolidated under isotropic conditions, at principal stress ratios, $k_c = \sigma_1/\sigma_3$, of 1.25 and 1.75.

Time versus interior volume change behavior was recorded during consolidation cycles, thus assuring completion of primary consolidation. Corresponding measurements of the exterior confining fluid were also made during the saturation and consolidation phases as a further check on the specimen volume changes.

Upon completion of the primary consolidation in both phases, an air cushion was established within the triaxial chamber by drawing off a portion of the confining fluid, closing the drainage valves, and applying a predetermined reversing cyclic axial stress at a frequency of 1 cps.

Tests were performed with the stress reversal controlled so that the peak stresses were maintained for a relatively short period of time, resulting in "sawtooth" shaped loading pulses.

Measurement of dynamic pressure, strains, and axial loads was accomplished with electronic transducers, and traces of the analog values were simultaneously recorded throughout the entire test. Dual traces for the axial strain were recorded at different amplification levels so that a more precise record could be obtained during the early portion of the test when the strain was low, as well as during the later portion of the test when values of large magnitude were anticipated. The stress-controlled dynamic triaxial test results for the compacted clay are given in Table 2.5-66. These test results are also plotted on Figure 2.5-93.

2.5.6.4.1.4.1.13 Strain-Controlled Dynamic Triaxial Compression Test

Test specimens were prepared as described in USAR Section 2.5.6.4.1.4.1.12 and mounted in a triaxial test apparatus. A backpressure saturation technique was employed to attain a "B" saturation parameter of 0.95 or greater. Upon completion of saturation, the specified isotropic consolidation pressure was applied, and volume change versus time readings were recorded until 100 percent primary consolidation was completed.

Following consolidation, each specimen was subjected to approximately 20 cycles of loading, which was applied with a series of offset circular cams that axially strained the specimen in a sinusoidal manner at 1 cps. Loading started with the smallest cam offset and progressed through a series of three larger cam offsets. Between each different cyclic strain, the specimens were

permitted to drain for a sufficient period of time to dissipate any pore pressure and to reestablish the designated effective confining pressure. The axial load, axial strain, and pore pressure variations during each application of strain were recorded on an electronic stripchart. The load-deflection hysteresis loops were recorded on an XY recorder at selected times during the application of cyclic strain.

Following dynamic testing, the entire test specimen was removed from the chamber and oven dried for moisture content and unit weight determination.

The shear modulus of the soil controls the velocity of the propagating shear waves due to earthquake and is expressed as the equivalent secant modulus, determined by the slope of a line passing through the ends of the hysteresis loop at the peak stress and strain after each loop. Figure 2.5-94 provides the laboratory results of the shear modulus.

The damping ratio provides the measure of the energy absorbing characteristics of soil. Under earthquake loading, damping arises from nonlinear frictional effects as mineral particles slide up on adjacent particles. The strain energy released during unloading is less than the strain energy stored during loading. Figure 2.5-95 provides the damping values from the laboratory results.

2.5.6.4.1.4.1.14 Dispersive Soil Tests

Soils from borrow locations within the UHS area and from the borrow area for the main dam and saddle dam were tested for dispersion. The tests were done according to the recommended procedures of the Soil Conservation Service (1976) and that of Sherard (Reference 239) and included double hydrometer tests, tests for dissolved sodium and total dissolved salts (TDS) and pinhole tests. The test results are presented in Table 2.5-67. The test procedures are described in the above-mentioned references.

The dispersive characteristics of the UHS embankment were first investigated during the search for borrow material sources for the UHS embankment fill. At that time, potential borrow material was tested using the SCS method (Reference 240) and Sherard's method (Reference 241). Chemical tests were also performed. The results (samples from Test Pits HSDC-1, -2, -3 shown on Table 2.5-67d) did not indicate a significant dispersive potential. During and after construction of the embankment, samples taken from borrow material (UHS-1 to UHS-3 shown on Table 2.5-67e) and the embankment (CUHS-1 to CUHS-3 shown on Table 2.5-67a) were again tested using Sherard's method. At this time, the tests showed dispersive

behavior. However, when the samples showing dispersive behavior were tested using water from the John Redmond Reservoir (the water in the Wolf Creek Lake is primarily water pumped from the John Redmond Reservoir), the samples did not test dispersive. Because of concern for failure from dispersive piping during filling, Mr. James L. Sherard was consulted. Mr. Sherard's evaluation and recommendations are shown in a attached letter (Table 2.5-67f). In accordance with Mr. Sherard's recommendations, the UHS dam was monitored closely during and after filling, and no signs of distress or piping were noticed. Consequently, there should be no danger of the UHS dam embankment failure from dispersive piping.

The results of the dispersion tests on samples from the main dam embankment are shown on Table 2.5-67e. It should be noted, however, as was the case for the samples from the UHS dam embankment, that when the samples showing dispersive behavior were tested using water from the John Redmond Reservoir, the samples did not test dispersive. The conditions at the main dam are being visually inspected weekly.

To provide assurance of the safety of UHS dam, the UHS basin was filled with water while the downstream (toe) water level was kept at or below 1955 feet for a thirty-day observation period. During the UHS fill and observation periods, the performance of the UHS dam was assessed through a program of visual inspection, monitoring of movement instrumentation and monitoring of water elevations.

The UHS basin was filled and maintained with water from the John Redmond Reservoir to an elevation of 1069.0 to 1069.5 feet, while the lake water elevation downstream of the dam was maintained below elevation 1055 feet for a thirty-day observation period. Pumping operations to fill and maintain the water elevations in the UHS basin were performed in accordance with the criteria specified in Table 2.5-67a and the test procedure specified in Table 2.5-67c. During the fill and observation periods, daily measurements, to the nearest 0.1 foot, were taken to record the water elevation in the UHS basin, in the lake downstream of the UHS dam and in a downstream pond which is southwest of the UHS dam. In addition, pump flow rates were measured and pumping periods were recorded for all pumping operations necessary to maintain the water elevation in the UHS basin and to remove water from the area at the toe of the UHS dam.

Prior to filling the UHS basin, the base elevations and coordinates were recorded for monuments 1 through 9 on the UHS dam. During the fill and observation periods, the monuments were periodically monitored for vertical and horizontal movement, per the procedures outlined in Table 2.5-90. During the initial fill

period, from May 20, 1980 to September 30, 1980, vertical movements of the monuments were recorded weekly; for the remainder of the fill period and the thirty-day observation period, vertical movements were recorded monthly. Horizontal movements of the monuments were recorded monthly from May 23, 1980 to September 24, 1980, and thereafter, per the schedule defined in Table 2.5-90. The monument monitoring data recorded during the fill and observation periods indicates vertical movements in a range from 0.1 inches to 0.6 inches, (May 20, 1980 to January 5, 1981) and horizontal movements from 0.8 inches to 3.1 inches (May 23, 1980 to September 24, 1980).

In addition, the UHS dam and the area downstream of the dam were inspected weekly during the fill and observation period for seepage, stability and segregation of the riprap material.

Data recorded during the UHS dam test program are on file at the Wolf Creek Generating Station, Unit No. 1. The UHS dam test data, and the results of the visual inspection were reviewed and summarized in the Section entitled "Observation Period" (Reference 73). The "Observation Period" section of this report is provided in Table 2.5-67b. The data and observations recorded during the UHS program are within the normal ranges for a compacted earth dam.

Plasticity indices were determined for samples from the borrow material. Once the material was compacted in-place, additional test samples were taken to verify that the range of plasticity indices did not deviate significantly from the range of indices for the material initially tested from the borrow areas. The in place plasticity indices were evaluated by the field geotechnical inspection staff and found consistent with the borrow material data.

The range of plasticity indices for main dam materials are given in Tables 2.5-74 and 2.5-75. The indices for the UHS dam materials are given in Tables 3 and 5 of a 1981 Dames & Moore Report (Reference 73).

2.5.6.4.1.4.2 Filter Materials

Since no deposits of sand or sand and gravel suitable for use as transition zones of filters in the proposed structure were found, such material is purchased offsite or manufactured by crushing the limestone rock members. The design of the filter materials was made such that (a) no significant head is lost in flow through the filters, and (b) no significant invasion of soil is permitted

into the filter. The gradation requirements of the filter material are based on particle size which was developed by Terzaghi and later extended by the U.S. Army Corps of Engineers at Vicksburg, Mississippi (Reference 143) and the U.S. Navy Design Manual DM-T. The resulting filter specifications relate the grading of the protective filter to that of the soil protected and the riprap by the following:

$$\frac{D(15)\ \text{Riprap}}{D(85)\ \text{Coarse Filter}} < 10$$

$$4 < \frac{D(15)\ \text{Riprap}}{D(15)\ \text{Coarse Filter}} < 20\ \text{(a)}$$

$$\frac{D(15)\ \text{Coarse Filter}}{D(85)\ \text{Fine Filter}} < 25$$

$$4 < \frac{D(15)\ \text{Coarse Filter}}{D(15)\ \text{Fine Filter}} < 20\ \text{(a)}$$

$$\frac{D(50)\ \text{Coarse Filter}}{D(50)\ \text{Fine Filter}} < 25$$

$$\frac{D(15)\ \text{Fine Filter}}{D(85)\ \text{Soil}} < 5\ \text{(b)}$$

$$4 < \frac{D(15)\ \text{Fine Filter}}{D(15)\ \text{Soil}} < 20\ \text{(ab)}$$

$$\frac{D(50)\ \text{Fine Filter}}{D(50)\ \text{Soil}} < 25\ \text{(b)}$$

D(15), D(50), and D(85) are the particle sizes from a particle-size distribution plot at 15, 60, and 85 percent, respectively, finer by weight. The gradation relationship between the filter and the riprap layer was designed using the Corps of Engineers criteria (Reference 239) for which the D(15) size of the riprap does not exceed 10 times the D(85) size of the filter. The following factors were considered in the selection of the filter thickness:

---

a This limit may be increased to 40 if the finer material is well graded (uniformity coefficient > 4).

b These criteria need not be satisfied if the resulting filter material contains more than 5 percent fines (<.074mm-No. 200 sieve).

a. The wave action as the lake drawdown occurs;
b. The gradation of the riprap; and
c. Plasticity and gradation of the embankment materials.

2.5.6.4.1.4.3 Riprap Materials

The rock for the riprap blanket for both the upstream and downstream slopes meet the quality specifications for concrete aggregate.

Riprap was obtained by blending the Plattsmouth Limestone from the onsite quarry with large size rock from the Southbend Limestone from the Fogle Quarry in Ottawa, Kansas. Testing of the Plattsmouth formation has been conducted by the Kansas State Department of Transportation and Dames & Moore. The testing of the Southbend formation has been conducted by Dames & Moore. Results are summarized in Table 2.5-68 and 2.5-68a.

Within the site area, the Plattsmouth Limestone has a maximum thickness of approximately 12 feet. This formation has many thin shale partings. It is found that the pieces having an average thickness of 6 to 9 inches and a maximum of 1 foot can be obtained.

The Southbend formation is a formation of limestones which does not contain fragments of shale partings or bedding planes. This formation is found at the Fogle Quarry at Ottawa, Kansas.

The cooling lake waters are saturated or near saturated with respect to calcium at all times. The water's ability to dissolve the limestone is, therefore, minimal, and the immersion of limestone riprap into the environment of the cooling lake does not affect the integrity of these blocks.

During the unlikely postulated total loss of the main cooling lake dam and baffle dike "A", the slopes and crest of the UHS dam would be subjected to a flow of water over the crest. Adequate erosion protection has been provided for the upstream and downstream slopes as well as the crest of the dam. The techniques for design of rock sections for overtopping were presented by Oliver (Reference 205).

2.5.6.4.1.4.4 Field Construction

All phases of the site preparation and earthwork operations were performed under the technical supervision of qualified geotechnical engineers who determined that all work was performed in compliance with project earthwork specifications and project quality assurance criteria. Placement of fill materials was made to densities greater than 95 percent of the maximum dry density at moisture contents ranging from 2 percent below to 2 percent above optimum moisture content as determined from the Standard Proctor Test D 698-70. The soil fill materials for the dam was placed in uniform lifts not exceeding 8 inches in loose thickness with each layer compacted.

The granular fill for the filter beneath the riprap was placed in lifts not exceeding 18 inches and compacted to 80 percent relative density with vibratory compaction.

No compaction requirement was required for the dumped riprap blanket.

The quality control procedures established the methods employed to accomplish the work covered in the specifications. The quality control procedures were as follows:

a. Identify methods for performing the required specification work;

b. Describe special construction methods, work procedures, and personnel qualifications required for accomplishing the work;

c. Establish acceptance criteria for determining that important activities have been accomplished satisfactorily;

d. Identify control measures necessary to ensure implementation of required inspection points;

e. Provide measures to ensure that material, equipment and services conform to procurement documents;

f. Provide traceability of materials to ensure identification of all materials used for incorporation in the UHS dam; and

g. Provide for identification, documentation, segregation, disposition, and/or resolution of nonconforming materials and workmanship used in safety-related construction that fails to meet established requirements.

The laboratory consolidation tests were performed on the fraction of the embankment soil finer than the Number 4 sieve. The results of consolidation tests for both the recompacted and undisturbed soil specimens are given in Table 2.5-69 and are shown in Figures 2.5-88f through 2.5-88h. The compressibility of the filter and rock sections was very small and occurred during construction.

2.5.6.4.2 Compaction

2.5.6.4.2.1 Ultimate Heat Sink

2.5.6.4.2.1.1 Laboratory Testing

A total of 17 compaction tests, including both Standard and Modified Proctor (ASTM D-698 and D-1557, Method A), were performed during the investigation on samples obtained within the UHS area. The results of these tests and the grain-size distributions for the compacted soils are shown in the Dames & Moore ultimate heat sink report (Reference 59). The test procedures are discussed in USAR Section 2.5.6.4.1.4.1.6.

Borrow material for the UHS dam was obtained from within the area of the excavation for the UHS. The maximum dry densities determined from the Standard Proctor tests ranged from 87 to 112 pcf, and optimum moisture contents ranged from 15 to 28 percent. The range of values obtained indicates a wide variation in properties and composition (liquid limits ranging from 36 to 80). Due to the large variation in maximum dry densities and optimum moisture contents, large variations in compacted densities occurred depending on the plasticity of the borrow material. Frequent field density and compaction tests were, therefore, performed to ensure that the compaction criteria for the UHS dam area were met.

The summary of the field density tests are shown on Figures 2.5-114a and 2.5-114b. Based on the field tests, 16 of the 195 field tests failed to meet the compaction criteria by 1 to 4 percent compaction. However, all failed areas were recompacted, or the failing material removed and replaced. Moisture content data are summarized on Figure 2.5-114d.

Triaxial tests on six samples obtained from three different boreholes drilled in the UHS-embankment were also performed. The test results are shown on Figure 2.5-114c. As can be seen, all tests

yielded strengths higher than the design strength. Based on this information, the strength parameters used in the design are valid.

2.5.6.4.2.1.2 Field Control

The UHS dam foundation was prepared as described in USAR Section 2.5.6.4.2.2.3. Location of the UHS dam and UHS is shown on Figure 2.5-114.

2.5.6 4.2.2 Main Dam and Main Dam Spillways

2.5.6.4.2.2.1 Laboratory Testing

Borrow material for the main dam embankment has been obtained from borrow areas within the Wolf Creek Valley. An extensive study of the soils within the borrow areas has been reported in "Final Report, Geotechnical Investigation, Soil Borrow Materials, Wolf Creek Generating Station, Unit No. 1, for Kansas Gas and Electric Company and Kansas City Power and Light Company" (Reference 55). A summary is also given in USAR Section 2.5.6.3.

A total of 21 Standard Proctor compaction tests (ASTM D698-70 Method of Compaction) were performed during the investigation for the main dam on representative bulk samples from each borrow area. Test results shown in the Dames & Moore main dam report (Reference 60) were used to generate generalized compaction criteria for the borrow materials.

2.5.6.4.2.2.2 Field Tests

Several test fills were performed on granular blanket drain material. The primary purpose of the test fills was to select the optimum lift thickness for placement of this material which is manufactured by crushing limestone from the on-site quarry. Limestone material is susceptible to breakdown with excessive compactive effort. To minimize this breakdown during placement and compaction, variable lift thicknesses were evaluated.

Lift thicknesses of 18, 36, and 72 inches were evaluated to select the lift thickness which would have less than 5 percent passing the Number 200 screen and an average relative density of 70 percent after compaction. The relative density, in-place dry density, and gradation results of these test fills are summarized in Table 2.5-70.

All laboratory and field testing, except petrographic examination and freeze thaw tests, were performed by DIC-QC personnel.

Lift thicknesses of 18 inches were selected because satisfactory and repeatable results could be more easily obtained using standard construction methods.

To meet specification requirements, it was necessary to use material which had a low percentage of material passing the Number 200 screen prior to compaction. To monitor the gradation of the granular drainage blanket material, numerous daily samples were obtained at the crusher. Gradation tests were performed on these samples to evaluate the gradation of the material being produced and provide information for adjusting the crushing, screening, and washing operations as necessary.

Lift thicknesses of 36 and 72 inches had satisfactory gradations but were rejected because the in-place relative densities, while considered acceptable, were less than desired for standard construction procedures. The 36- and 72-inch test fills were proofrolled with six passes using a 50-ton pneumatic roller and accepted.

A test fill was also performed on granular toe drain material. The purpose of the test was to establish a performance type placement and compaction procedure that could be observed and verified visually. The large size of the toe drain material makes it difficult to reliably test for relative density. Toe drain test fill results are presented in Table 2.5-71. The method of placement and compaction selected was using a lift thickness of 1 foot and compacting with two passes using a 6-ton vibratory drum roller.

2.5.6.4.2.2.3 Field Control

Clearing and grubbing was performed using dozers and scrapers. Foundation excavation and preparation for the main dam and spillways was also performed using dozers and scrapers and/or a belt loader and belly dumps. Blasting was used to break hard rock. Foundations were prepared for approval by final cleaning using graders, front end loaders, and hand labor as required.

All blasts expected to exceed 10 percent of the allowable peak particle velocity were monitored. The results of the blast monitoring is shown in Table 2.5-72. One of the blasts for keytrench excavation exceeded the allowable peak particle velocity at the concrete cutoff walls of the low-level outlet structure. The concrete cutoff walls and all other concrete at the low-level outlet were inspected by D&M geotechnical staff immediately following identification of the excessive particle velocity. No damage was observed.

Prior to fill placement, all foundations that were in natural soil were proof rolled using a 20-ton, self-propelled sheepsfoot. The site geotechnical staff observed the proof rolling. Any soft areas discovered during the proof rolling were excavated to sound material to provide an acceptable foundation. Documentation of proof rolling is presented on D&M Surveillance Reports available at the WCGS site. All foundations were jointly inspected and approved by Kansas State Division of Water Resources (DWR) personnel and D&M geotechnical staff.

Several types of fill material were specified for use on the main dam and spillways as outlined below.

a. Cohesive embankment;

b. Granular drainage blanket;

c. Granular toe drain;

d. Granular fine bedding;

e. Granular coarse bedding;

f. 30-inch riprap;

g. 22-inch riprap;

h. 6-inch riprap; and

i. Miscellaneous compacted granular fill, granular bedding, and gravel drain.

A typical section is presented on Figure 2.5-115. Center line profiles of the main dam are presented on Figure 2.5-132.

Cohesive embankment material was obtained from approved borrow areas or approved foundation excavation areas as specified on project drawings. Documentation of test results on cohesive material is presented in Table 2.5-62. Borrow and foundation areas were previously investigated and evaluated during the initial site studies. These studies formed the basis for the borrow and foundation areas shown on project drawings. As borrow or foundation areas were excavated, fill material was evaluated visually and approved by the D&M geotechnical staff. To document material approval, additional samples were obtained from the source areas for laboratory testing.

Cohesive fill was placed in approximately 3-inch-thick loose lifts for compaction with hand-operated compaction equipment, such as "Whackers", "Jumping Jacks", or "Powder Puffs." Loose, lift thicknesses of approximately 8 inches were used where heavy compaction equipment could be used. Prior to compaction, the material was mixed and broken down using a dozer-towed disk. Self-propelled, 20-ton, sheepsfoot compactors were used for compaction.

At the beginning of long holidays, or when precipitation was imminent, the fill surface was sealed for protection by rolling the fill with loaded scrapers and/or graded for drainage. Prior to placing additional fill, the surface was scarified by discing.

The fill was placed as close to optimum moisture content as possible. The S&L specification requires +2 percent of optimum. Small deviations for a few tests were authorized and approved by the resident geotechnical engineer, however.

All cohesive fill placed at the main dam and spillways was compacted to 95 percent of maximum dry density as determined by ASTM Test Designation D698. A lift thickness summary of the cohesive embankment fill for the main dam and saddle dams is presented in Table 2.5-73.

Documentation of in-place field density test results performed during placement operations is presented in Table 2.5-62. Other control tests performed on cohesive material are presented in Tables 2.5-74 and 2.5-75.

All granular materials used on the main dam, except the gravel drain, were produced from the approved on-site quarry. Gravel drain materials were obtained from a locally approved quarry. Granular drainage blanket material was hauled by end dump truck from the crusher at the onsite quarry to the placement area. This procedure reduced the handling necessary to place the material and minimized breakdown of the limestone.

Granular drainage blanket material was placed in 18-inch-thick loose lifts and compacted with a 6-ton vibratory roller. Granular drainage blanket material was compacted to 85 percent relative density as determined by ASTM-D-2049. Documentation of control tests is presented in Table 2.5-76.

Toe drain material was hauled from the crusher to the placement area using Belly Dumps. Lifts were controlled to 12 inches in thickness using dozers. The lift was then compacted with two passes using a 10-ton vibratory roller. Compaction was visually observed by DIC-QC or D&M geotechnical staff.

Gravel drain was used as the permeable material around the drain pipes under the service spillway channel. Gravel drain material was placed by hand labor in 3-inch lifts. The material was compacted by "Whacker" type, hand-operated compactors. Compaction of this material was observed visually since it was not possible to test the material by usual methods in the confined 14-inch wide and 17-inch deep trench.

2.5.6.4.2.3 Saddle Dams

2.5.6.4.2.3.1 Laboratory Testing

Borrow material for the saddle dams was obtained from the borrow areas in the Wolf Creek Valley. The testing program is discussed in the Dames & Moore alternate baffle dikes report (Reference 58).

2.5.6.4.2.3.2 Field Control

The field control procedures used for the saddle dams are identical to those used for the main dam (USAR Section 2.5.6.4.2.2). However, except for saddle dam IV, no granular toe drains or drainage blanket are used at the saddle dams. Figures and tables pertaining to the field control procedures for the saddle dams are presented with those for the main dam and spillways.

2.5.6.4.2.4 Baffle Dikes

2.5.6.4.2.4.1 Laboratory Testing

Compaction tests were performed on representative samples of potential borrow materials encountered in the test pits. All compaction tests were performed in accordance with the ASTM Test Designation D 698-70 method of compaction. Test results are presented in "Final Report, Geotechnical Investigation, Alternate Baffle Dikes A and B and Alternate Channels, Wolf Creek Generating Station, Unit No. 1 for Kansas Gas and Electric Company and Kansas City Power and Light Company" (Reference 58).

2.5.6.4.2.4.2 Field Tests

Sargent & Lundy specifications permit the contractor to use shale and rock to construct the inner core section of the baffle dikes. The contractor elected to use waste rock and shale from the on-site quarry and foundation excavations to construct a rock core in baffle dike A. To evaluate the compaction characteristics of the rock and shale, a test fill was constructed at baffle dike A. The primary purpose of the test fill was to evaluate the number of passes required to compact an 18-inch thick lift of rock and shale. Because of the rock size, it was not feasible to reduce

the lift thickness. Also, based on prior experience with rock fills, it was not considered good practice to increase lift thicknesses greater than 18 inches for this material.

Rock and shale for the test fill was placed by end dump trucks and leveled to 18-inch lift thickness using dozers. To evaluate the compactive effort required (95 percent of the maximum dry density as determined by ASTM D 698-70), the lifts were compacted with two to four passes using a 25-ton minimum, self-propelled, sheepsfoot compactor. The compaction was observed by the D&M geotechnical staff to determine the minimum number of passes required to compact the rock and shale. Based on these observations, a minimum of two passes was approved for compacting the rock and shale.

2.5.6.4.2.4.3 Field Control

The foundation preparation procedure for the baffle dikes was the same as that described in USAR Section 2.5.6.4.2.2. Location of the baffle dikes is shown on Figure 2.5-114. Centerline profiles of the baffle dikes are presented on Figure 2.5-133. Foundations for the baffle dikes were inspected by the geotechnical staff prior to fill placement. Foundation approval is documented by D&M Surveillance Reports.

Types of fill material specified for use in the baffle dike construction are as follows:

a. Cohesive embankment;

b. Rock and shale embankment;

c. Granular fine bedding;

d. Granular coarse bedding;

e. 15-inch riprap; and

f. 30-inch riprap.

Cohesive material was obtained from approved borrow areas, baffle dike foundation excavation, or from the on-site quarry excavation. Material evaluation and approval was the same as described in USAR Section 2.5.6.4.2.2. Documentation of test results on cohesive material is presented in Tables 2.5-77 through 2.5-79.

Baffle dike cohesive fill placement, compaction, and protection were the same as described in USAR Section 2.5.6.4.2.2, except that no hand-operated compaction equipment was required.

Documentation of in-place field density test results performed during placement is presented in Table 2.5-78. Other control tests performed on cohesive material are presented in Tables 2.5-79 and 2.5-80.

Rock and shale embankment material was obtained from the on-site quarry excavation, baffle dike foundation, or main dam foundation excavation. Only baffle dike A was constructed with portions of the core using compacted rock and shale. Baffle dike B was constructed entirely of compacted cohesive embankment material. Locations of compacted rock and shale embankments in baffle dike A are presented on Figure 2.5-134.

The rock and shale material was placed by end dump trucks and leveled to 18 inches in thickness with dozers. The lift was compacted with two passes using a 25-ton minimum, self-propelled sheepsfoot compactor. The compaction was visually observed by DIC-QC personnel and/or D&M geotechnical staff.

2.5.6.5 Slope Stability

2.5.6.5.1 Main Dam Stability Analysis

2.5.6.5.1.1 Shear Strength of Materials

Preliminary unconfined compression and consolidated-undrained triaxial tests were performed on remolded samples from the borrow area test pits. The samples were compacted according to ASTM D 698-70 with densities of at least 93 percent of Standard Proctor and moisture content ranging from plus or minus 4 percent of optimum. The results of the strength tests are given in Table 2.5-81.

An average shear strength of 1,800 psf was used for the end of construction slope stability analysis, while the effective stress parameters used for the steady state and rapid drawdown conditions were a cohesion of 280 psf and a friction angle of 25 degrees. Other parameters used in the analyses are given in Table 2.5-82.

2.5.6.5.1.2 Stability Analysis

The main dam is designed such that its slopes are stable under all reservoir operation conditions. The various loading conditions considered in the analyses are described below. The minimum factors of safety used are in accordance with standard practice commonly used for embankment design.

Condition	Minimum Required Safety Factor
1. End of construction	1.4
2. Steady-state flow, cooling lake at Elevation 1087	1.5
3. Sudden drawdown, Elevation 1087 to Elevation 1030	1.2
4. End of construction plus horizontal earthquake force (0.06g)	1.0
5. Steady state seepage with cooling lake at Elevation 1087 with horizontal earthquake force (0.06g)	1.0

As noted above, the steady-state cooling lake elevation was taken as 1,087 feet, and the rapid drawdown condition water level was taken down to Elevation 1,030 feet. For the steady-state seepage condition, an estimate for the phreatic line was based on a flow net construction.

The computer program SLOPE was used for evaluating the safety factors for the main dam slopes. The details of SLOPE program are described in USAR Section 3.12.

For static stability analysis, the program SLOPE uses the simplified Bishop method. In this method, the failure surface is assumed to be an arc of a circle. The pore pressures developed in the embankment during construction are also considered in the analyses. The safety factor is defined as the ratio of the moment of the available resisting forces to the moment tending to cause sliding.

To evaluate the effect of an earthquake loading on the stability of slopes and embankments, a pseudo-static force is used in the computer program SLOPE to represent the deformation effects of earthquake motions. The static force is applied to a slope mass bounded by the slope profile and the assumed failure surface. The earthquake force for a slice is equivalent to the slope mass of that slice times a percent of the acceleration of gravity. Slope mass is calculated using the total unit weights, and does not take into account any pore pressure effects. The earthquake force for each slice is applied horizontally through the center of gravity of that slice.

In the analysis, an earthquake force equivalent to 0.06g corresponding to the OBE was used to determine the stability of the main dam.

The safety factors obtained from the stability analyses are greater than the minimums described above and are given in Table 2.5-83. Figures 2.5-115b through 2.5-115d show the critical slip circles for the cases investigated.

Riprap and filter layers are placed on the upstream slopes and a rock toe is placed on the downstream end of the dam to provide protection against tailwater erosion.

2.5.6.5.2 Saddle Dams Stability Analyses

Because of similar geometry and embankment features, the stability analyses made for the main dam have been applied to the saddle dams.

2.5.6.5.3 Baffle Dikes Stability Analyses

Analyses were the same as those for the main dam, as described in USAR Section 2.5.6.5.1. For the rock core section of the baffle dike, the minimum factor of safety obtained for the worst condition (rapid drawdown) is 1.2.

For the rock core section of the baffle dike, the rock was assumed to have C = 0, ϕ = 35 degrees properties.

2.5.6.5.4 UHS Dam Stability Analyses

2.5.6.5.4.1 Shear Strength of Materials

In the process of evaluating the shear strength of the soil, a series of laboratory triaxial tests were performed on samples taken from the UHS reservoir. The soil specimens tested represented the range of materials found in the UHS reservoir limits and adjacent areas. The laboratory test samples were compacted and tested at optimum water content plus 3 percent and density of 95 percent of Standard Proctor D 698-70, which was selected to simulate the conditions that will be obtained during construction.

For determining the strength of compacted, impervious soils, the following tests were used. Undrained tests were performed primarily to determine the relationship between the shear strength and normal pressure in terms of total stresses for use in the analysis of the stability of the dam during the period immediately after construction. Consolidated-undrained tests were performed

with the pore pressure measured to determine the strength parameters in terms of effective stress (C' and ϕ'). The purpose of the test is to obtain the strength for use in the effective stress method of analysis. The tests were conducted on compacted samples which were completely saturated in order to obtain the lowest shear strengths. The results of the testing are shown in Table 2.5-78.

The filters are compacted to 80 percent relative density within the embankment to prevent liquefaction during an earthquake.

Rock strengths listed in Table 2.5-32 are based on laboratory unconfined compressive tests on NX-rock core from the plant and pumphouse site areas. The shear strength and modulus characteristics of the rock are such that they may be excluded from consideration in the dam analysis.

The rock strength of the riprap blanket has been estimated based upon published data and adopted criteria for construction.

2.5.6.5.4.2 Stability Analyses

2.5.6.5.4.2.1 Static Stability Analysis

The stability analysis was made for the most critical section of the dam shown on Figure 2.5-135. The soil parameters used in the analysis of various conditions are also shown on the figure. The increase in strength due to the filters and large riprap blanket were not considered in the analysis. The solution to each of the design conditions was made by the use of computer program SLOPE, which solves for the stability of embankment employing the modified Bishop method of slices for a circular arc. The computer program is described in USAR Section 3.12.

The static loading conditions analyzed for the stability slopes are as follows:

a. The end of construction;

b. Rapid drawdown, lake water Elevation 1,087 to Elevation 1,050;

c. Steady-state seepage, cooling lake at Elevation 1,050; and

d. Fully submerged condition.

The end of construction case was examined using a total stress analysis in which an estimate was made of the shear strength that will be available considering the pore pressure of the compacted

samples. The minimum factor of safety of 1.4 was selected on the basis of the degree of conservatism for the selection of the soil strength.

The effective stress method of analysis was used in evaluating the rapid drawdown condition on embankment stability. In the effective stress method of analysis, the results of consolidated-undrained tests on saturated clay samples were used to determine the shear strength. In the analysis, the drawdown is assumed to be instantaneous and no drainage occurs during the time the water level is lowered due to the postulated loss of water in the cooling lake. For the analysis, the drained strength was determined by taking into consideration the stresses to which the soil is consolidated prior to drawdown. Lowe and Karafath's (Reference 156) method for determining this shear strength and for accomplishing the necessary stability calculations was used. A factor of safety of 1.2 was selected as the minimum.

For the steady state seepage condition, an effective stress analysis was used with the pore pressures estimated from a flow net. The shear strengths used were determined from consolidated-undrained tests on saturated samples to which pore pressures are applied simulating those which may exist under the gravity flow of the dam. A conservative assumption was made concerning the ratio of the permeabilities in the horizontal and vertical directions. The degree of anisotropy was conservatively selected as nine. A safety factor of 1.5 was considered satisfactory when computed with a method of calculation in which pore pressures were estimated from a steady-state flow net.

Long-term stability of the embankment was analyzed using an effective stress analysis with pore pressures corresponding to equilibrium conditions of the main cooling lake. To provide assurance of a conservative design, a higher factor of safety (1.5) has been provided to allow for the possible decrease in the shear strength of the clay with time. Also, the strength of the weakest material encountered was used in the analysis for stability.

The factors of safety obtained from the slope stability analyses for the above loading conditions are given in Table 2.5-84.

2.5.6.5.4.2.2 Seismic Analysis of UHS Dams

The methods of analyses used to evaluate the seismic stability of the UHS dam are (a) the pseudo-static analysis using the soil strength parameters provided in USAR Section 2.5.6.5.1, and (b) the finite element analysis using the method proposed by Seed and others (Reference 232) and Seed and others (Reference 233).

Additional seismic analysis of the UHS dam using the Lawrence Livermore Laboratories spectrum is presented in Appendix 3C.

2.5.6.5.4.2.2.1 Pseudo-static Analysis

In the pseudo-static method of analysis, the end of construction, steady-state seepage, and long-term stability conditions havebeen evaluated using a 0.12g acceleration. The selection of the seismic coefficient is based on the SSE conditions for the site. The effects of the seismic loading will not be applied to the rapid drawdown condition, because the rapid drawdown condition is a direct result of the SSE. Also, the time period for the earthquake is shorter in duration than the improbable event that the main dam and baffle dyke A would disappear, resulting in a drawdown condition from Elevation 1,087 (normal cooling lake elevation) to the lowest level of the UHS dam.

For end of construction, prior to filling the cooling lake, the saturated, unconsolidated-undrained (UU) shear strength parameters are applicable to the stability analysis. This shear strength is expressed in terms of total strength. This analysis contains the implication that the field pore pressures will not exceed those experienced in the laboratory test. The recognition of this fact does not invalidate the use of such test results in the computation.

The steady seepage condition, where the UHS is stablized at the maximum storage level that can be maintained for a period to produce equilibrium throughout the embankment, creates a critical case for analysis of the downstream slope. The saturated, consolidated-undrained, corrected-for-pore-pressure (CU w/pp) shear strength parameters are applicable to the stability analysis of the downstream slope. The analysis is done in terms of effective stresses, and a flow net is constructed to determine the phreatic line and uplift forces to be used.

The horizontal seismic coefficient, as established and reported in USAR Section 2.5.2, is applied uniformly throughout the embankment. The seismic coefficient multiplied by the mass of an individual slice gives the earthquake force on the zone. This force times the moment arm provides the earthquake overturning moments on the section. Vertical accelerations are neglected.

The results of the pseudo-static stability studies for a uniform slope of four horizontal to one vertical provided the safety factors shown on Figure 2.5-135 for circular sliding surfaces. The results are also given in Table 2.5-84.

2.5.6.5.4.2.2.2 Finite Element Analysis

2.5.6.5.4.2.2.2.1 Introduction

In the finite element method of analysis, the procedure used for evaluating the seismic stability of the UHS dam consists of the following steps:

a. A dynamic response analysis of the UHS dam is conducted to evaluate the shear stress time history at various locations throughout the embankment. The response computation is performed using the finite element method of analysis. The computer program used to compute the response incorporates the strain-dependent modulus and the damping ratio for each element of the model.

b. The irregular shear stress time histories obtained for the various locations throughout the embankment are represented by equivalent uniform shear stresses corresponding to a certain number of cycles.

c. Analysis is performed to determine the static stresses existing in the embankment prior to the earthquake.

d. The cyclic shear stresses required to cause strains greater than 5 percent in the material for conditions representative of those existing in the embankment are determined by means of appropriate dynamic triaxial compression tests on representative specimens of the materials.

e. The seismic stability of the embankment is evaluated by comparing the shear stress required to cause strains greater than 5 percent with the equivalent shear stresses induced due to the SSE.

The soil properties for the dam correspond to those that are expected to be obtained in the constructed dam, and are to be based on laboratory test results, field measurements, and published and unpublished data.

A comprehensive series of dynamic triaxial compression tests was conducted to evaluate the strength characteristics and dynamic properties of the remolded saturated specimens. Strength characteristics of the material were obtained from the stress-controlled dynamic triaxial compression texts. The dynamic properties, shear modulus, and damping ratio were obtained from the strain-controlled dynamic triaxial compression test.

2.5.6.5.4.2.2.2.2 Design Earthquake and Loading Conditions

The SSE of 0.12g is considered at the free field of the foundation level of the Category I UHS dam. (See Appendix 3C for additional seismic analysis.)

The horizontal and vertical design response spectra for the SSE of 0.12g horizontal ground acceleration are shown on USAR Figures 3.7(S)-1 and 3.7(S)-2. In accordance with the design criterion, the dam will remain stable, assuming that the horizontal and vertical accelerations act simultaneously, while the water level is at the steady-state design water surface elevation of 1,087 feet.

2.5.6.5.4.2.2.2.3 Procedures Used in Seismic Stability Evaluation

The following steps are used in evaluating the seismic stability of the dam:

a. Generation of Synthetic Accelerograms: The computer program RSG (described in USAR Section 3.12) is used to generate synthetic accelerograms for horizontal and vertical motions such that the response spectra of these accelerograms essentially envelop the design response spectra. These normalized accelerograms are shown on Figures 2.5-136 and 2.5-137.

   The close matching of the response spectra obtained for the artificial accelerograms with the design response spectra is demonstrated on Figures 3.7-3 through 3.7-8.

b. Dynamic Response Analysis: The horizontal and vertical rock motion obtained above in Step a. are simultaneously used for the dynamic response analysis of the dam to evaluate the shear stress time histories at various locations in the dam. The results of the computation of the response provide values of cyclic stress that are likely to be induced in the soils during an earthquake.

   The response of the dam is obtained using the dynamic finite element method of analysis.

   Figure 2.5-138 shows the finite element representation for the submerged UHS dam. The dynamic material properties are incorporated in the analysis using strain-dependent modulus and damping values.

The computer program QUAD-4 (Reference 119) is employed to compute the response. This computer program is described in USAR Section 3.12.

The evaluation proceeds by assigning shear modulus and damping values to each element in the dam. Because these values are strain dependent, they would not be known at the start of the analysis, and an iteration procedure is required. At the outset, values of shear moduli and damping are estimated and the analysis is performed. Using the computed values of average strain developed in each element, new values of modulus and damping are determined from the appropriate data relating these values to strain. Proceeding in this way, a solution is obtained incorporating modulus and damping values which are compatible with the average strain developed, and the shear stress time history in each element of the dam is generated.

c. Representation of Irregular Shear Stress Time History by Equivalent Uniform Shear Stress: The procedure used to represent the irregular shear stress time history of any element by an equivalent uniform shear stress corresponding to any N number of cycles is similar to the method proposed by Lee and Chan (Reference 148).

d. Static Stress Analysis: A knowledge of the initial static effective stress conditions is required for the evaluation of the cyclic strength of materials in the dam. For this purpose, an incremental finite element approach is used that simulates the construction of an embankment in a series of layers. The dam is divided into several horizontal layers, each represented by quadrilateral elements. During any increment of the layer, appropriate values of the Young's modulus, E, and Poisson's ratio, μ, are assigned to each element. After determining the stresses, E and μ are reevaluated for the average stress conditions during the new increment and compared with the assigned values. If a significant difference is obtained, the E and μ values are adjusted until a reasonable correspondence is established between the input and the computed values. This process is continued until the last layer is added. The effect of buoyancy on stresses is evaluated by using submerged unit weight for the material

in the dam. The analysis is conducted using the computer program ISBILD. This computer program is described in USAR Section 3.12.

Table 2.5-85 provides the soil properties used in the static stress analysis of the UHS dam. The finite element model used for this analysis is similar to that being used for the dynamic analysis.

e. Dynamic Material Properties: To conduct the analysis, it is necessary to determine the cyclic shear stress required to cause strains greater than 5 percent in the material of the dam for conditions representative of those existing in the dam prior to earthquake loading. These data are obtained by conducting appropriate cyclic loading triaxial compression tests on representative specimens of the material in accordance with the procedures described by Seed and Peacock (Reference 234). The details of these tests are described in USAR Section 2.5.6.4.

f. Evaluation of Seismic Stability: The initial stress conditions and the failure conditions for the dynamic triaxial test specimens are given in Table 2.5-106. Following the computation procedure suggested by Seed and others (Reference 233), the cyclic load test data in Table 2.5-86 lead to the results presented in Table 2.5-87. These results are plotted on Figure 2.5-139. On this figure, the initial stress conditions on a soil element are expressed by the values, σ_{fc} , the normal stress on the potential failure surface before earthquake, τ_{fc} the shear stress on the same surface at the same time, and = τ_{fc} / σ_{fc} . Figure 2.5-139 shows the values of cyclic shear strength to be applied in the direction of potential failure to cause 5 percent axial strain in 5 cycles for different initial stress conditions. The laboratory test data provide results for values of equal to 0.108 and 0.288. The stress conditions causing 5 percent axial strain for other values of have been interpolated and plotted in Figure 2.5-139.

The initial static normal and shear stresses are computed along several planes within the UHS dam. Typical values of initial effective normal stress, τ_o, initial shear stress, σ_o', and the

ratio, τ_O/σ_O', along the base of the UHS dam are presented in Figure 2.5-139. These values, together with the cyclic tests data presented in Figure 2.5-139, are used to determine the cyclic strength required to cause 5 percent strain in 5 cycles.

The minimum factors of safety for various elements against local failure due to seismic loading are determined by comparing the shear strength required to cause strains greater than 5 percent with the equivalent shear stresses induced by the simultaneous action of both horizontal and vertical rock accelerations. The induced equivalent uniform shear stresses are determined using the procedure described in Step c.

2.5.6.5.4.2.3 Safety Factors

Results of studies of the foundation and borrow materials available for construction of the UHS dam, as well as the seismicity of the project, have been considered in the assignment of safety factors. The following safety factors are in accordance with standard practice and are used for embankment design:

Condition	Minimum Safety Factor
1. End of construction	1.4
2. Steady-state flow, cooling lake Elevation 1,087	1.5
3. Steady-state flow, cooling lake at Elevation 1,050	1.5
4. Sudden drawdown, lake water Elevation 1,087 to Elevation 1050	1.2
5. Earthquake (SSE) for conditions 1, 2, and 3 (pseudo-static)	1.2
6. Earthquake (SSE) for conditions 2 and 3 (finite element)	1 1

In the pseudo-static method of analysis, the effect of an earthquake is approximated for the embankment by finding the pseudo-static force or moment produced by the accelerating mass of earth involved in the zone of potential shear. This inertia force is added to the forces or moments producing failure. The resulting safety factor is defined as the ratio of the resisting forces provided by the soil shear strength to the sum of the forces tending to produce motion. The computed factors of safety using the pseudo-static method of analysis are given in Table 2.5-84.

In the finite element dynamic stability analysis, the seismic stability is evaluated by comparing the shear stresses, t_f, required to cause 5 percent strain at any location to the shear stresses, t_d, induced by the SSE. The ratio is considered to represent a local factor of safety against the development of 5 percent strain. In view of the previous experience (reported by Reference 233), a minimum value of the stress ratio t_f/t_d greater than 1.1 provides an ample margin of safety for seismic stability. Table 2.5-88 provides the computed factor of safety for the finite element model of the submerged UHS dam. Due to the symmetry of the model, only half of the model factor of safety is provided in Table 2.5-88.

The results of dynamic analyses indicate that the UHS dam will have an ample margin of safety under the seismic loading conditions.

2.5.6.5.4.2.4 Stability Analysis Using Static Strength Following Cyclic Loading

To assess the effects of cyclic straining on the soil strength, undrained static loading tests were performed on the compacted samples and on the samples which had been subjected to cyclic loading. The results of static triaxial tests on samples which were subjected to cyclic loading are shown on Figure 2.5-141. The loss of strength due to 11 cycles was determined by the ratio of the undrained strength of sample after 11 cycles to the static undrained strength. Table 2.5-89 provides the test results for loss of strength.

The test results in Table 2.5-89 indicate that for σ_{3c} = 600 psf and K_c = 1.0 the sample retains undrained shear strength of 390 psf after straining for 11 cycles. The stability analysis of the UHS dam was performed using the retained undrained shear strength in the computer program SLOPE. The stability analysis for the dam shows a minimum factor of safety of 2.07. This indicates that the use of design strength parameters following cyclic loading provides ample margin of safety for the dam.

The natural slopes in the immediate vicinity of the outlet structure are flat, ranging from one vertical to 15 horizontal through one vertical to 60 horizontal. The residual strength of the soil forming these slopes after saturation is more than adequate. The details are described in USAR Section 2.5.6.4.

2.5.6.6 Seepage Control

2.5.6.6.1 Main Dam Seepage Control

To determine the need and extent of seepage control required for the main dam, the foundation conditions underlying the site have been investigated by detailed geologic studies, a number of borings, and test pits. In addition, field permeability tests were conducted in selected borings using single and double inflatable packers. The permeability of the compacted fill used for the embankment construction was determined in the laboratory using both the falling head and constant head permeameter tests. The details of these explorations and their results are discussed in USAR Section 2.5.6.2.

Based on the exploration and testing indicated above, it was concluded that the foundation conditions underlying the main dam are practically impermeable. The amount of seepage from the cooling lake through the bedrock was analyzed, and the results of the seepage analyses indicated that the water loss from the cooling lake due to seepage through the foundation of the main dam will be very minor, and the foundation rocks need no special treatment to prevent seepage.

Based on the laboratory permeability tests, the permeability of the cohesive embankment material was determined to range from 4×10^{-8} cm/sec to 8×10^{-8} cm/sec. To provide a conservative estimate for the seepage through the embankment, a permeability value of 8×10^{-7}cm/sec was used for the compacted soil in the seepage analysis. The permeability of the filter material was assumed to be 1×10^{-3} cm/sec based on permeability of well-graded sands and gravels. The rock used as the riprap was assumed to be free draining. The seepage through the main dam was calculated using the computer program SEEPAGE (see USAR Section 3.12). Based on the permeability values of various materials as described above, a seepage rate of 0.6×10^{-5} cfs/ft of main dam was computed. An adequate drainage system is provided near the downstream toe of the dam to remove this insignificant amount of seepage water so that ponding and subsequent softening near the toe does not occur and to prevent potential erosion of the downstream soils.

On the basis of seepage analyses described above both through the foundation as well as the embankment, it was determined that no other seepage control measures will be necessary to prevent seepage through the embankment and the foundation of the main dam. However, during the foundation preparation, it was decided that two key-trenches should be provided along portions of the axis of the dam to prevent any potential seepage through the base of the dam. The details of this design change are given in USAR Section 2.5.6.9.

The performance monitoring instrumentation, and the criteria for each set of instrumentation on the main dam, the saddle dams and the baffle dikes are described in Section 2.5.6.8 of the USAR, and Sections 3.2.2.4, 3.3.1.4 and 3.4.1.4 of WCNOC-24, "Engineering Data Compilation for Wolf Creek Lake."

The program for periodic monitoring of the instrumentation and periodic inspection of the main dam, the saddle dams and the baffle dikes is presented in Wolf Creek Specification C-403 see reference 352.

During operation of the Wolf Creek Generating Station, the performance of the main dam is evaluated through a program of movement monitoring and visual inspection, using the same procedures discussed above. Vertical and horizontal movement of the main dam will be monitored, as defined in of Table 2.5-90. The down-stream slope, the toe and the immediate downstream area of the main dam is visually inspected in accordance with the same schedule noted in Table 2.5-90 for vertical movement. Visual inspection will also include flow measurements at the weir installed at the toe of the main dam at Station 56 + 96.

Data collected on the vertical and horizontal movements of the main dam are presented in Tables 2.5-92 through 2.5-95. Data collected on the main dam piezometer water level elevations are presented in Table 2.5-96. Locations of movement monuments and piezometers installed in the main dam are shown on Figure 2.5-142.

The data collected per Tables 2.5-92 through 2.5-95 show lateral movements on the order of 0 to 4 inches with most of the movements taking place within and west of the closure section (west of approximately station 60+00). No analysis was performed to predict the lateral movements, however, the movements recorded are considered within the expected range. These movements are primarily the results of the non-symmetrical softening of the embankment that takes place during the filling of the reservoir. Very little data on lateral movements of dam embankments taking place during reservoir filling are available. This is particularly the case for embankments less than 100 feet high such as the Main Dam Embankment at Wolf Creek; however, data from dams ranging in height from 250 to 700 feet high show lateral movements between 10 and 20 inches (Reference 138; 195 and 164).

The maximum settlement recorded through lake fill is on the order of five inches and was observed within the closure section.

Settlements outside the closure section range from 0 to 3 inches. It is felt that the higher settlements recorded within the closure section reflect its shorter construction period, thereby not allowing time for completion of the construction related settlements prior to installation of the settlement monitoring monuments. Also, the embankment outside the closure section was nearly completed 6 to 12 months before construction started on the closure section. The recorded settlements represent approximately 1/2 of 1 percent of the embankment height. Based on reports on settlements of earth dams (Reference 138, 195 and 164) settlements up to one percent of the embankment are considered normal and acceptable.

During operation of the Wolf Creek Generating Station, visual inspection of the main dam includes inspection for abnormal seepage, per paragraph 3.1.2.5 of Reference 76 . Any areas showing signs of seepage, such as excessively wet areas, springs, or boils as photographed and described. Any amount of solids associated with the flow is estimated and reported. If the seepage rate is judged to be excessive, the flow rate is measured either by timing how long a container of known volume takes to fill, or by constructing a temporary weir in the drainage channel at the toe of the main dam. Records of the flow rate, the location of the seep and/or weir, date and time, weather conditions, and recent precipitation are kept for areas which show signs of seepage. Any source of excessive seepage is investigated to determine cause and potential severity affecting the dam safety in accordance with the requirements of state jurisdiction.

One such area of abnormal seepage, located at the toe of the main dam at Station 58+50, has been under observation since April 1981. Observations have been made at approximately weekly intervals. Data collected on this area of seepage are presented in Tables 2.5-97 and 2.5-100. The cooling lake elevations of each seepage observation are also shown on these tables. Figure 2.5-143 shows the locations of the seep and of the flow measuring weir. Prior to completion of the weir in September 1983, the seepage observations were generally made by visual inspection and, therefore, do not represent precise quantitative data. However, these observed rates are considered to represent reasonable approximations of the actual seepage rates.

The observed seepage indicates a wide range of flow rates ranging from 5 milliliters per second (ml/sec) to 1500 ml/sec. The majority of these observations, however, indicate seepage flow rates of less than 100 ml/sec. Higher flow rates which occasionally occur are attributed to increased infiltration through the toe drain due

to precipitation prior to the observation dates; these higher flows are not considered to represent increases in seepage through the main dam embankment. These conclusions are supported by the fact that peaks in the observed seepage are always followed by a return to a substantially lower rate on later observations. In order to illustrate the relationship between precipitation and fluctuations in the observed seepage flow rates, the two sets of data are graphically compared on Figure 2.5-144.

To provide quantitative data on this identified area of seepage,a weir has been constructed approximately 150 feet downstream, at Station 56+96 (see Figure 2.5-143). A section of the drainage ditch has been lined with a reinforced concrete slab to alleviate any future erosion. A pool of water is retained in the lined section by a reinforced concrete weir wall. Flow measurements are made using a steel plate "V" notch weir, which is centered on and attached to the weir wall. This weir is capable of measuring flows up to approximately 1.5 cubic feet per second (cfs). The theoretical discharge curve of this weir is given by the following equation, where Q is the discharge rate in cubic feet per second (cfs), and H is the height of water above the weir crest, in feet: $Q = 1.25 H^{2.5}$.

Since the weir is located in the drainage ditch at the dam toe, the measured flows integrate seepage through the main dam with surface runoff and subsurface drainage from tributary landside surfaces of the main dam. Flow measurements from the weir commenced in mid-September, 1983, and are tabulated in Table 2.5-100. Measurements have been taken at approximately weekly intervals, and during and/or following periods of precipitation.

The measured flows have varied from essentially zero up to 0.35 cfs. Flow measurements above 0.0180 cfs are related to precipitation which occurred prior to the flow measurements. The relationship between precipitation and measured flow rates is graphically illustrated in Figure 2.4-145. Peak flow rates through the weir occur immediately following a period of precipitation; shortly after cessation of the precipitation, the flows diminish to a value well below the maximum anticipated seepage rate of 0.0180 cfs.

As previously stated in this section, the computed seepage rate through the main dam is 0.6×10^{-5} cfs/linear foot. The location of the seep at Station 58+50 is a low point in both the finish grade and the toe drainage blanket. Water seepage through the main dam from approximately Station 40+00 to Station 87+00 (a distance of 4700 feet) will migrate toward and exit from the drainage blanket at Station 58+50. If a conservative tributary

length of 3000 feet is used, the maximum anticipated seepage rate is 3000 feet times 0.6 x 10^{-5} cfs/linear foot, equal to 0.0180 cfs (510 ml/sec).

Except for the occasional peak flows, which are attributed to surface runoff and subsurface drainage, both the observed flow rates and the measured flow rates are well under the anticipated flow rate. Furthermore, the amount of flow has no discernable relationship with the elevation of the cooling lake.

The Dames & Moore report "Results of Filling Inspection and First Periodic Inspection, Main Dam and Reservoir," (Reference 77) summarizes the performance monitoring program for the main dam during and after the initial filling of the reservoir. Inspection reports and engineering review summaries are prepared in accordance with the requirements of state jurisdiction. The filling inspection report, as well as subsequent dam inspection reports, are maintained on file at the Wolf Creek Generating Station, and will be available for reference in accordance with paragraph C.5 of Regulatory Guide 1.127.

The main dam is not considered a back-up structure to the safety-related Seismic Category I, Ultimate Heat Sink (UHS) dam. As stated in USAR Section 2.5.6.1, the UHS dam is designed to retain sufficient cooling water to safely shutdown the plant, assuming a loss of the main dam and cooling lake water.

2.5.6.6.2 Saddle Dams Seepage Control

All saddle dams with the exception of saddle dam IV are dry and do not retain water under normal operating conditions of the lake. They do, however, retain water for a short duration during the PMF. Since the crosssectional details of the saddle dams are similar to those of the main dam, it is concluded that the seepage through saddle dams would be insignificant. For saddle dam IV, visual monitoring of wet areas along the dam toe shall be performed quarterly beginning 1993.

2.5.6.6.3 Baffle Dikes Seepage Control

Baffle dikes were mainly constructed to control the flow of water in the cooling lake and are subjected to the same water levels on both sides.

2.5.6.6.4 UHS Dam Seepage Control

The extent of the seepage control measures required in the UHS dam was determined by detailed analysis of data from the geologic exploration, a number of borings, and test pits at the site of the UHS dam. In addition, field permeability tests were made across the entire length of the dam. A series of 150 water pressure

tests were made on the total stratigraphic geologic column to a depth of 2 1/2 times the height of the dam. A summary of the results of the permeability tests is shown in Table 2.5-35. The measured in-place values for rock permeability at the site of the dam, which include the effects of rock jointing, range from 0 to 48 feet per year. A representative value for an upper limit of rock mass permeability is 100 feet per year. The conservative upper limit was exceeded by none of the tests conducted at any location within the entire bounds of the UHS. In addition, both falling and constant head permeameter testing was conducted to complement the pressure test results in specific zones.

The representative permeability value for the natural and recompacted soil samples was obtained from laboratory permeability tests. The results of these tests are shown in Table 2.5-36. For compacted embankment clays an average permeability of 3.6 x 10^{-8} cm/sec was measured. In the analysis for seepage through the embankment, a value of 1 x 10^{-7} cm/sec was used in order to provide a conservative estimate of seepage through the embankment. Based on the average permeability of compacted well-graded sands and gravels, the permeability of the filter material was assumed to be 1 x 10^{-3} cm/sec. The rock used as the riprap blanket was assumed as completely free draining. Seepage through the UHS dam was computed using the computer program SEEPAGE. The details of this program are described in USAR Section 3.12. Based on the permeability values described above, a discharge of 0.23 x 10^{-4} cfs/ft through the dam was calculated.

Based on the results of the seepage analyses through the foundation and embankment of the UHS dam, it is concluded that no special seepage control measures are required. Adequate drainage is provided near the toe of the dam so that softening at the toe does not occur.

The performance monitoring instrumentation is described in WCNOC Specification C-404, "Periodic Inspection of Safety Related Water Structures and Reservoir." Details for installation of the instrumentation are shown on Sargent & Lundy drawing S-81.

The program for periodic monitoring of the instrumentation and periodic inspection of the UHS and UHS dam is presented in WCNOC Specification C-404, "Periodic Inspection of Safety Related Water Structures and Reservoir." Instrumentation measurements on the UHS dam are performed in accordance with Table 2.5-90. Refer to USAR Section 2.5.6.8.4 for additional information on the UHS dam Instrumentation and Monitoring.

2.5.6.7 Diversion and Closure

2.5.6.7.1 Creek Diversion During Main Dam Construction

Dewatering during construction was generally handled by gravity drainage and supplemented where required by ditches and sump pumps.

The water levels observed in the borings indicated a perched water level within the soil and upper weathered rock zone. Seepage from this zone is expected to be small. The bedrock units beneath the soil and weathered rock zone are generally saturated, but do not contain large quantities of water due to the absence of extensive jointing and fracturing of the rock mass. Seepage from these units is also minimal and limited to joints and the contacts between the shale and limestone units.

Surface runoff from rainfall was diverted from the dam foundation areas by minor grading and ditching, except along Wolf Creek. Diversion and control of flows in Wolf Creek was provided during the construction period. The flow was diverted into a temporary channel through the dam until the final closure was made. On July 31, 1980, during the dry season, approval was given to commence placing fill in the temporary opening; closure was completed on September 22, 1980. After closure, the impounding of water was begun and the reservoir filled to the level of the low-level outlet.

The side slopes for the temporary opening were cut down to a slope of approximately one vertical to three horizontal prior to placement of fill material. These slopes provided a good bonding surface between the previously placed fill and the fill of the closure section. This further reduces the possibility of cracking due to differential settlements between the dam and closure section.

2.5.6.7.2 Creek Diversion for Saddle Dams Construction

Creek Diversion for the saddle dams was not required as the foundations were well above the Wolf Creek water levels. Other dewatering details are the same as those for main dam construction.

2.5.6.7.3 Creek Diversion for Baffle Dikes Construction

For baffle dikes construction, diversion or collection of water from the watershed above the dam was provided during construction as discussed for the main dam. The flow was diverted to culverts through baffle dikes.

2.5.6.7.4 Diversion of Water During UHS Dam Construction

Diversion or collection of water from the watershed above the UHS dam was provided during the construction period. The water flow was diverted in a temporary channel through the dam from station 4 + 15 to 4 + 40. On May 3, 1980 approval was given to commence closing the channel; closure was completed on May 4, 1980. At this time, the flow was impounded behind the dam.

The foundation preparation required for the dam was completed in the area of the temporary opening. The water was channeled through this prepared area. The portion of the embankment on either side of the diversion opening was then completed. The side slopes of the opening did not exceed one vertical to four horizontal. These flat slopes provided a good bonding surface between the previously constructed embankement and the material to be placed. They also reduced the danger of cracking or differential settlement between the dam and the closure section.

The average rate of embankment placement in the closure section was faster than the rate at which the water rose in the UHS reservoir. Care was exercised during filling of the closure section so that the quality of the work is not sacrificed. Also, care was used to obtain the required densities and, thus, avoid excessive settlement of the completed dam.

2.5.6.8 <u>Performance Monitoring</u>

2.5.6.8.1 Main Dam Instrumentation

Measurements of internal pore pressures and vertical and horizontal movements during and after construction are monitored by the following system of instrumentation in general accordance with Regulatory Guide 1.70:

a. Pore pressure cells of the Casagrande Porous-Tube type are installed in the highest portion of the main dam. A group of pore pressure cells are located to record pore pressures down-stream at selected stations and in the various formations below the dam and in the abutments.

b. Concrete monuments are placed on the crest of the dam to measure external settlements after construction. In 1987 new monuments were added.

c. Non Electric Piezometers, consisting of a wellpoint placed in a borehole with filter pack, are

located in the valley downstream of the dam and record the ground-water levels before and after construction. These are necessary to obtain information regarding changes in ground-water levels.

d. A system of triangulation points, sufficiently remote from the main dam, is provided. These basic points are suitable for construction and postconstruction control points.

In compliance with the provisions of Kansas statutes KSA 82a-301 to 305 "regulating the placing of dams and other obstructions in streams and the making of changes in the course, current or cross-section of streams within the state..." the Operating Agent has submitted appropriate applications and received permits for all applicable structures for the construction of WCGS.

The Division of Water Resources (Kansas Department of Agriculture) is responsible for the inspection of various structures in accordance with the provisions of the National Dam Safety Act. Representatives of the Division of Water Resources were contacted to inspect the foundations of the Wolf Creek lake dam and related structures after excavation was completed. Approval for each area excavated was granted before the construction and backfilling of the structure was undertaken.

The initial safety inspection of the cooling lake main dam was performed by the Kansas Division of Water Resources and/or The U.S. Army Corps of Engineers following filling of the cooling lake. However, the Operating Agent initiated a periodic inspection program including an initial completion inspection, and a periodic inspection program performed during and following filling of the cooling lake. This inspection program includes those facilities required by Regulatory Guide 1.127 and also the main dam embankment and the saddle dams.

The inspection program includes: a complete visual inspection of the dam and the erosion protection (riprap and vegetative cover); inspection of the downstream area for seepage, wet areas and boils; periodic monitoring of vertical and horizontal movements; and observation of the water levels in the installed piezometers. The frequency of the inspection was monthly during the filling of the cooling lake. After filling and during the inservice period, all performance instrumentation was initially monitored monthly except for the horizontal movement surveys which were performed on an annual basis. After steady state was recorded, monitoring has been extended as noted in Table 2.5-90 (Sheet 2 of 4). The visual inspection is performed annually for the first four years, every two years for the next four years, and every

five years thereafter. In addition, complete inspections will be performed following draw-down in excess of five feet and refilling to normal pool elevation.

2.5.6.8.2 Saddle Dams Instrumentation

The instrumentation of the saddle dams consists of placement of concrete settlement monuments. Piezometers are installed in Saddle Dam IV to record piezometric levels in the embankment. In 1987 new monuments and electric piezometers were added.

2.5.6.8.3 Baffle Dikes Instrumentation

The measurement of movements of the baffle dikes consists of concrete settlement monuments located on the crest. Pore pressure cells are not required as the baffle dikes will normally function under balanced heads. Foundation piezometers are not required for the above reason, and, secondly, they are not accessible after the cooling lake is filled.

2.5.6.8.4 Ultimate Heat Sink Dam Instrumentation and Monitoring

Measurements of the horizontal and vertical movements at the crest of the dam during filling were made. These measurements were made from the time the core crest was completed until the dam was submerged beneath the cooling lake. Monuments were established at the abutments and at 300-foot intervals along the crest to facilitate these measurements.

Prior to submergence of the UHS dam, the monitoring system used to measure horizontal and vertical movements of the dam utilized concrete piers located at Stations -2+00, 0+00, 2+00, 4+00, 5+50, 7+00, 8+50, 10+00 and 12+00 along the centerline at the dam crest. These piers are 3 feet in diameter and are embedded in the embankment 5 feet and extend 1 foot above the riprap. A survey marker is embedded in the center of each pier. A comparison marker consisting of a 3 inch diameter pipe with a survey marker attached that extends up to elevation 1091 feet was also provided for making measurements after the piers had become submerged. However, the comparison markers were bent by ice flows, and are no longer used for measuring horizontal and vertical movement. After the comparison markers were bent, inspection confirmed that the 3 inch diameter comparison marker pipes were bent above the concrete piers, and the concrete piers were not damaged.

These survey monuments were installed at completion of riprap placement on the UHS dam and initial elevations were measured on May 20, 1980 and initial coordinate locations were established by trilateration techniques from reference monuments on May 23, 1980.

Vertical settlement readings are taken monthly and as of July 10, 1981, the maximum vertical settlement is 0.72 inches at Station 4+00. The height of dam embankment is the greatest at this location (Figure 2.5-116) and the observed settlement is well within the estimated settlement of 1.35 inches for an embankment height of 17 feet and has no influence on the safety of the UHS dam.

As of the February 16, 1981 measurement of horizontal movement, all of the movements were within 1.57 inches of their initial location as established on May 23, 1980. The magnitudes of the movements are within the expected survey accuracy and all or a portion of the movement could be attributed to this. Even if the measured movements have actually occurred, their magnitudes are not large and have no influence on the safety implication of the UHS dam.

The quantity of water pumped into the UHS reservoir during the 30-day monitoring period of the UHS dam filling test was 388,740 cubic feet. The quantity of water pumped from the downstream toe of the UHS dam to maintain a water elevation of 1055 feet during this 30-day monitoring period was 57,710 cubic feet.

The UHS dam has a zone extending 30 feet beyond the toe of the embankment which has been excavated to rock and backfilled to grade elevation with riprap stone. This is shown on Figures 2.5-116 and 2.5-117.

During the 30-day observation period, water was pumped from a sump at the low point in this area to maintain the water level in this area below elevation 1055 feet. The net cumulative amount of water pumped from this area during the period 11/7/80 to 12/6/80 was 347,400 gallons which corresponds to a seepage rate of 8.3 gpm. The net cumulative amount was obtained by taking the total amount of water pumped and subtracting the volume of precipitation falling on the downstream face and excavated toe area during the 30-day period.

The seepage during this period was 8.3 gpm which corresponds to 0.154×10^{-4} cfs/ft length of dam. This is less than the predicted seepage rate of 0.23×10^{-4} cfs/ft as given in USAR Section 2.5.6.6.4.

During the filling, no estimates of deformation of the UHS dam were made. The locations of movement monuments are provided in Figure 2.5-117a, and the measured deformations for each monument are presented in Tables 2.5-60a through 2.5-60d. From these tables, it may be seen that the vertical movements during the filling period are on the order of less than 0.5 inch and on the

order of 0.1 inch during the observation period (Table 2.5-60b). The UHS dam has been constructed with a conservative 3.5 percent camber, so that the crest elevation will remain above elevation 1070.0 feet (msl), as described in Sargent & Lundy Report No. SL-3831, Paragraph 2.2.3.5.

The observations of the horizontal movements for September 24, 1980 (Table 2.5-60d) show deformations up to 3 inches along the axis of the UHS dam and deformation close to 1 inch transverse to the axis of the UHS dam. However, the survey data for the prior and subsequent periods, including the observation period, show movement on the order of 1 inch or less. It is, therefore, felt that the data for September 24, 1980 does not reflect actual movements. Actual movements should, therefore, be considered on the order of 0.5 inch for vertical displacements and 1 inch or less for horizontal displacements.

These recorded horizontal and vertical movements are considered normal and have no impact on the safety of the UHS dam.

When the UHS dam is submerged, the dam's profile is regularly monitored either by hydrographic sounding techniques using an echo sounding system, or by having a diver physically inspect the dam. To provide assurance that the hydrographic sound survey can be performed over the same portion of the dam each time, navigating and positioning benchmarks are established. The hydrographic survey area is preplotted in a grid pattern such that in the unlikely event a change has occurred, it can be noted on the profile, and divers may be used to confirm any anomalies.

Pore pressure cells for measurement of internal pore pressures are not required. The dam is submerged during its operating life. The embankment fill is saturated and not subject to development of seepage gradients.

A series of pads are located on the bottom of the UHS to provide reference points to measure buildup of sedimentation.

A monitoring program is instituted on a periodic basis to ensure that UHS maintains the required volumetric capacity.

2.5.6.9 Construction Notes

2.5.6.9.1 Construction History

All lakework construction was completed by October, 1980.

After completion of the rough excavation of the UHS basin, several areas of the finished bottom were higher than the high point

elevation of 1,065 feet (msl). These high areas were in the Plattsmouth Limestone and would have been difficult to blast and excavate. To provide the required UHS storage capacity, the north lobe of the UHS was extended 75 feet to the west in an area between the ESWS intake channel and a point about 500 feet northeast of the UHS dam. (See Figure 2.5-108 for asbuilt configuration.)

2.5.6.9.2 Design and Procedure Changes

The most significant design change on the project was the excavation of two additional keytrenches on the main dam.

These keytrenches were excavated between main dam Stations 8+00 to 18+00 and 37+06 to 46+90. The location of these keytrenches is presented on Figure 2.5-114.

During the initial site studies and planning, several key-trench areas were identified and included on the project plans. As the excavation for the main dam foundation reached final grade, inspections by D&M geotechnical staff revealed two areas where the limestone foundation was highly jointed. In consultation with Sargent & Lundy (S&L), Kansas State Division of Water Resources (DWR) personnel, and D&M geotechnical staff, a decision was reached to excavate key-trenches through the jointed limestone to more competent foundation material. This would eliminate the possibility of the jointed limestone providing a water migration path beneath the foundation. Excavating keytrenches and compacting cohesive fill in the excavation minimizes the water seepage, reduces the water losses, and provides additional safety to the structure. The procedure for excavating and filling the keytrenches is described in USAR Section 2.5.6.3.

Another design change of a less significant nature was the excavation of the Heebner Shale in the keytrench of the main dam between Stations 85+60 to 102+05. The location for this excavation is presented on Figure 2.5-114. The original plans provided for founding the main dam on the Heebner Shale between these stations. During final cleaning of the Heebner Shale, however, it became apparent that the shale could not be cleaned satisfactorily. The platy nature of the shale caused excessive breakage under the wheel and track loads of construction traffic. To remedy this problem, the Heebner Shale was excavated and removed between Stations 85+60 and 105+05. Approximately 4 to 5 feet of Heebner Shale was removed in this area down to the Leavenworth Limestone. The Leavenworth Limestone is a very competent, relatively unjointed rock unit that provided a superior foundation for compacting cohesive fill.

Several of the procedure changes incorporated on the project are presented below:

a. Granular drainage blanket lift thickness increased from 12 to 18 inches;

b. Toe drain compaction testing changed from in-place relative density tests to visual observation; and

c. Test frequencies changed from those specified on various cohesive and granular materials.

During placement of the original test fill for the granular drainage blanket, it became apparent that breakdown of the soft limestone was occurring during compaction. Breakdown of this material caused the placed material to fail the S&L specification requirement of having less than 5 percent passing the Number 200 screen after compaction. To minimize the breakdown, lift thicknesses of 18, 36, and 72 inches were evaluated as described in USAR Section 2.5.6.4. The S&L specifications required 12-inch lifts on granular drainage blanket material. A lift thickness of 18 inches for placement and testing was selected.

Because of the large size of the toe drain material (4 inches), it is impractical to perform in-place density tests with any degree of reliability. For this reason, a test fill was evaluated as described in USAR Section 2.5.6.4. A procedure was approved for placement of the toe drain material and compaction by two passes with a 10-ton vibratory roller. The S&L specification required placement of 12-inch thick lifts and compacting to 85 percent relative density as determined by ASTM D 2049.

As construction progressed and more testing information became available for review, test frequencies were changed where justified. Frequency testing is specified in S&L specification. These changes were requested only after individual evaluation of the tests were completed. All test frequency change requests were submitted to S&L for review and approval. Following is a list of test frequency changes:

<u>Change Item</u>

a. Change grain-size analysis from one test per 4,000 cubic yards to one test per 10,000 cubic yards for the main dam, saddle dams, and baffle dikes on embankment fill.

b. Change from compacting toe drain to 85 percent relative density to two passes with vibratory roller and visual observation.

c. Change from one in-place density test per 1,000 cubic yards to three grain-size tests per 4,000 cubic yards using the average of three tests for record on granular drainage blanket.

2.5.6.10 Operational Notes

Embankment performance history since completion of construction is continually updated and is compiled in WCNOC 55.

2.5.7 REFERENCES SECTION 2.5

Published References

1. Agocs, W.B., 1959, Comparison of basement depth from aeromagnetics and wells along the northern border of Kansas in Hambleton, W.W., ed., Symposium on geophyics in Kansas; Kansas Geol. Surv., Bull. 137, p. 143-152.

2. American Geological Institute, 1977, Bibliography and index of Kansas geology through 1974: Kansas Geol. Survey, Bull. 213, 190 p.

3. American Geophysical Union and United States Geological Survey, 1964, Bouger gravity anomaly map of the United States.

4. Anderson, K.H., and Wells, J.S., 1968, Forest City Basin of Missouri, Kansas, Nebraska, and Iowa: The American Association of Petroleum Geologists, Bull., vol. 52, no. 2.

5. Anderson, K. H., and others, 1979, Geologic map of Missouri: Missouri Geological Survey, scale 1:500,000.

6. Arbenz, J. K., 1956, Tectonic map of Oklahoma, showing surface structural features: Oklahoma Geol. Survey, map.

7. Ball, S.M., 1964, Stratigraphy of the Douglas Group in the northern Midcontinent Region: Univ. of Kansas, Unpublished Ph.D. Dissertation, vol. 1, p. 89, 146, 255-271, 310.

8. Ball, S.M., Ball, M.M., and Laughlin, D.J., 1963, Geology of Franklin County, Kansas: State Geol. Survey of Kansas, Bull. 163, p. 38, pl. 1.

9. Barosh, P.J., 1969, Use of seismic intensity data to predict effects of earthquakes: U.S. Geol. Survey Bull. 1279, Washington, D.C.

10. Bayne, C. K., and Ward, J. R., 1967, General availability of ground water in Kansas: U.S. Geol. Survey and State Geol. Survey of Kansas.

11. Beene, D.L., 1973, Oil and gas productions in Kansas during 1971: State Geol. Survey of Kansas, Special Distribution Publication 64, p. 20-21.

REFERENCES: SECTION 2.5 (continued)

12. Berggren, W.P., 1943, Prediction of temperature distribution in frozen soils, Transactions of the American Geophysical Union, Pt. 3, p. 71-77.

13. Beveridge, T.R., 1951, The geology of the Weaubleau Creek area, Missouri: Missouri Geol. Survey and Water Resources, vol. XXXII, 2nd series, p. 60, 77-81.

14. Bickford, M.E., and others, 1971, Metamorphism of Precambrian granitic xenoliths in a mica periodotite at Rose Dome, Woodson County, Kansas: Geol. Soc. Am. Bull., vol. 82, no. 10, p. 2863-2868.

15. Bickford, M.E., Harrower, K.L., Nusbaum, R.L., Thomas, J.J., & Nelson, G.E., in press, 1979, Map of Precambrian basement rocks in Kansas: Kansas Geol Survey, Map M-9, scale 1:500,000

16. Bishop, A.W., and Henkel, D.J., 1962, The measurement of soil properties in the triaxial test: London, Edward Arnold Publishers, Ltd.

17. Bollinger, G.A., 1973, Seismicity of the Southeastern United States: Seism. Soc. Am. Bull., vol. 63, no. 5, p. 1785-1808.

18. Bonilla, M.G., 1970, Surface faulting and related effects in earthquake engineering: Prentice Hall, Englewood Cliffs, N.J.

19. Bowsher, A.L., and Jewett, J.M., 1943, Coal resources of the Douglas Group in east-central Kansas: State Geol. Survey of Kansas, Bull. 46, p. 64-65.

20. Brady, L.L., Adams, D.B., and Livingston, N.D., 1976, An evaluation of the strippable coal reserves in Kansas: Kansas Geol. Survey, Mineral Resources Series 5, 40 p.

21. Brady, L.L., and others, 1971, Kansas mineral industry report 1971: State Geol. Survey of Kansas, Special Distribution Publication 61, p. 35.

22. Branson, C. C., and others, 1965, Geology and oil and gas resources of Craig County, Oklahoma: Oklahoma Geol. Survey, p. 47-50, pl. 1.

REFERENCES: SECTION 2.5 (continued)

23. Brazee, R.J., and Cloud, W.K., 1958, United States earthquakes: U.S. Department of Commerce, Washington, D.C., 78 p.

24. Brookings, D.G., and Naeser, C.W., 1971, Age of emplacement of Riley County, Kansas kimberlites and a possible minimum age for the Dakota Sandstone: Geol. Soc. Am. Bull., vol. 82, p. 1723-1726.

25. Brookings, D.G., and Woods, M.J., 1970, Rb-Sr geochronologic investigation of the basic and ultrabasic xenoliths from the Stockdale Kimberlite, Riley County, Kansas: State Geol. Survey of Kansas, Bull. 199, part 2, 12 p.

26. Bulletin of the Seismological Society of America, 1957, Seismological notes: Seism. Soc. Am. Bull., vol. 47, no. 1, p. 77-83.

27. Burchett, R.R., 1971, Guidebook to the geology along portions of the lower Platte River valley and Weeping Water valley of eastern Nebraska: Nebraska Geol. Survey, Conservation and Survey Div., fig. 4.

28. -----, 1978, Regional tectonics and seismicity of eastern Nebraska: U.S. Nuclear Regulatory Commission, NUREG/ CR-0053, 19 p.

29. Burchett, R.R., and Arrigo, J.L., 1978, Structure of the Tarkio Limestone along the Humboldt fault zone in southeastern Nebraska: Nebraska Geological Survey, R.I., no. 4, 112 p.

30. Burchett, R.R., and Carlson, M.P., 1966, Twelve maps summarizing the geologic framework of southeastern Nebraska: Nebraska Geol. Survey, Conservation and Survey Div., Rept. of Invest. no. 1, figs. 7, 9, 12.

31. Burchett, R.R., and Reed, E.C., 1967, Centennial guidebook to to the geology of southeastern Nebraska: Nebraska Geol. Survey, Conservation and Survey Div., p. 15-17.

32. Bush, W.V., Haley, B.R., Stone, C.G., Holbrook, D.F., and McFarland, J.D., III, 1977, A guidebook to the geology of the Arkansas Palezoic area (Ozark Mountains, Arkansas Valley, and Quachita Mountains): Arkansas Geological Commission, 79 p.

REFERENCES: SECTION 2.5 (continued)

33. California Institute of Technology, Earthquake Engineering Research Laboratory, Analyses of Strong Motion Earthquake Accelerograms, Vol. III - Response Spectra, Part B, EERL 73-80, February 1973, Pasadena.

34. Caplan, W.M., 1957, Subsurface geology of northwestern Arkansas: Arkansas Geol. and Conservation Commission, Info. Circ. 19, pls. I, IV, VI, VIII, X, XIV.

35. -----, 1960, Subsurface geology of pre-Everton rocks in northern Arkansas: Arkansas Geol. and Conservation Commission, Infor. Circ. 21, pl. III, p. 10.

36. Carlson, M.P., 1970, Distribution and subdivision of Precambrian and lower and middle Paleozoic rocks in the subsurface of Nebraska: Nebraska Geol. Survey, Rept. of Invest. no. 3, p. 1, fig. 2.

37. Chandra, R., 1970, Slake-durability test for rock: Univ. of London, Imperial College, London, England, Master's Thesis.

38. Chelikowsky, J.R., 1972, Structural geology of the Manhattan, Kansas, area: State Geol. Survey of Kansas, Bull. 204, p. 11.

39. Clair, J.R., 1943, The oil and gas resources of Cass and Jackson Counties, Missouri: Missouri Geol. Survey and Water Resources, vol. XXXVII, 2nd series, p. 35, 44, 50, 61.

40a. Claremore-Rogers County News, 1956, p. 1 (October 30).

40b. Claremore Daily Progress, 1956, p. 1 (October 30)

41. Coates, D. F., 1965, Rock mechanics principles: Canadian Dept. of Mines and Tech. surveys, mines Branch Mono. 874.

42. Coffman, J.L., and Von Hake, C.A., 1973, Earthquake history of the United States: National Oceanic and Atmospheric Administration, Boulder, Colorado

43. Cole, V.B., 1962, Configuration of top of Precambrian basement rocks in Kansas: Kansas Geol. Survey, Oil and Gas Inv., no. 26, map.

REFERENCES: SECTION 2.5 (continued)

44. -----, 1975, Subsurface Ordovician - Cambrian rocks in Kansas: Kansas Geol. Survey, Subsurface Geology Series 2, 18 p.

45. -----, 1976, Configuration of the top of Precambrian rocks in Kansas: Kansas Geol. Survey, Map M-7, scale 1:500,000.

46. Cole, V.B., and Ebanks, W.J., Jr., 1974, List of Kansas wells drilled into Precambrian rocks: Kansas Geological Survey, Subsurface Geology Series 1, 101 p.

47. Cole, V.B., Merriam, D.F., and Hambleton, W.W., 1965, Final report of the Kansas Geological Society basement rock committee and list of Kansas wells drilled into Precambrian rocks: State Geological Survey/The University of Kansas, special distribution publication 25.

48. Condra, G.E., 1927, The stratigraphy of the Pennsylvanian System in Nebraska: Nebraska Geol. Survey, Conservation and Survey Div., Bull. 1, 2nd series, p. 15.

49. Condra, G.E., and Reed, E.C., 1959, The geological section of Nebraska: Nebraska Geol. Survey, Conservation and Survey Div., Bull. 14A, p. 1, 2, fig. 2.

50. Cornell, C.A., 1971, Probablistic analysis of damage to structures under seismic loads, in Dynamic waves in Civil Engineering: Wiley & Sons, London, Howells, D.A., ed.

51. Cornell, C.A., and Merz, M.A., 1974, A Seismic risk analysis of Boston: presented at the National Conference A.S.C.E., Cincinnati, Ohio, (April).

52. Coulter, H.W., Waldron, H.H., and Devine, J.F., 1973, Seismic and design considerations for nuclear facilities, in Proceedings of the fifth world conference on earthquake engineering: Rome, Italy, paper no. 302.

53. Croneis, C., 1930, Geology of the Arkansas Palezoic area: Arkansas Geol. Survey, Bull. 3, p. 170-335, pls. 1-A, 1-B, III.

54. Curtis, N.M., Jr., and Ham, W.E., 1972, Geomorphic provinces of Oklahoma, in Geology and earth resources of Oklahoma: Oklahoma Geol. Survey and Oklahoma State Dept. of Education, p. 3.

REFERENCES: SECTION 2.5 (continued)

55. Dames & Moore, 1974, Preliminary Geotechnical investigation soil borrow materials Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co. and Kansas City Power & Light Co., Dames & Moore, October 1, 1974.

56. -----, 1975a, Geotechnical investigation on-site rock quarry areas Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, September 21, 1975.

57. -----, 1975b, Geotechnical investigation proposed switchyard Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, May 23, 1975.

58. -----, 1976a, Geotechnical investigation alternate baffle dikes A and B and alternate channels Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, July 1, 1976.

59. -----, 1976b, Geotechnical investigation Category I Pond and Dam Ultimate Heat Sink Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, October 15, 1976.

60. Dames & Moore, 1976c, Geotechnical investigation main dam and service spillway foundations Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, September 20, 1976.

61. -----, 1976d, Geotechnical investigation proposed circulating water system Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, June 10, 1976.

62. -----, 1976e, Geotechnical investigation proposed cooling lake Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, February 19, 1976.

REFERENCES: SECTION 2.5 (continued)

63. -----, 1976f, Geotechnical investigation proposed make-up pipeline, river pumphouse, intake channel, and discharge structure Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, October 18, 1976.

64. -----, 1976g, Geotechnical investigation proposed railroad spur and bridges Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, July 12, 1976.

65. -----, 1976h, Geotechnical investigations proposed Route 1 and 8 and the Causeway Borrow Area Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, June 29, 1976.

66. -----, 1976i, Geotechnical investigation proposed Saddle Dams I through VI Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, June 17, 1976.

67. -----, 1976j, Geotechnical investigation Route 8 causeway and bridge Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, June 28, 1976.

68. -----, 1976k, Geotechnical investigation soil borrow materials Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, July 6, 1976.

69. Dames & Moore, 1977a, Geotechnical investigation ESWS pipelines, pumphouse and discharge structure Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, August 12, 1977.

70. -----, 1977b, Penecontemporaneous deformation zones Wolf Creek Generating Station; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, May 20, 1977.

REFERENCES: SECTION 2.5 (continued)

71. -----, 1979a, Report of blast evaluation program Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, January 3, 1979.

72. -----, 1981a, Final report - volumes I and II, results of geologic excavation mapping Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co., Dames & Moore, August 13, 1981.

73. ----- 1981b, Final report, Surveillance of Earthwork - UHS Dam, Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co. and Kansas City Power & Light Co., Dames & Moore, August 18, 1981.

74. -----, 1982a, Final report, Surveillance of Earthwork - Power Block, Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co. and Kansas City Power & Light Co., Dames & Moore, May 10, 1982.

75. -----, 1982b, Final report, Surveillance of Earthwork - Essential Service Water System, Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co. and Kansas City Power & Light Co., Dames & Moore, May 26, 1982.

76. -----, 1982c, Procedures for Periodic Inspection of the Main Dam and Reservoir and the Ultimate Heat Sink, Wolf Creek Generating Station, Unit No. 1, Dames & Moore, November 2, 1982.

77. -----, 1983, Report, Results of Filling Inspection and First Periodic Inspection, Main Dam and Reservoir, Wolf Creek Generating Station, Unit No. 1; for Kansas Gas and Electric Company, Dames & Moore, June 6, 1983.

78. Davis, C. V., and Sorensen, K.E., 1969, Handbook of applied hydraulics: McGraw-Hill, 3rd ed.

79. Deere, D.U., and others, 1967, Design of surface and near-surface construction in rock, in Failure and breakage of rock, 8th Symposium on rock mech., C. Fairhurst, ed.: Amer. Inst. of Min., Metall., and Petr. Engr., 581 p.

REFERENCES: SECTION 2.5 (continued)

80. Denison, R. E., Burke, W.H., Otto, J. B., and Hetherington, E.A., 1977, Age of igneous and metamorphic activity affecting the Ouachita foldbelt, in Stone, C.G., ed.: Symposium on the Geology of the Ouachita Mountains, vol. I, Arkansas Geol. Commission, p. 25-40.

81. Donovan, N.C., 1973, Earthquake hazards for buildings (ground motion design earthquake) in Building practices for disaster Standards, U.S. Dept. of Commerce, National Bureau of Standards, Washington, D.C., p. 82-111.

82. Donovan, N.C., and Singh, S., 1976, Liquefaction criteria for the trans-Alaska pipeline, Liquefaction problems in geotechnical engineering: American Society of Civil Engineers Annual Convention (October 1), p. 139-167.

83. Donnelly, E.B., 1965, Wisby and Wisby North fields, in Kansas oil and gas fields: Kansas Geol. Soc., vol. IV, p. 290-297.

84. DuBois, S. M., 1978, The origin of surface lineaments in Nemaha County, Kansas: U.S. Nuclear Regulatory Commission, NUREG/CR-0321, 36 p.

85. DuBois, S. M., and Wilson, F. W., 1978, List of earthquake intensities for Kansas, 1867-1977: Kansas Geol. Survey, Environmental Geology Series No. 2, 56 p.

86. Duke, C.M., and Leeds, D.J., 1962, Site characteristics of southern California strong-motion earthquake stations: University of California, Los Angeles, Report 62-55.

87. Dunbar, C.0., and Rodgers, J., 1957, Principles of stratigraphy: John Wiley & Sons, New York, New York, p. 13-17.

88. Eardley, A.J., 1962, Structural geology of North America: Harper and Row, New York, New York, 2nd ed., p. 51, 55, 224.

89. Elder, J.A., 1969, Soils of Nebraska: Nebraska Geol. Survey, Conservation and Survey Div., Resource Dept. no. 2, p. 7.

REFERENCES: SECTION 2.5 (continued)

90. Elster, T., 1965, Donald Field, in Kansas oil and gas fields: Kansas Geol. Soc., vol. IV, p. 68-77.

91. Eppley, J.F., 1965, Earthquake history of the United States: U.S. Coast and Geodetic Survey, Washington, D.C.

92. Fay, R.O., and Roberts, J., 1971, Geology, in Appraisal of the water and related land resources of Oklahoma: Oklahoma Water Resources Board, Region IX, Publication 36, p. 19.

93. Fenneman, N. M., 1946, Physical divisions of the United States: U.S. Geol. Survey, reprinted 1957.

94. Figueroa, J.J., 1960, Some considerations about the effect of Mexican earthquakes in Proceedings, II World Conference on Earthquake Engineering, Japan, vol. III.

95. Franklin, J. A., 1970, Classification of rock according to mechanical properties: Univ. of London, Imperial College, London, England, Ph.D. Dissertation.

96. Franklin, J.A., and Chandra, R., 1972, The slake-durability test, International Journal of Rock Mechanics and Minerals Science: London, Pergamon Press Ltd., vol. 9, p. 325-341.

97. Frye, J. C., and Swinefrod, A., 1949, The plains border physiographic section, in Transactions of the Kansas Academy of Science: State Geol. Survey of Kansas, vol. 52, no. 1, p. 71-80.

98. Fuller, M.L., 1912, The New Madrid earthquakes: U.S. Geol. Survey, Bull., no. 494, 119 p.

99. Gamble, J.C., 1971, Durability-plasticity classification of shales and other argillaceous rocks: Univ. of Illinois, Urbana, Illinois, Unpublished Ph.D. Dissertation.

100. Gentile, R.J., 1976, The geology of Bates County, Missouri: Missouri Geol. Survey, R.I. 59, 89 p.

101. Greensfelder, R. G., 1974, Map of maximum bedrock acclerations in California: California Division of Mines and Geology, Map Sheet 2.

REFERENCES: SECTION 2.5 (continued)

102. Gupta, I. N., 1976, Attenuation of intensities based on iso-seismels of earthquakes in central United States: Earthquake notes, vol. 47, no. 3, p. 13-19.

103. Gupta, I. N., and Nuttli, 0.W., 1976, Spatial attenuation of intensities for central U.S. earthquakes: Bull. Seismological Society America, vol. 66, p. 743-751.

104. Gutenberg, B., and Richter, C. F., 1942, Earthquake magnitude, intensity, energy, and acceleration: Seismol. Soc. Am. Bull., vol. 32, p. 163-191.

105. Haley, B. R., 1976, Geologic map of Arkansas: Arkansas Geologic Commission, Scale 1:500,000.

106. Hammer, R.J. (compiler), 1973, General rules and regulations for the conservation of crude oil and natural gas: State Corporation Commission at the State of Kansas, Topeka, (January).

107. Hardin, B.0., 1970, Suggested method of test for shear modulus and damping of soils by the resonant columns, Special Procedures for Testing Soil and Rock for Engineering Purposes, American Society for Testing and Materials, ASTM STP 479.

108. Heck, N.H., and Bodle, R.R., 1931, United States earthquakes of 1929: U.S. Dept. of Commerce, Coast and Geodetic Survey, Washington, D.C.

109. Heckel, P.H., 1978, Field guide to upper Pennsylvanian cyclothemic limestone facies in eastern Kansas: Kansas Geol. Survey, Guidebook Series 2, 79 p.

110. Heinrich, R., 1941, Contribution to the earthquake history of Missouri: Seismol. Soc. Am. Bull., vol. 31, p. 187-224.

111. Herrmann, R.B., 1979a, written communication.

112. -----, 1979b, personal communication.

113. Hershberger, J., 1956, A comparison of earthquake accelerations with intensity ratings: Seismol. Soc. Am. Bull., vol. 46, no. 4, p. 317-320.

REFERENCES: SECTION 2.5 (continued)

114. Hershey, H.G., and others, 1960, Highway construction materials from the consolidated rocks of southwestern Iowa: Iowa Geol. Survey and Iowa State Highway Commission, Bull. no. 15, fig. 17.

115. Heyl, A.V., 1972, The 39th Parallel lineament and its relationship to ore deposits: Economic Geology, vol. 67, p. 879-894.

116. Hinze, W.J., Braile, L.W., Keller, G.R. and Lidiak, E.G., 1977, A tectonic overview of the central midcontinent: U.S. Nuclear Regulatory Commission, NUREG-0382, 106 p.

117. Housner, G.H., 1969, Engineering estimates of ground shaking and maximum earthquake magnitude: Fourth World Conference on Earthquake Engineering, Santiago, Chile.

118. Huffman, G. G., 1958, Geology of the flanks of the Ozark Uplift: Oklahoma Geol. Survey, Bull. 77, p. 89-109, pl. VI.

119. Idriss, I.M., Lysmer, J., Hwang, R., and Seed, H.B., 1973, A computer program for evaluating the seismic response of soil structures by variable damping finite element procedures. Report EERC 73-16, Earthquake Engineering Research Center, University of California, Berkeley, July, 1973.

120. International Petroleum Encyclopedia, 1970; Petroleum Publishing Company, 367 p.

121. Janbu, N., 1967, Settlement calculations based on the tangent modulus concept: Univ. of Norway, Troudheim, Norway, Soil Mechanics and Foundation Engineering Bull. 2.

122. Jennings, J.E., and Robertson, A. Mac G., 1969, The stability of slopes cut into natural rock <u>in</u> Proceedings VII International Conference of Soil Mechanics and Foundation Engineering, Mexico City, vol. 2, p. 585-590.

123. Jewett, J.M., 1951, Geologic structures in Kansas: State Geol. Survey of Kansas, Bull. 90, p. 114-167.

124. -----, 1954, Oil and gas in eastern Kansas: State Geol. Survey of Kansas, Bull. 104, p. 57, 80-290.

REFERENCES: SECTION 2.5 (continued)

125. -----, 1964, Geologic map of Kansas: Kansas Geol. Survey, Map M-1, scale 1:500,000.

126. Jewett, J.M., and Merriam, D.F., 1959, Geologic framework of Kansas - a review for geophysicists, in Symposium on geophysics in Kansas, W.W. Hambleton, ed.: State Geol. Survey of Kansas, Bull. 137, p. 9-52.

127. Johnson, K.S., and others, 1972, Geology and earth resources of Oklahoma: Oklahoma Geol. Survey and Oklahoma State Dept. of Education, Educational Publication no. 1, p. 1-5.

128. Jones, V.L., and Lyons, P.L., Vertical - intensity magnetic map of Oklahoma: Oklahoma Geol. Survey, Map GM-6.

129. Jopling, D.W., and Cashion, K., 1959, Regional gravity of Kansas, in Symposium on geophysics in Kansas, W.W., Hambleton, ed.: State Geol. Survey of Kansas, Bull. 137, p. 9-52.

130. Jordon, L., 1962, Geologic map and section of pre-Pennsylvanian rocks in Oklahoma: Oklahoma Geol. Survey, Map GM-5.

131. Kansas Gas & Electric Company and Kansas City Power & Light, 1974, Wolf Creek generating station environmental report: Wichita, Kansas, vol. I-IV.

132. Kansas Geological Society, 1956a, North-south electric log cross section from Nebraska to Oklahoma along sixth principle meridian: plate.

133. -----, 1956b, East-west-south electric log cross section from township 35-2W to 34-43W: plate.

134. Kennedy, J.F., and Patincloux, J.C., 1976, Frazil ice formation in ultimate heat sink - Wolf Creek Generating Station for Kansas Gas & Electric. Bechtel Power Corporation.

135. King, C.R., 1965, Alameda Field, in Kansas oil and gas fields: Kansas Geol. Soc., vol. IV, p. 1-17.

136. King, E.R., and Zietz, I., 1971, Aeromagnetic study of the midcontinent gravity high of the central United States: Geol. Soc. Am. Bull., vol. 82, p. 2187-2208.

REFERENCES: SECTION 2.5 (continued)

137. King, P.B., 1959, The evolution of North America: Princeton Univ. Press, Princeton, New Jersey, p. 23.

138. Kjaernsli, B., and Torblaa, I., (1968), Leakage Through Horizontal Cracks in the Core of Hyttejuvet Dams; The Norwegian Geotechnical Institute Publication No. 80, OSLO, Norway.

139. Knox, W.A., 1967, Multilayer near-surface refraction computations, in Seismic refraction prospecting: Soc. Explor. Geophysicists, p. 197-216.

140. Krinitzky, E.L., 1974, Fault assessment in earthquake engineering, miscellaneous paper S-73-1, State-of-the-art for assessing earthquake hazards in the United States: U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, May.

141. Krinitzsky, E.L., and Chang, F.K., 1975, State-of-the-art for assessing earthquake hazards in the United States; Earthquake intensity and the selection of ground motions for seismic design; Miscellaneous paper S-73-1, Report 4, September, 1975, U.S. Army Engineer Waterways Experiment Station, C.E., Vicksburg, Mississippi.

142. Lambe, T.W., 1960, Soil PVC Meter: Federal Housing Administration, FHA-701, Cat. no. 10589.

143. Lambe, T.W., and Whitman, R.V., 1969, "Soil Mechanics" - Wiley & Sons.

144. Landes, K.K., 1959, Petroleum geology: John Wiley & Sons, New York, New York, 2nd ed.

145. Lane, R.G.T., Temporary dam construction under water and overtopped by floods: Ninth International Congress on Large Dams, Instanbul, Turkey, vol. IV, question 35, p. 59-83.

146. Lawrence Livermore National Laboratory, 1981, NUREG/CR-1582, Seismic Hazard Analysis, Application of Methodology, Results and Sensitivity Studies, Vol. 4.

REFERENCES: SECTION 2.5 (continued)

147. Leatherock, C., 1945, The correlation of rocks of Simpson age in north-central Kansas with the St. Peter Sandstone and associated rocks in northwestern Missouri: Kansas Geol. Survey, Bull. 60, pt. l, p. 1-16.

148. Lee, K.L., and Chan, K., 1972, Number of equivalent significant cycles in strong motion earthquakes: Proceedings of the International Conference on Microzonation for Safer Construction, Research and Application, Vol. II, Nov., 1972.

149. Lee, W., 1943, The stratigraphy and structural development of the Forest City Basin in Kansas: State Geol. Survey of Kansas, Bull. 51, p. 13.

150. -----, 1956, Stratigraphy and structural development of the Salina Basin area: State Geol. Survey of Kansas, Bull. 121, p. 53, 93-96, 142-143.

151. Lee, W., and others, 1946, The stratigraphy and structural development of the Forest City Basin of Missouri, Kansas, Iowa and Nebraska: U.S. Geol. Survey, Oil and Gas Invest., Prelim. Map 48, shs. 5 and 6.

152. Leeds, D. J., 1972, The underground seismic environment: Proceedings North American Rapid Excavation and Tunnelling Conference, A.I.M.E., vol. 1, p. 157-168.

153. Leps, T.M., 1973, Embankment-Dam Engineering, Casagrande volume - flow through rockfill: John Wiley and Sons, New York.

154. Levorsen, A.I., 1956, Geology of petroleum; Freeman & Co., San Francisco, 703 p.

155. Lins, T.W., 1950, Origin and environment of the Tonganoxie Sandstone in northeastern Kansas: State Geol. Survey of Kansas, Bull. 86, part 5, p. 117.

156. Lowe, J., III, and Karafiath, L.L., 1959, Stability of earth dams upon drawdown, Proceedings of the First Panamerican Conference: vol. 2, p. 537.

157. Lugn, A.L., 1935, The Nebraska earthquake of March 1, 1935: Science, vol. 81, no. 2102, p. 338-339.

REFERENCES: SECTION 2.5 (continued)

158. Luza, K.V., 1978, Seismicity and tectonic relationships of the Nemaha Uplift in Oklahoma: U.S. Nuclear Regulatory Commission, NUREG/CR-0050, 67 p.

159. Lyons, P.L., 1959, The greenleaf anomaly, a significant gravity feature in Symposium on geophysics in Kansas: University of Kansas Publications, State Geological Survey of Kansas, Bull. 137, Hambleton, W.W., ed., p. 105.

160. Lyons, P.L., Jones, V.L., and Jacobsen, P., 1964, Vertical-intensity magnetic map and Bouguer gravity-anomaly map of Oklahoma: Oklahoma Geol. Survey, Maps GM-6, GM-7, p. 11.

161. Mack, L. E., 1962, Geology and groundwater resources of Ottawa County, Kansas: State Geol. Survey of Kansas, Bull. 154, p. 24.

162. Marcher, M.V., 1969, Reconnaissance of the water resources of the Fort Smith Quadrangle, east-central Oklahoma: Oklahoma Geol. Survey, Hydrologic Atlas l, Map HA-1, sh. 1.

163. Marcher, M.V., and Bingham, R.H., 1971, Reconnaissance of the water resources of the Tulsa quadrangle, northeastern Oklahoma: Oklahoma Geol. Survey, Hydrologic Atlas 2, Map HA-2, sh. 1.

164. Marsal, R.J., (1959), Earth Dams in Mexico, Proceedings of the First Panamerican Conference on Soil Mechanics and Foundation Engineering, Mexico, September 7-12.

165. Matthiesen, R.B., and others, 1964, Site characteristics of southern California strong-motion earthquake stations, Part II: University of California, Los Angeles, Report 64-15.

166. McCauley, J.R., Dellwig, L.F., and Davison, E.C., 1978, LANDSAT lineaments of eastern Kansas: Kansas Geol. Survey, Map M-11, Scale 1:500,000.

167. McCracken, M.H., 1961, Geologic map of Missouri: Missouri Geol. Survey and Water Resources, map.

REFERENCES: SECTION 2.5 (continued)

168. -----, 1971, Structural features of Missouri: Missouri Geol. Survey and Water Resources, Dept. of Invest. 49, p. 8-67, pl. 1.

169. McCracken, E., and McCracken, M.H., 1965, Subsurface maps of the lower Ordovician (Canadian series) of Missouri: Division of Geological Survey and Water Resources, State of Missouri, Rolla.

170. McGinnis, L.D., and Ervin, C.P., 1974, Earthquakes and block tectonics in the Illinois Basin: Geology, vol. 2, no. 10.

171. McKeown, F.A., 1978, Hypothesis: many earthquakes in the central and southeastern United States are causually related to mafic intrusive bodies: Jour. Research U.S. Geol. Survey, vol. 6, no. 1, p. 41-50.

172. Medvedev, S.V., Sponheuer, S., and Karnik, V., 1963, Seismische Skala, in Proceedings of the third conference on earthquake engineering.

173. Merriam, D. F., 1956, History of earthquakes in Kansas: Seismological Society of America Bull., vol. 46, no. 2, p. 87-96.

174. Merriam, D.F., 1963, The geologic history of Kansas: State Geological Survey of Kansas, Bull. 162, 317 p.

175. Merriam, D.F., and Kelly, T.E., 1960, Preliminary regional structural contour map on top of Mississippian rocks in Kansas: Kansas Geological Survey, Oil and Gas Inv. no. 23, map.

176. Merriam, D.F., and Smith, P., 1961, Preliminary regional structural contour map on top of Arbuckle rocks (Cambrian-Ordovician) in Kansas: Kansas Geological Survey, Oil and Gas Inv. no. 25, map.

177. Merriam, D.F., Winchell, R.L., and Atkinson, W.R., 1958, Preliminary regional structural contour map on top of the Lansing Group (Pennsylvanian) in Kansas: Kansas Geol. Survey, Oil and Gas Inv. no. 19, map.

REFERENCES: SECTION 2.5 (continued)

178. Mesri, G., and Gibala, R., 1971, Engineering properties of a Pennsylvania shale, Stability of Rock Slopes: Proceedings of the Thirteenth Symposium on Rock Mechanics, New York, American Society of Civil Engineers, p. 57-75.

179. Miser, H.D., 1954, Geologic map of Oklahoma: U.S. Geol. Survey and Oklahoma Geol. Survey, map.

180. Miser, H.D., 1954, Geologic map of Oklahoma: U.S. Geol. Survey and Oklahoma Geol. Survey, map.

181. Mitchell, B.J., 1974, St. Louis University, written communication.

182. Mohraz, B., Hall, W.J., and Newmark, N.M., 1972, A study of vertical and horizontal earthquake spectra: Nathan M. Newmark, Consulting Engineering Service, Urbana, Illinois, U.S. AEC Contract no. AT (49-5) - 2667.

183. Monthly Weather Review, 1882, Annual report of the chief signal officer to the Secretary of War for the year 1882: U.S. Government Printing Office, Washington, D.C.

184. Moore, R. C., 1949, Divisions of the Pennsylvanian System in Kansas: State Geol. Survey of Kansas, Bull. 83, p. 150-152.

185. Murphy, J.R., and O'Brien, L.J., 1977, The correlation of peak ground acceleration amplitude with seismic intensity and other physical parameters: Bulletin of Seismological Society of America, vol. 67, no.3, p. 877-915.

186. -----, 1978, Analysis of a worldwide strong motion data sample to develop an improved correlation between peak acceleration, seismic intensity, and other physical parameters: Computer Services Corporation (for U.S. Nuclear Regulatory Commission) NUREG-0402.

187. Murphy, L.M., and Cloud, W.K., 1954, United States earthquakes of 1952: U.S. Dept. of Commerce, Coast and Geodetic Survey, Washington, D.C.

188. Murphy, L.M., and Ulrich, F.P., 1951, United States earthquakes, 1949: U.S. Coast and Geodetic Survey.

REFERENCES: SECTlON 2.5 (continued)

189. Murray, D.K., and Marvin, R.G., 1973, A guide to uppermost Cretaceous stratigraphy, central Front Range, Colorado: deltaic sedimentation, growth faulting and early Laramide crustal movement: The Mountain Geologist, vol. 10, no. 3, p. 53-97.

190. Muskogee Daily Phoenix, 1956, p. 3 (October 31)

191. Necioglu, A, and Nuttli, 0.W., 1974, Some ground motion and intensity relations for the Central United States: Earthquake Eng., and Struct. Dynamics, vol. 3, p. 111-119.

192. Neumann, F., 1937, United States earthquakes of 1935: U.S. Dept. of Commerce, Coast and Geodetic Survey, Washington, D.C.

193. -----, 1954, Earthquake intensity and related ground motion: University of Washington Press, Seattle, Washington.

194. Newmark, N.M., Blume, J.A., and Kapur, K.K., 1973, Design response spectra for nuclear power plants: Am. Soc. Civil Engineers Annual Meeting, San Francisco, California.

195. Nobari, E.S., and Duncan, J.M., (1972), Movements in dams due to reservoir filling; Proceedings of the specialty conference on performance of earth and earth-supported structures, Purdue University, Lafayette, Indiana, June 11-14.

196. Nuttli, 0.W., 1973, The Mississippi Valley earthquakes of 1811-1812: Intensities, ground motion and magnitude: Seismol. Soc. Am. Bull., vol. 63, no. l, p. 227-248.

197. -----, 1973a, Seismic wave attenuation and magnitude relations for eastern North America: Jour. Geophys. Res., vol. 78, no. 5, p. 876-885.

198. -----, 1973b, State-of-the-art for assessing earthquake hazards in the United States; Design earthquakes for the Central United States: Miscellaneous Paper S-73-1, Report 1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

REFERENCES: SECTION 2.5 (continued)

199. -----, 1974, Magnitude-recurrence relation for central Mississippi Valley earthquakes: Seism. Soc. Am., Bull. 64, no. 4, p. 1189-1207.

200. Nuttli, O.W., and Herrmann, R.B., 1978, State-of-the-art for assessing earthquake hazards in the United States; Credible earthquakes for the central United States: Miscellaneous Paper S-73-1, Report 12, December 1978, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

201. O'Brien, L.J., Murphy, J.R., and Lahoud, J.A., 1977, The correlation of peak ground acceleration amplitude with seismic intensity and other physical parameters: U.S. Nuclear Regulatory Commission, NUREG-0143.

202. Ocola, L.C., and Meyer, R.P., 1973, Central North American rift system, structure of the axial zone from seismic and gravimetric data: Jour. of Geophysical Research, vol. 78, no. 23, p. 5173-5194.

203. O'Connor, H.G., 1960, Geology and ground-water resources of Douglas County, Kansas: State Geol. Survey of Kansas, Bull. 148, p. 65-67, pl. 1.

204. O'Connor, H.G., and others, 1955, Geology, mineral resources, and ground-water resources of Osage County, Kansas: State Geol. Survey of Kansas, vol. 13, part 1, p. 19, pl. 1.

205. Olivier, H., 1967, Through and overflow rockfill dams new design techniques: Paper 7012 in Proceedings of the Institute of Civil Engineers, March, vol. 36.

206. Oros, M.O., and others, 1975, Oil and gas fields in Kansas: Kansas Geol. Survey, Map M-3A, scale 1:500,000.

207. Ohta, Y., et. al., Observation of 1- to 5-second microtremors and their application to earthquake engineering, Part I: Comparison with long-period acceleration at the Tokachioki earthquake of 1968, Bull. Seism. Soc. Am., vol. 68, no. 3, pp 767-779, June 1978.

REFERENCES: SECTION 2.5 (Continued)

208. Parker, M.C., 1971, Resume of oil exploration and potential in Iowa: Iowa Geol. Survey, Public Infor. Circ. no. 2, fig. 1.

209. Pawhuska Journal Capital, 1956, p. 1 (October 30).

210. Perry Daily Journal, 1956, p. 1 (October 30).

211. Peterschmitt, E., 1952, Sur la variation de intensite micro-seismique avec la distance epicentrale: Bureau Central Seismol. Internationale, Pub. Series A, no. 8, p. 183-208.

212. Petroleum Information Corporation, 1973a, Oil and gas operations in the Mid-Continent, Rocky Mountains and Northeast Regions: 1972 Resume, p. 26.

213. -----, 1973b, Kansas, mid-year review: July 24, p. 8.

214. Petroleum Information Corporation, 1973c, Petroleum information: August 28, p. 2.

215. -----, 1973d, Mid-Continent Region: Newsletter ed., vol. 20, no. 181, September 14, p. 30.

216. Poulos, S.J., Hirschfeld, R.C., 1973, Embankment - Dam Engineering Casagrande Vol., Wiley & Sons, New York.

217. Pyke, Robert, Seed, H. Bolton, and Chan, Clarence K., 1975, "Settlement of Sands Under Multidirectional Shaking", Journal of the Geotechnical Engineering Division, volume 101, no. GT4, American Society of Civil Engineers, pp 279-398.

218. Reed, E.W., Schoff, S.L., and Branson, C.C., 1955, Ground-water resources of Ottawa County, Oklahoma: Oklahoma Geol. Survey, Bull. 72, p. 32-35, pl. 1.

219. Reid, M.W., 1922, Collected earthquakes memos: National Oceanic and Atmospheric Administration, clippings.

220. Richardson, J.M., 1965, Rino Pool, in Kansas oil and gas fields: Kansas Geol. Soc., vol. IV, p. 193-199.

221. Riggs, E.A., 1960, Major basins and structural features of the United States: C.S. Hammond & Co., New Jersey.

REFERENCES: SECTION 2.5 (continued)

222. Rockwood, C., 1882, Some recent earthquakes: Am. Jour. Sci., vol. 23, no. 11, p. 239.

223. Sabzevari, A., and Ghahramani, A., 1974, Dynamic passive earth-pressure problems: Am. Soc. Civil Engineers, Jour. of the Geotech. Engineering Div., vol. 100, no. GT-1, p. 15-30.

224. Sanger, F.J., 1963, Degree-days and heat condition in soils; in Proceedings of the 1st International Conference on Permafrost, p. 260-262.

225. Sapulpa Daily Herald, 1956, p. 1 (October 30).

226. Schnabel, P.B., and Seed, H.B., 1973, Accelerations in rock for earthquakes in the western United States: Seismol. Soc. America, Bull. vol. 63, no. 2, p. 501-516.

227. Schoewe, W.H., 1949, The geography of Kansas, part II, physical geography, in Transactions of the Kansas Academy of Science: State Geol. Survey of Kansas, vol. 52, no. 3, p. 275-277.

228. Scott, R.W., 1966, New Precambrian (?) formation in Kansas: Am. Assoc, Pet. Geol., Bull., vol. 50, no. 2, p. 380-384.

229. Seed, H.B., and Chan, C.K., 1959, Undrained Strength of Compacted Clays After Soaking: Jour. Soil Mech. ASCE - vol. 85 SM6 - Dec. 1959, p. 31-47.

230. Seed, H.B, and Idriss, I.M., 1971, Simplified procedure for evaluating soil liquefaction potential, Journal of the soil Mechanics and Foundations Division; Proceedings of the American Society of Civil Engineers, vol. 97, no. SMA (September), p. 1249-1273.

231. Seed, H.B., Idriss, I.M., and Kiefer, F.W., 1969, Characteristics of rock motions during earthquakes: Journal of the Soil Mech. and Found. Div., ASCE, vol. 95, p. 1199-1218.

232. Seed, H.B., Lee, K.L., and Idriss, I.M., 1969, An analysis of the Sheffield Dam failure: Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 95, No. SM5, Nov., 1969.

REFERENCES: SECTION 2.5 (continued)

233. Seed, H.B., Lee, K.L., Idriss, I.M., and Makdissi, F., 1973, Analysis of the slides in the San Fernando dams during the earthquake of February 9, 1971: Report EEFC 73-2, Earthquake Engineering Research Center, University of California, Berkeley, March, 1973.

234. Seed, H.B., and Peacock, W.H., 1971, Test procedures for measuring soil liquefaction characteristics: Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 97, No. SM8, p. 1099-1119, Aug., 1971.

235. Seed, H.B., and Whitman, R.V., 1970, Design of Earth-Retaining Structures for Dynamic Loads, in Proceedings of the Specialty Conference on lateral stresses in the ground and design on earth-retaining structures: Am. Soc. Civil Engineers, Soil Mechanics and Foundations Div.

236. Shannon and Wilson, Inc., and Agbabian-Jacobsen Associates, 1972, Soil behavior under earthquake loading conditions: Report for the U.S. Atomic Energy Commission.

237. Shawver, D.D., 1965, 0.S.A. Field, in Kansas oil and gas fields: Kansas Geol. Soc., vol. IV, p. 175-183.

238. Shenkel, C.W., Jr., 1959, Geology of the Abilene Anticline in Kansas: Kans. Geol. Soc., Ann. Field Conf., no. 24, p. 116-128.

239. Sherard, J.L., and others, 1966, Earth and earth rock dams engineering problems of design and construction: John Wiley & Sons, New York.

240. Sherard, James L., Dunnigan, Lorn P., and Decker, Ray S., (1976): Identification and nature of dispersive soils; Journal of the Geotechnical Engineering Division, ASCE, Vol. 102, No. GT4, April.

241. Sherard, James L., Dunnigan, Lorn P., Decker, Ray S., and Steele, Edgar F., (1976): Pinhole Test for Identifying Dispersive Soils; Journal of the Geotechnical Engineering Division, ASCE, Vol. 102, No. GT2, January.

REFERENCES: SECTION 2.5 (continued)

242. Silver, Marshall L., and Seed, H. Bolton, 1971, "Volume changes in sands during cyclic loading", Journal of the Soil Mechanics and Foundation Division, volume 97, no. SM9, American Society of Civil Engineers, pp 1171-1182

243. Snyder, F.G., 1968, Tectonic history of midcontinental States: University of Missouri at Rolla (UMR) Journal, V.H. McNutt Colloquium Series 1, no. l, p. 75.

244. Snyder, F.G., and Gerdemann, P.E., 1965, Explosive igneous activity along an Illinois-Missouri-Kansas axis: Am. Jour. of Sci., vol. 263, p. 465-493, June.

245. Stearns, R.G., and Wilson, C.W., Jr., 1972, Relationships of earthquakes and geology in west Tennessee and adjacent areas: Report prepared for Tennessee Valley Authority, Vanderbilt University, Nashville, Tennessee.

246. Steeples, D.W., and Bickford, M.E., 1981, Piggyback drilling in Kansas: an example for the continental scientific drilling program: EOS (Trans., American Geophys. Union), vol. 62, no. 18, p. 473-476.

247. Steeples, D.W., 1981a, Microearthquake network activities, fiscal year 1980: Kansas Geological Survey, Report to the Kansas City District, Corps of Engineers, July 29, 1981.

248. Steeples, D.W., 1981b, Structure of the Salina-Forest City interbasin boundary from seismic studies: Kansas Geological Survey prepared for the W.H. McNutt Memorial Lecture Series, to be published in Univ. Missouri (Rolla) Journal No. 3, 36 p.

249. Steeples, D.W., DuBois, S.M., and Wilson, F.W., 1979, Seismicity, faulting, and geophysical anomalies in Nemaha County, Kansas: Relationship to regional structures: Geology, vol. 7, no. 3, p. 134-138.

250. Stepp, J. C., 1972, Analysis of the completeness of the earthquake sample in the Puget Sound area and its effect on statistical estimates of earthquakes hazard: Proceedings International Conference Microzonation, Seattle, Washington, vol. 2, p. 897-910.

REFERENCES: SECTION 2.5 (continued)

251. Sylvester, A.G., and Smith, R.R., 1976, Tectonic transpression and basement-controlled deformation in San Andreas fault zone, Salton trough, California: American Assoc. Petroleum Geol. Bull., vol. 60, no. 12, p. 2081-2102.

252. Tarr, R.S., Jordan, L., and Rowland, T.L., 1965, Geologic map and section of pre-Woodford rocks in Oklahoma: Oklahoma Geol. Survey, Map GM-9.

253. Terzaghi, K., and Peck, R.B., 1967, Soil Mechanics in Engineering Practice: John Wiley & Sons, New York, New York.

254. Thiers, G.R., and Seed, H.B., 1968, Cyclic stress-strain characteristics of clay: Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 94, No. SM2, March 1968.

255. Thompson, T.L., and Goebel, E.D., 1968, Conodonts and Stratigraphy of the Meramecian Stage (upper Mississippian) in Kansas: State Geol. Survey of Kansas, Bull. 192, p. 4-7.

256. Thornbury, W.D., 1965, Regional geomorphology of the United States: John Wiley & Sons, New York, New York, p. 250-251.

257. Trifunac, M.D., and Brady, A.G., 1975, On the correlation of seismic intensity scales with the peaks of recorded strong ground motion: Bulletin Seismological Society of America, vol. 65, no. 1, p. 139-162.

258. Tulsa Tribune, 1956, p. 1 (October 30).

259. Tulsa World, 1956, p. 1 (October 31).

260. United States Army Corps of Engineers, 1959, John Redmond Dam and Reservoir - Design Memorandum No. 3: geology, soils and structural foundations. U.S. Army Engineer District, Tulsa.

261. United States Atomic Energy Commission, 1973, Regulatory guide 1.60--Design response spectra for seismic design of nuclear power plants: Rev. 1.

262. United States Department of Commerce, 1928-1970, U.S. earthquake yearly list: U.S. Dept. of Commerce.

REFERENCES: SECTION 2.5 (continued)

263. United States Geological Survey, 1932, Geologic map of the United States: Washington, D.C., reprinted 1960.

264. United States Department of the Navy, 1971, Design manual - soil mechanics, foundations, and earth structures; NAVFAC, DM-7, 1971.

265. United States Nuclear Regulatory Commission, 1975, Safety Evaluation Report related to construction of Wolf Creek Generating Station, Unit No. 1, NUREG-75/080, Docket No. STN 50-482.

266. Wagner, H.C., 1954, Geology of the Fredonia Quadrangle, Kansas: U.S. Geol. Survey, Washington, D.C.

267. Walters, R.F., 1977, Land subsidence in central Kansas related to salt dissolution: Kansas Geol. Survey, Bulletin 214, 82 p.

268. Ward, J. R., 1968, A study of joint patterns in gently-dipping sedimentary rocks of south-central Kansas: State Geol. Survey of Kansas, Bull. 191, part 2, p. 3-22.

269. Warren, D. H., 1968, Transcontinental geophysical survey (35°-39°N), Seismic refraction profiles of the crust and upper mantle: Dept. of the Interior, U.S. Geological Survey, Washington, D.C., p. 1.

270. Watney, W.L., 1978, Structural contour map: Base of Kansas City Group (Upper Pennsylvanian) - eastern Kansas: Kansas Geological Survey, Map M-10, scale 1:500,000.

271. Weiss, A., 1951, Construction Technique of Passing Floods Over Earth Dams: ASCE Transactions, paper 2461: vol. 116, p. 1158-1178.

272. Wilson, F.W., 1979, A study of the regional tectonics and seismicity of eastern Kansas - Summary of project activities and results to the end of the second year, or September 30, 1979: U.S. Nuclear Regulatory Commission, NUREG/CR-0666, 68 p.

273. Wilson, S.D., 1964, Suggested method of test for moisture-density relations of soils using Harvard compaction apparatus, Harvard Miniature Mold compaction: Am. Soc. Testing and Materials, Procedure for Soils Testing Committee D-18.

REFERENCES: SECTION 2.5 (continued)

274. Winslow, A., 1894, Lead and zinc deposits: Missouri Geol. Survey and Water Resources, vol. II, sec. 2, p. 429-434.

275. Wolfe, A., Brady, L.L., and Romero, G., 1978, Directory of Kansas Mineral Producers: Kansas Geol. Survey, Mineral Resource Series 8, 79 p.

276. Woods, R.C., 1978, A correlation of gravity and magnetic anomalies in central Coffey County and western Anderson County, Kansas: Unpublished M.S. thesis, Dept. of Geology, Wichita State Univ., Wichita, Kansas, 51 p.

277. Woolard, G.P., 1959, The relation of gravity to geology in Kansas, in Symposium on geophysics in Kansas, W.W. Hambleton, ed.: State Geol. Survey of Kansas, Bull. 137, p. 63-103.

278. Woolard, G.P., 1968, A catalogue of earthquakes in the United States prior to 1925: Hawaii Institute of Geophysics, HIG-68-9 (based on unpublished data compiled by Reid, H.F., and published prior to 1930).

279. Wuerker, R.G., 1956, Annoted tables of strength and elastic properties of rocks: Petroleum Branch, AIME, Paper no. 663-G (December).

280. Wyss, M., 1979, Estimating maximum expectable magnitude of earthquakes from fault dimensions: Geology, vol. 7, p. 336-340.

281. Yarger, H.L., 1981, Aeromagnetic survey of Kansas: EOS (Trans., American Geophys. Union), vol. 62, no. 17, p. 173-178.

282. Yarger, H., Lam, C., Sooby, R., Martin, A., Rothe, G., and Steeples, 1981, Bouguer gravity map of southeastern Kansas: Kansas Geological Survey, Open-File September 1, 1981, Scale 1:500,000.

283. Yarger, H., Ng., K., Robertson, R., and Woods, R., 1980, Bouguer gravity map of northeastern Kansas: Kansas Geological Survey, Open-File April 1, 1980, Scale 1:500,000.

REFERENCES: SECTION 2.5 (continued)

284. Yarger, H.L., Robertson, R.R., and Wentland, R.L., in press, Aeromagnetic map of eastern Kansas: Kansas Geol. Survey, Map M-12, scale 1:500,000.

285. Zartman, R.E., and others, 1967, K-Ar and Rb-Sr ages of some alkalic intrusive rocks from central and eastern United States: Am. Jour. Sci., vol. 265, p. 848-870.

286. Zeller, D.E., ed., 1968, The stratigraphic succession in Kansas: State Geol. Survey of Kansas, Bull. 189, p. 8-61, pl. 1.

Unpublished References

287. Burchett, R.R., 1973a, Research geologist, Nebraska Geological Survey: Written communication, May 15.

288. -----, 1973b, Research geologist, Nebraska Geological Survey: Written communication, June 15.

289. Carlisle, R.K., 1974, State Corporation Commission of the State of Kansas, Conservation Division: Written communication, June 28.

290. Cole, V.B., 1973a, Private consultant, Wichita, Kansas: Written communication, July 31.

291. -----, 1973b, Private consultant, Wichita, Kansas: Written communication, August 4.

292. -----, 1973c, Private consultant, Wichita, Kansas: Written communication, September 26.

293. Cornish Oil Well Services, 1968, Radioactivity log - Tesoro Petroleum Corporation, Ryser "A" No. 1, Woodson County, Kansas.

294. Coulter, H.W., 1975, U.S. Geological Survey, Reston, Va., written communication.

295. Ebanks, W.J., Jr., 1973, Chief, subsurface geology section, Kansas Geological Survey: Written communication, July 19.

REFERENCES: SECTION 2.5 (continued)

296. Fellows, L.D., 1973a, Assistant state geologist, Missouri Geological Survey and Water Resources: Written Communication, July 20.

297. -----, 1973b, Assistant state geologist, Missouri Geological Survey and Water Resources: Written communication, July 20.

298. Gupta, I.N. and Nuttli, 0.,W., Spatial attentuation of intensities for central U.S. earthquakes, paper to be presented at the 56th Annual Meeting of the American Geophysical Union in June 1975.

299. Hager, R., 1973, Acting state administrative officer, Kansas Soil Conservation Service: Written communication, August 3.

300. Haley, B. R., 1973, Geologist, United States Geological Survey: Written communication, April 17.

301. Hambleton, W. W., 1973a, Director, Kansas Geological Survey: Written communication, April 17.

302. -----, 1973b, Director, Kansas Geological Survey: Written communication, August 6.

303. Johnson, K.S., 1973a, Geologist, Oklahoma Geological Survey: Written communication, June 29.

304. -----, 1973b, Geologist, Oklahoma Geological Survey: Written communication, June 29.

305. McBee, C.W., 1973, State soil scientist, United States Department of Agriculture, Soil Conservation Service: Written communication, May 31.

306. Nuttli, 0.W., 1974, St. Louis University, Written communication.

307. Nuttli, 0.W., and Brill, K.G., Jr., in press, Earthquake source zones in the central United States determined from historic seismicity: Submitted to the NRC in September 1980.

308. O'Connor, H.G., 1974, Hydrologist, Kansas Geological Survey: Written communication, February 11.

REFERENCES: SECTION 2.5 (continued)

309. Van Eck, O.J., 1973a, Assistant state geologist, Iowa Geological Survey: Written communication, June 19.

310. -----, 1973b, Assistant State Geologist, Iowa Geological Survey: Written communication, June 19.

311. Wilson, F.W., 1973, Engineering Geologist, Kansas Geological Survey: Written communication, July 17.

312. -----, 1981, Senior Geologist, Kansas Geological Survey: Written communication, December 28.

313. -----, 1982, Senior Geologist, Kansas Geological Survey: Written communication, January 22.

Uncited References

314. ASTM Technical Publication No. 377, 1964, Compaction of Soils: 77th Annual Meeting ASTM Chicago.

315. Barden, L., and Sides, G.R., 1970, Engineering Behavior and Structure of Compacted Clay: Jour. Soil Mech. ASCE, vol. 96 SM4.

316. Bishop, A.W., and Bjerrum, L., 1960, The Relevance of the Triaxial Test to the Solution of Stability Problems: ASCE Research Conf. on Shear Strength of Cohesive Soils.

317. Holtz, W.G., and Gibbs, H.J., 1956, Engineering Properties of Expansive Clays: ASCE Trans., vol. 121, Paper 2814, p. 641-677.

318. ICES Slope, Bailey, W.A., 1974, McDonnell Douglas Automation Company.

319. Li, C.Y., 1959, Construction Pore Pressures in an Earth Dam: Jour. Soil Mech. ASCE, vol. 85, no. SM5.

320. Seed, H.B., and Chan, C.K., 1956, Structure and Strength Characteristics of Compacted Clays: Jour. Soil Mech. ASCE, vol. 85 SM5.

REFERENCES: SECTION 2.5 (continued)

321. Stallard, A.H., 1966, Materials Inventory of Coffee County Kansas: State Highway Commission of Kansas Research Dept. Report No. 2, 1966.

322. U.S. Dept. of the Interior, 1972, Design of Small Dams: Bureau of Reclamation, Second Edition.

323. United States Geological Survey, 1927, State of Kansas base map, scale 1:500,000.

324. Merriam, 1964.

Additional References

325. Dames & Moore, 1978, Interim Report results of detailed geological excavation mapping Wolf Creek Generating Station, Unit No. 1; for Kansas Gas and Electric Co., and Kansas City Power & Light Co., Dames & Moore, May 5, 1978.

326. 1979b Second interim report results of geologic excavation Mapping Wolf Creek Generating Station, Unit No. 1; for Kansas Gas & Electric Co., and Kansas City Power & Light Co.,Dames & Moore, July 9, 1979.

327. Bishop, BJ, 1975, Chief Operation Division, Tulsa District of U.S. Army Corps of Engineers, oral communication.

328. Merriam and Hambleton, 1959.

329. Lidiak and Zietz, 1976.

330. Miller, 1969.

331. Cornish Oil Well Services, 1968.

332. Merrian, 1960.

333. Melton, 1929.

334. Docekal, 1970, Earthquake history of the stable interrior: unpublished Ph.D. Dissertation, Univ. of Nebraska, Lincoln, Nebraska.

335. Parker, John D., Professor of Natural Science Lincoln College Topeka "Memoranda of the Earthquake of April 24, 1867", Kansas Collection of Kenneth Spencer Research Library in Lawrence, Kansas.

336. Reid, 1986.

337. Docekal, 1971.

338. Thiel, 1956.

339. Craddok, et el, 1963.

340. Coons, 1966.

341. Cohen, 1966.

342. Shar and Sykes, 1973.

343. Meek, 1962.

344. McCraken, 1972.

345. Gott and Hill, 1953.

346. Evans, 1962.

347. MacLachlin and Kleinkopt, 1969.

348. Brock and Singewald, 1968.

349. Chase and Gilmer, 1973.

350. Nuttli and Herman, 1978.

351. Dames & Moore, 1975, Final Report-Geotechnical Investigation for Alternate Baffle dikes.

352. WCNOC Specification C-403, Periodic Surveillance of Nonsafety-Related Water Structures and Reservoir.

353. WCNOC 55 The Main Dam Periodic Inspection.

354. Fugro, 2013, ESW Piping Replacement – Geotechnical Data Report.

355. Bechtel, 2014, Subsurface Investigation and Foundation Report.

356. Bechtel 2014, Addendum to Subsurface Investigation and Foundation Report.

TABLE 2.5-1

SUMMARY OF FOLDS IN ARKANSAS WITHIN THE REGIONAL AREA

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
1	Osage Anticline	Ark.-Carroll Mo.-Lawrence, Barry	Ark.- S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I) Mo.- SC (McCracken, 1971, pl. 1)	60	N45°W to N-S		Probably extends into Missouri as the Osage-Verona Anticline (Fold No. 93); Steep E flank and relatively flat W flank; faulted along E flank (Green Forest Fault) near southern end.
2	Price Mountain Syncline	Carroll, Benton, Washington	S (Croneis, 1930, pl. 1-A)	26	N30°E to N35°E		NW limb faulted by Glade Fault to the north and Price Mountain Fault to the south.
3	Clifty Anticline	Madison	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	10	Approx. E-W		Short, steep, irregular slope toward the Clifty Creek Faults to the north; long, gradual slope toward the Brush Creek Fault to the south; irregular, indefinite slope toward the Price Mountain Syncline to the west; irregular, steep slope toward the Moody Hollow Fault to the east (Croneis, 1930, p. 185).
4	Wharton Arch	Madison	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	9	E-W	W	Bounded by the Reed Creek Fault on the north and the Drakes Creek Fault on the west; the general area is located on a Precambrian "high".
5	Sneeds Creek Dome	Madison, Newton	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	11	N70°W to E-W to N70°E		Bounded on south by the Compton and Sneeds Creek Faults; eastern part of fold much more pronounced than western part.

[a] Fold numbers correspond to those shown on Figure 2.5-15.

[b]
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours

For Sources cited above, see REFERENCES: SECTION 2.5.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
6	Carroliton Dome	Boone	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	6	N20°W to N30°E		
7	Frisco Syncline	Crawford	S (Croneis, 1930, pl. 1-A)	5.5	E-W		N flank dips (3° to 6°) are steeper than S flank dips (2° to 5°); flanked by Frisco Fault to north.
8	Armada Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	7	E-W		N limb dips average 3°, S limb dips average 5°.
9	Chester Syncline	Crawford	S (Croneis, 1930, pl. 1-A)	10	E-W to N40°E		Western part (main part) is 6 miles long, N limb dips average 5°, S limb dips average 3°; fold branches to the east - North Fork is 5 miles long, N limb dips average 5°, S limb dips average 3° and 4°; south fork is 4.5 miles long, N limb dips average 5°, S limb dips average 3°; Three Rocks Anticline lies between the two forks.
10	Three Rocks Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	6	Approx. E-W		Lies between the two branches of the Chester Syncline; S limb dips average somewhat more than 4°, N limb dips average 3° and 4°.
11	Meadow Mountain Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	12	E-W		S flank dips range from 2° to 13° and average 5° and 6°; N flank dips average 3°.
12	Mountainburg Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	3	N65°E to E-W		N limb dips average less than 3°, S limb dips average more than 4°.
13	Warloop Syncline	Crawford	S (Croneis, 1930, pl. 1-A)	3.5	N70°E		N limb dips range from 2° to 13°, S limb dips range from 1° to 4°.

WOLF CREEK

TABLE 2.5-1 (continued)

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
14	Liberty Hill Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	5	E-W to N80°W		Two NE-trending normal faults lie at right angles to the axis on both limbs but apparently do not cross the crest; N limb dips average 5°, S limb dips average 3° and 4°.
15	Cove Syncline	Crawford	S (Croneis, 1930, pl. 1-A)	14	N70°W to N70°E		Western part (main part) is 3.5 miles long, dips average 3°; fold branches to the east - North Fork is 10 miles long, N limb dips average 3°, S limb dips average 4° and 5°; South Fork is 7 miles long, dips average 5° or more; the Lee Creek Anticline lies between the two forks.
16	Lee Creek Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	9	N75°W		Lies between the two forks of the Cove Syncline; N limb dips range from 3° to 7°, S limb dips range from 2° to 10°.
17	Pine Mountain Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	10	N65°W		N limb dips average more than 5°, S limb dips average 3° and 4°.
18	Uniontown Syncline	Crawford	S (Croneis, 1930, pl. 1-A)	6	N60°E		N limb dips range from 2° to 7°, S limb dips range from 2° to 8°.
19	Cedarville Anticline	Crawford	S (Croneis, 1930, pl. 1-A) SC (Caplan, 1957, pl. I)	7.5	N55°E		N limb dips average 4° and 5°, S limb dips average 5°.

TABLE 2.5-2

SUMMARY OF FOLDS IN IOWA WITHIN THE REGIONAL AREA

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
1	Glenwood Syncline	Mills	SC (Hershey and others, 1960, fig. 17)	12	N50°E		
2	Lyons Anticline	Mills	SC (Hershey and others, 1960, fig. 17)	13	N50°E		
3	Bartlett Syncline	Iowa-Fremont, Mills Neb.-Cass	Iowa- SC (Hershey and others, 1960, fig. 17) Neb.- SC (Condra and Reed, 1959, fig. 2)	11	N70°E		Extends into Nebraska (Fold No. 6).
4	Tabor Anticline	Fremont	SC (Hershey and others, 1960, fig. 17)	4	N65°E		
5	Malvern Anticline	Mills	SC (Hershey and others, 1960, fig. 17)	7	N10°W to N15°E		
6	Red Oak Anticline	Montgomery	SC (Hershey and others, 1960, fig. 17)	10	N15°E to N35°E		A structural high extends from the Hamburg-Farragut Anticline to the Red Oak Anticline.

a Fold numbers correspond to those shown on Figure 2.5-15.

b
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours
For Sources cited above, see REFERENCES: SECTION 2.5.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
7	Hamburg-Farragut Anticline	Fremont	SC (Hershey and others, 1960, fig. 17)	13	N20°E to N65°E		A structural high extends from the Hamburg-Farragut Anticline to the Red Oak Anticline.
8	New Market Anticline	Adams, Page, Taylor	SC (Hershey and others, 1960, fig. 17)	21	N30°W to N20°E		
9	Thurman-Redfield Structural Zone	Iowa-Story, Boone, Dallas, Guthrie, Adair, Cass, Montgomery, Mills, Fremont Neb.-Cass, Otoe	Iowa-SC (Hershey and others, 1960, fig. 17; Parker, 1971, fig.1; Van Eck, 1973b) Neb.-SC (Burchett, 1971, fig. 4)	180	N30°E to N65°E		Structural zone marked by a series of domes and anticlines with some faulting; probably extends into Nebraska (Fold No. 5).

TABLE 2.5-3

SUMMARY OF FOLDS IN KANSAS WITHIN THE REGIONAL AREA

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
1	Commerce Trough	Kan.-Cherokee Ok.-Ottawa, Craig	Kan.-S(Jewett, 1951, p. 127) Gm(Jopling and Cashion, 1959, fig. 1) OK.-S(Arbenz, 1956)	36	N20°E		Also called the Miami Syncline in Oklahoma (Fold No. 1).
2	Barneston (Abilene) Anticline	Kan.-Marshall Neb.-Johnson, Pawnee	Kan.-S(Jewett, 1951, p. 117) Neb.-S(Condra and Reed, 1959, fig. 2)	45	N30°E		Northern extension of the Abilene Anticline; Fold No. 3 in Nebraska.
3	Irving Syncline	Kan.-Marshall, Pottawatomie Neb.-Pawnee	Kan.-S(Jewett, 1951, p. 117) SC(Merriam, 1963, p. 205, fig. 112) Gm(Jopling and Cashion, 1959, fig. 1) Neb.-S(Condra and Reed, 1959, fig. 2)	25±	N30°E		The term Irving Syncline is not used in Nebraska (Fold No. 4).
4	Straham Anticline	Nemaha	S(Jewett and Merriam, 1959, p. 39)	3	N25°E		Major movement: Pre-Mississippian (Cole, 1973c)
5	Brownville Syncline	Kan.-Brown, Nemaha, Jackson, Pottawatomie, Wabaunsee, Morris, Chase Neb.-Nemaha, Richardson	Kan.-S(Jewett, 1951, p.122) SC(Merriam, 1963, p. 203, fig. 111) Gm(Jopling and Cashion, 1959, fig. 1) Neb.-SC(Burchett, 1971, fig. 4)	85	N25°E		Marks the deepest part of the Forest City Basin in Nebraska (Fold No. 1).
6	Abilene Anticline	Riley, Clay, Dickinson	S(Jewett, 1951, p.114) SC(Merriam, 1963, p.203, fig.111) Gm(Jopling and Cashion, 1959, fig. 1)	180	N10°E		Contains the McPherson gas field; the Barneston Anticline is the northern extension of the Abilene Anticline; steeply dipping SE limb, gently dipping NW limb.

[a] Fold numbers correspond to those shown on Figure 2.5-15.

[b]
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours

For Sources cited above, see REFERENCES: SECTION 2.5.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
7	Tipton Anticline	Mitchell	S(Jewett, 1951, p. 162)	3	N-S	N	
8	Fairport-Natoma Anticline	Russell, Osborne	S(Jewett, 1951, p. 134) SC(Merriam, 1963, p.201, fig. 110) Gm(Jopling and Cashion, 1959, fig. 1)	15	N10°E		Part of the Central Kansas Uplift; contained the first discovered oil in Kansas; W limb dips 50' to 200'/mi., E limb dips 15' to 40'/mi.
9	Alta Vista Anticline	Wabaunsee, Morris	SC(Merriam, 1963, p. 238, fig. 135)	2	N16°E		Part of the Nemaha Anticline; contains the Alta Vista oil field; steeply dipping E limb.
10	Alma Anticline	Wabaunsee, Morris	SC(Merriam, 1963, p. 205, fig. 112)	38	N40°E		Associated with a series of en echelon folds.
11	Ackerland Anticline	Leavenworth	S(Jewett, 1951, p. 114)	1	NW-SE		Domelike; contains the Ackerland oil and gas pools.
12	McLouth Anticline	Jefferson, Leavenworth	S(Jewett, 1951, p. 143) SC(Merriam, 1963, p. 205, fig. 112)	9	NW-SE		Domelike; faulted in Mississippian and lower rocks; contains oil and gas pools of the McLouth field.
13	McLouth North Anticline	Jefferson	S(Jewett, 1951, p. 143) SC(Merriam, 1963, p.205, fig. 112)	7	NW-SE		Northern extention of the McLouth Anticline; contains oil and gas pools of the McLouth North field.
14	Maywood Anticline	Wyandotte	S(Jewett, 1951, p. 144)	6	SW-NE		Elongate dome.
15	Morris Anticline	Wyandotte, Johnson	S(Jewett, 1951, p. 145) Gm(Jopling and Cashion, 1959, fig. 1)	1	NE-SW		Dips on NW flank 160'/mi.
16	Gorham Structure	Russell	S(Jewett, 1951, p. 138) SC(Cole, 1962)	10	N40°W		Anticlinal structure; part of the Central Kansas Uplift; high-angle fault on SW side; contains the Gorham oil pool.
17	Pfeifer Anticline	Ellis, Russell	S(Jewett, 1951, p. 151)	30	N10°E		In general alignment with the Fairport-Natoma Anticline.

Fold Number(a)	Name	Location	Identification(b)	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
18	Ellsworth Anticline	Ellsworth	S(Jewett, 1951, p. 133) SC(Merriam, 1963, p. 203, fig. 111) Gm(Jopling and Cashion, 1959, fig. 1)	22	N60°W		Subsidiary structure of the Central Kansas Uplift; contains several oil pools. Major movement: Pre-Mississippian (Cole, 1973c)
19	Russell Rib	Ellis, Russell, Barton	S(Jewett, 1951, p. 155) SC(Jewett, 1951, p. 155)	48	N45°W		Part of the Central Kansas Uplift; anticlinal structure. Major movement: Pre-Mississippian (Cole, 1973c)
20	Lindsborg Anticline	Saline, McPherson	SC(Merriam, 1963, p. 205, fig. 112)	7	N10°E	S	Contains the Lindsborg oil field.
21	John Creek Anticline	Morris	SC(Merriam, 1963, fig. 134)	4 to 5	N19°E		Part of the Alma Anticline; faulted on E flank; contains the John Creek oil field.
22	Rush Rib	Ellis, Rush, Barton	S(Jewett, 1951, p. 155) SC(Merriam, 1963, p. 207, fig. 114)	52	N45°W		Part of the Central Kansas Uplift; anticlinal structure.
23	Kraft-Prusa Structure	Russell, Barton, Ellsworth	SC(Jewett, 1951, pp. 141, 142; Merriam, 1963, p. 195) Gm(Jopling and Cashion, 1959, fig. 1)	15	NW-SE		Associated with burried P€ topography; part of the Central Kansas Uplift.
24	Geneseo Uplift	Ellsworth, Rice	SC(Jewett, 1951, p. 138; Merriam, 1963, p. 203, Fig. 111)	27	N20°W		Part of Central Kansas Uplift; contains several oil pools which are faulted.
25	Tobias Anticline	Rice	SC(Cole, 1973c) Gs(Cole, 1973c)	3.5	N-S		E limb faulted.
26	Conway Syncline	McPherson, Reno	SC(Jewett, 1951, p. 128) Gm(Jopling and Cashion, 1959, fig. 1)	40±	N10°E		
27	Voshell Anticline	McPherson, Harvey, Reno	SC(Merriam, 1963, p. 205, fig. 112) Gm(Jopling and Cashion, 1959, fig. 1)	40	N20°E	SW	Along W side is a reverse fault with W side down 400 ft.; contains several oil pools.
28	Halstead-Graber Anticline	McPherson, Harvey	SC(Jewett, 1951, p. 139) Gm(Jopling and Cashion, 1959, fig. 1)	12	N15°E		Contains Mississippian limestone oil pools. Last movement: Pre-Lower Permian (Cole, 1973c)
29	Florence-Urschel Fold	Marion	S(Jewett, 1951, p. 135) SC(Jewett, 1951, p. 135)	3	NW-SE		Anticlinal structure containing the Florence-Urshel oil field.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
30	Elmdale Dome	Chase	S(Jewett, 1951, p. 134)	E-W 9 N-S 12			Part of the Nemaha Anticline; dips 3^{o} - 4^{o}.
31	Pawnee Rib	Rush, Pawnee	SC(Jewett, 1951, p. 151)	26	N30°W		Part of the Central Kansas Uplift; anticlinal structure. Major movement: Pre-Mississippian
32	Elbing Anticline	Marion, Butler	S(Jewett, 1951, p. 132) SC(Jewett, 1951, p. 132; Cole, 1962) Gm(Jopling and Cashion, 1959, fig. 1)	16	N25°E		Northern extension of the Bluff City-Valley Center-Elbing anticlinal trend.
33	Cedar Creek Syncline	Chase	S(Jewett, 1951, p. 124) SC(Cole, 1962)	10	N20°W		Part of the Nemaha Anticline; a large graben structure.
34	Mildred Dome	Anderson, Allen	SC(Jewett, 1951, p. 145)	1	N65°W		
35	Mound City Dome	Linn	S(Jewett, 1951, p. 145) SC(Jewett, 1951, p. 145) Gm(Jopling and Cashion, 1959, fig. 1)	6			Contains the Mound City oil pool.
36	Burns Dome	Marion, Butler	S(Jewett, 1951, p. 123) SC(Jewett, 1951, p. 123)	9	E-W		Part of the Nemaha Anticline.
37	El Dorado Anticline	Butler	S(Jewett, 1951, p. 159) SC(Jewett, 1951, p. 120) Gm(Jopling and Cashion, 1959, fig. 1)	12	NE-SW		Contains most prolific oil pools in Kansas; part of the Nemaha Anticline; includes substructures: Bancroft Syncline, Bishop Syncline, Boyer Dome, Chelsea Dome, Chestney Dome, Dunkle Syncline, Fowler Syncline, Hammond Syncline, Hegberg Syncline, Koolger Nose, Lincoln Syncline, Oil Hill Dome, Ramsey Syncline, Ralston Syncline, Robinson Dome, Shumway Dome, Theta Syncline, Whitewater Nose, Wilson Dome.
38	Virgil Anticline	Greenwood	S(Jewett, 1951, p. 163) SC(Merriam, 1963, fig. 139)	5	N35°E		Domelike; may be the northern extension of the Beaumont Anticline; contains the Virgil oil pool.
39	Neosho Falls Dome	Woodson	SC(Merriam, 1963, fig. 85)	1.5 long 0.25 wide	NW-SE		May have been formed by intrusion of igneous material into the Pennsylvanian sequence; similar structure to Silver City Dome and Rose Dome.

Fold Number(a)	Name	Location	Identification(b)	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
40	Pratt Anticline	Stafford, Pratt, Barber	SC(Merriam, 1963, p. 205, fig. 112) Gm(Jopling and Cashion, 1959, fig. 1)	76±			Southern extension of Central Kansas Uplift.
41	Cunningham Anticline	Pratt, Kingman	SC(Merriam, 1963, p. 205, fig. 112)	10	N45°E		Contains the Cunningham oil and gas pools; horst structure.
42	Greenwich Anticline	Sedgwick	SC(Cole, 1962)	5	NE-SW	SW	Part of the Nemaha Anticline. Last movement: Pre-Lower Permian (Cole, 1973c)
43	Walnut Syncline	Butler	S(Jewett, 1951, p. 164) SC(Jewett, 1951, p. 164)	12	N25°E		
44	Reese Anticline	Greenwood	S(Merriam, 1963, p. 244, fig. 140) SC(Merriam, 1963, fig. 140)	5	N45°E		NW limb dips steeper than SE.
45	Beaumont Anticline	Greenwood, Butler	S(Jewett, 1951, p. 119) SC(Merriam, 1963, p. 205, fig. 112) Gm(Jopling and Cashion, 1959, fig. 1)	25	NE-SW		In same trend as Dexter-Otto Anticline to south and Virgil Anticline to north.
46	Silver City Dome	Woodson, Wilson	S(Jewett, 1951, p. 159) SC(Merriam, 1963, fig. 84)	3	E-W		May have been formed by intrusion of igneous material into the Pennsylvanian sequence; structure similar to Neosho Falls Dome and Rose Dome.
47	Rose Dome	Woodson	S(Jewett, 1951, p. 154) SC(Merriam, 1963, fig. 84)	3	E-W		May have been formed by intrusion of igneous material into the Pennsylvanian sequence; granite exposed at surface; structure similar to Neosho Falls Dome and Silver City Dome.
48	Coats Anticline	Pratt	SC(Merriam, 1963, fig. 128)	0.5	N10°E		Contains Coats oil field; narrow horst.
49	Willowdale Anticline	Kingman	SC(Merriam, 1963, fig. 145)	2	N40°E		
50	Valley Center Anticline	Sedgwick	SC(Merriam, 1963, p. 183)	12	N10°E		Part of the Bluff City-Valley Center-Elbing anticlinal trend; contains the Valley Center oil pool.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
51	Augusta (North and South) Anticlines	Butler	S(Jewett, 1951, p. 116)	4; 7	N-S; NE-SW		Part of the Nemaha Anticline; divided into north and south structures; probably faulted on E side; equally dipping limbs. Major movement: Upper Mississippian-Lower Pennsylvanian (Jewett, 1951, p. 116)
52	Fredonia Dome	Wilson	S(Jewett, 1951, p. 137) SC(Merriam, 1963, p. 205, fig. 112)	6 to 7			
53	Pittsburg Anticline	Kan.-Crawford Mo.-Barton, Jasper	Kan.-S(Jewett, 1951, p. 151) Mo.-SC(McCracken, 1971, pl. 1)	23	N35°W	NW	Extends into Missouri (Fold No. 85) as the Galesburg-Pittsburg Anticline.
54	Bluff City Anticline	Sumner, Harper	SC(Merriam, 1963, p. 183)	40	N40°E		Part of the Bluff City-Valley Center-Elbing anticlinal trend.
55	Redbud Dome	Cowley	S(Jewett, 1951, p. 154)	1			Part of the Nemaha Anticline.
56	Slick-Carson Dome	Cowley	SC(Jewett, 1951, p. 159)	1			Contains the Slick-Carson oil field.
57	Winfield Anticline	Cowley	S(Jewett, 1951, p. 167) SC(Merriam, 1963, p. 205, fig. 112)	15	N20°E to N50°E		
58	Longton Anticline	Elk, Chautauqua	SC(Merriam, 1963, p. 205, fig. 112) Gm(Jopling and Cashion, 1959, fig. 1)	27	N-S	S	Also called Longton Ridge.
59	Cherryvale Anticline	Montgomery	S(Jewett, 1951, p. 127)	5	N50°E		
60	Joplin Anticline	Kan.-Cherokee Mo.-Jasper, Newton	Kan.-S(Jewett, 1951, p. 141) Gm(Jopling and Cashion, 1959, fig. 1) Mo.-SC(McCracken, 1971, pl. 1)	28	N10°W to N40°W		Mostly located in Missouri (Fold No. 86).
61	Lawton Trough	Kan.-Cherokee Mo.-Jasper	Kan.-S(Jewett, 1951, p. 142) Mo.-SC(McCracken, 1971, pl. 1)	19	N40°W		Extends into Missouri (Fold No. 87).
62	Graham Dome	Cowley	SC(Jewett, 1951, p. 138)	1			Contains the Graham oil pool.

TABLE 2.5-3 (continued)

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
63	Countryman Anticline	Cowley	S(Merriam, 1963, fig. 141) SC(Merriam, 1963, Fig. 141)	3	NE-SW		On same structural trend as the Dexter-Otto Anticline.
64	Dexter-Otto Anticline	Cowley	S(Merriam, 1963, fig. 142) SC(Merriam, 1963, fig. 142) Gm(Jopling and Cashion, 1959, fig. 1)	24	N-S to N25°E		In same structural trend as the Countryman and Beaumont Anticlines.
65	Coffeyville Anticline	Montgomery	S(Jewett, 1951, p. 127) SC(Jewett, 1951, p. 127) Gm(Jopling and Cashion, 1959, fig. 1)	18	N-S		Contains the Coffeyville oil pool.
66	Cow Creek Anticline	Cherokee	S(Jewett, 1951, p. 128)	2	N20°W		
67	Wilson-Burns Element	Ellsworth, McPherson, Marion	S(Jewett, 1951, p. 166)	100	N55°W		E limb steep (35° to 40° dips), W limb less steep (10° to 12° dips), may be interpreted as the SW limit of the Lawton Trough.

TABLE 2.5-4

SUMMARY OF FOLDS IN MISSOURI WITHIN THE REGIONAL AREA

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
1	Tarkio Structure	Atchison	SC(McCracken, 1971, p. 63, pl. 1)	1.5	N-S		Anticline; contains oil.
2	Corning Structure	Holt	SC(McCracken, 1971, pl. 1) B (McCracken, 1971, p. 21)	1	N10°W to N15°W		Anticlinal structure; contains oil; associated with granitic rocks.
3	Hamilton-King City-Quitman Axis (Anticline)	Nodaway, Andrew, Gentry, DeKalb, Daviess, Caldwell	SC(McCracken, 1971, pl. 1)	80	N55°W		Large gentle anticlinal structure.
4	Trenton Anticline	Worth, Harrison, Grundy, Livingston, Linn	SC(McCracken, 1971, pl. 1)	88	N50°W		
5	College Mound-Bucklin Anticline	Linn, Macon, Randolph, Monroe	SC(McCracken, 1971, pl. 1)	42	N55°W	NW	Gentle NE limb, slightly steeper SW limb.
6	Blackburn School Anticline	Livingston	SC(McCracken, 1971, pl. 1)	6	N35°W		
7	Breckenridge Anticline	Caldwell	SC(McCracken, 1971, pl. 1)	3	N-S to N30°W		

[a] Fold numbers correspond to those shown on Figure 2.5-15.

[b]
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours
For Sources cited above, see REFERENCES: SECTION 2.5.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
8	Cameron-Union Star Syncline	DeKalb	SC (McCracken, 1971, pl. 1)	25	N55°W		Broad structure; part of NW Missouri's structural grain.
9	Savannah Structure	Andrew	SC (McCracken, 1971, pl. 1)	3	N30°E		Elongate dome.
10	Filmore Structure	Andrew	SC (McCracken, 1971, p. 30)	4	E-W		Anticlinal nose.
11	Cameron Structure	Clinton, Caldwell	SC (McCracken, 1971, pl. 1)	10	N-S	N	Anticlinal structure; contains Turney gas field.
12	Lathrop Dome	Clinton	SC (McCracken, 1971, pl. 1)	2	N40°W		Contains the Lathrop gas field.
13	Polo Structure	Caldwell	SC (McCracken, 1971, pl. 1)	2	N20°W		Anticlinal structure.
14	Gower Anticline	Clinton	SC (McCracken, 1971, pl. 1)	4	N40°E		
15	Hammond (North Plattsburg) Structure	Clinton	SC (McCracken, 1971, pl. 1)	1.5	N50°W		Contains the Hammond gas field; anticlinal structure.
16	South Plattsburg Structure	Clinton	SC (McCracken, 1971, pl. 1)	2	N15°E		Small dome.
17	Richmond-St. Joseph Anticline	Buchanan, Clinton, Clay, Ray	SC (McCracken, 1971, pl. 1)	56	N60°W		Large gentle anticline.
18	Ellington Structure	Clay	SC (McCracken, 1971, pl. 1)	2	E-W		Elongated dome.
19	Paradise (Smithville) Anticline	Clay	SC (McCracken, 1971, pl. 1)	5	N30°W		

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
20	Nashua Structure	Clay	SC (McCracken, 1971, pl. 1)	2	N40°E		Anticlinal structure; contains the Nashua gas field.
21	Liberty Structure	Clay	SC (McCracken, 1971, pl. 1)	2	N30°E to N50°W		
22	Parkville Structure	Platte	SC (McCracken, 1971, pl. 1)	2	N30°E		Anticlinal structure.
23	Prairie Point Structure	Platte	SC (McCracken, 1971, pl. 1)	2	E-W		Anticlinal structure.
24	Belgium Bottoms (Lakeside) Structure	Platte	SC (McCracken, 1971, pl. 1)	1	NE-SW		Domal structure.
25	Avondale Structure	Clay	SC (McCracken, 1971, pl. 1)	2	NE-SW	S	Anticlinal structure; contains the Avondale gas fields.
26	Centropolis Dome	Jackson	SC (McCracken, 1971, p. 18; pl. 1)	1	N-S		Flat-topped structure.
27	Coloma Anticline	Carroll	SC (McCracken, 1971, pl. 1)	9	N65°W		
28	Salisbury-Quitman Anticline	Charitan	SC (McCracken, 1971, pl. 1)	6	N45°W		
29	Howard County Syncline	Charitan, Howard	SC (McCracken, 1971, pl. 1)	19	N50°W		Has been called both a syncline and a structural basin.
30	Browns Station Anticline	Boone	SC (McCracken, 1971, pl. 1)	14	N35°W		

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
31	Fish Creek Anticline	Saline, Howard, Boone	SC (McCracken, 1971, pl. 1)	48	N40°W to N60°W		
32	Cow Creek Anticline	Saline	S (McCracken, 1971, p. 21) SC (McCracken, 1971, pl. 1)	26	N45°W		
33	Blue Lick Anticline	Saline	S (McCracken, 1971, p. 12) SC (McCracken, 1971, pl. 1)	14	N50°W	NW	
34	Knobnoster Anticline	Johnson	SC (McCracken, 1971, pl. 1)	6	N30°W		Gentle dips on NE limb.
35	Kansas City-Blue Springs-Lone Jack Syncline	Jackson	SC (McCracken, 1971, p. 38, pl. 1)	30	N60°W		Also called the Burris Syncline.
36	Blue Springs Anticline	Jackson	SC (McCracken, 1971, p. 13, pl. 1)	7	N50°W		Part of the Centerview-Kansas City Anticline; contains the Blue Springs gas field.
37	Centerview-Kansas City Anticline	Jackson, Johnson	SC (McCracken, 1971, pl. 1)	64	N65°W		Several smaller structures are identified along this anticline.
38	Penn Valley Syncline	Jackson	SC (McCracken, 1971, p. 49, pl. 1)	20	N20°W to N20°E		Bifurcates forming two major synclines.
39	Martin City Anticline	Jackson	SC (McCracken, 1971, p. 43, pl. 1)	5	N60°W to N-S		Contains a series of small domes.
40	East Grandview Anticline	Jackson	SC (McCracken, 1971, p. 27, pl. 1)	2	N60°E		Located between the two branches of the Penn Valley Syncline.

WOLF CREEK

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
41	King Anticline	Cass	SC (McCracken, 1971, p. 38, pl. 1)	1	N-S		Flat-topped dome.
42	Knoche Anticline	Cass	SC (McCracken, 1971, p. 39, pl. 1)	1	N-S		Consists of two sharp, elongate domes.
43	Main City-Belton Syncline	Cass	SC (McCracken, 1971, p. 42, pl. 1)	28	N20°W to N20°E		Appears to be offset by the Belton Fault Complex.
44	Jaudon Anticline	Cass	SC (McCracken, 1971, p. 37, pl. 1)	2	E-W		Consists of two anticlines and a small depression.
45	East Cleveland Anticline	Cass	SC (McCracken, 1971, p. 27, pl. 1)	4	N10°W to N10°E	N	A western extension of the Main City-Belton Syncline.
46	North West Linc Syncline	Cass	SC (McCracken, 1971, p. 47, pl. 1)	5	N40°W to E-W		A western extension of the Main City-Belton Syncline.
47	West Grandview Structure - West Grandview Terrace	Jackson	SC (McCracken, 1971, p. 67, pl. 1)	2.5	N45°W to N-S		Associated with the West Grandview gas field; consists of a small dome and monocline; may be part of the Martin City Anticline.
48	West Dolan Syncline	Cass	SC (McCracken, 1971, p. 67, pl. 1)	4.5	E-W		Merges with the Main City-Belton Syncline to the east.
49	Riner (Kelly) Dome	Cass	SC (McCracken, 1971, p. 53, pl. 1)	2	N40°E		
50	Harless Creek-South Creek Anticline	Cass	SC (McCracken, 1971, p.34, pl. 1)	4	N40°W		
51	Prettyman Anticline	Cass	SC (McCracken, 1971, p. 18, pl. 1)	6	N10°W		Consists of several smaller structures.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
52	Archie-Lonetree-Peculiar Syncline	Cass	SC (McCracken, 1971, p. 10, pl. 1)	20	N20°W		
53	Harrisonville Anticline	Cass	SC (McCracken, 1971, p. 18, pl. 1)	11	N30°W to N-S		Consists of two flat domes.
54	Merrill Depression	Cass	SC (McCracken, 1971, p. 18, pl. 1)	3	N10°E		
55	Pleasant Hill-Garden City-Dayton Syncline	Cass	SC (McCracken, 1971, p. 50, pl. 1)	30	N-S to N40°W		Southward extension of the eastern limb of the Penn Valley Syncline.
56	La Due-Freeman Anticline	Cass, Henry	SC (McCracken, 1971, pl. 1)	56	E-W to N55°W		Broad anticlinal axis with gentle dips.
57	Lewis Trough	Henry	SC (McCracken, 1971, pl. 1)	5.5	N60°W		
58	Benton County Anticline	Benton	SC (McCracken, 1971, pl. 1)	25	N70°W		Bordered on either side by synclinal areas.
59	Proctor Anticline	Morgan, Camden	SC (McCracken, 1971, pl. 1)	40	N25°W to N30°W		W flank dips 4°, E flank dips 1°.
60	Long Dome	Bates	SC (McCracken, 1971, pl. 1)	1	NW-SE		SW side has the steeper dip.
61	Schell City-Rich Hill Anticline	Bates, St. Clair	SC (McCracken, 1971, pl. 1)	33	N60°W		Asymmetrical anticline with a steep SW limb; it may be a fault in the pre-Pennsylvanian Paleozoics, where it may be an extension of the Eldorado Springs Fault.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
62	Ackerman Structure	Bates	SC (McCracken, 1971, pl. 1)	1	——		Anticlinal structure.
63	Blue Ridge School Anticline	St. Clair, Cedar	SC (McCracken, 1971, pl. 1)	9	N30°W		Steep W limb terminates in the Eldorado Springs North Fault; E limb gentle; structure probably part of the Schell City-Rich Hill Anticline.
64	Little Weaubleau Anticline	Hickory	SC (McCracken, 1971, pl. 1)	4	N40°W	NW	Very gentle S limb.
65	Galmey Church Anticline	Hickory	SC (McCracken, 1971, p. 32)	3	N30°E		Gentle dips (½° to 1°); two small faults cut the W limb.
66	Cedar Point Anticline	Hickory	SC (McCracken, 1971, p. 18)	2	N50°W	Doubly Plunging	Gentle dips (½° to 1°).
67	Jordan Creek Anticline	Hickory	SC (McCracken, 1971, p. 38)	1.5	N40°W	Doubly Plunging	
68	Vanderman Branch Syncline	Hickory	SC (McCracken, 1971, p. 64)	2	N40°W	NW	Dips slightly greater than 1°.
69	Humansville Anticline	St. Clair, Polk	S (McCracken, 1971, p. 35) SC (McCracken, 1971, pl. 1)	10	N40°W	NW	Dips less than 1°.
70	Bolivar-Marshfield Anticline	Polk, Dallas, Webster	SC (McCracken, 1971, pl. 1)	33	N60°W to N70°W		Steep SW limb.
71	Morrisville-Brighton Fold	Polk	SC (McCracken, 1971, pl. 1)	20	N70°W to N45°W		Part of the Bolivar-Marshfield Anticline.

WOLF CREEK

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
72	Sac River Anticline	Lawrence, Greene	SC(McCracken, 1971, pl. 1)	9	N50°W		
73	North Dry Sac Syncline	Polk	SC(McCracken, 1971, pl. 1)	15	N50°W to N70°W		
74	Graydon-Northview Anticline	Polk, Greene, Webster	SC(McCracken, 1971, pl. 1)	30	N70°W to E-W		NE limb is steep and faulted in a number of places (Graydon Springs Fault Zone); merges with Springfield Anticline to east.
75	Springfield Anticline	Webster, Christian, Lawrence	S (McCracken, 1971, p. 61) SC(McCracken, 1971, pl. 1)	42	N45°E to N70°E		Steeper on N flank than on S flank; mostly topographic feature-may not be structural.
76	Dry Creek Anticline	Webster	SC(McCracken, 1971, pl. 1)	4	N60°W	NW	Domelike; cut off by Dry Creek Fault Complex at NE edge.
77	Fordland Anticline	Webster	SC(McCracken, 1971, pl. 1)	6	E-W	W	S flank gentle; N flank broken by Fordland Fault.
78	South Sac-Ash Grove Syncline	Dade, Greene	SC(McCracken, 1971, pl. 1)	13	N40°W to N70°W		
79	Stinton Anticline	Lawrence	SC(McCracken, 1971, pl. 1)	6	E-W to N20° W		Gentle SW dip; NE dip (4° to 6°).
80	Newport Basin	Barton, Dade	SC(McCracken, 1971, pl. 1)	15	N40° W	NW	
81	Golden City-Miller Anticline	Barton, Dade, Lawrence	SC(McCracken, 1971, pl. 1)	40	N75° W to N35° W		NE limb steep.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
82	Lamar Syncline	Vernon, Barton, Jasper	S (McCracken, 1971, p. 40) SC (McCracken, 1971, pl. 1)	39	N50°W to N30°W		
83	Jasper Anticline	Barton, Jasper, Newton	SC (McCracken, 1971, pl. 1)	52	N45°W to N40°W	NW	
84	Nashville-Carthage Sag	Barton, Jasper	SC (McCracken, 1971, pl. 1)	28	N40°W		Gentle synclinal structure with dips of 1° or 2°.
85	Galesburg-Pittsburg Anticline	Mo.-Barton, Jasper, Kan.-Crawford	Mo.- SC (McCracken, 1971, pl. 1) Kan.- S (Jewett, 1951, p. 151)	23	N25°W	NW	Probably extends westward into Kansas as the Pittsburg Anticline (Fold No. 53).
86	Joplin Anticline	Mo.-Jasper, Newton Kan.-Cherokee	Mo.- SC (McCracken, 1971, pl. 1) Kan.- S (Jewett, 1951, p. 141) Gm (Jopling and Cashion, 1959, fig. 1)	28	N10°W to N40°W	NW	SW flank dips steeper than NE flank; fold probably renews to the west in Kansas (Fold No. 60).
87	Lawton Trough	Mo.-Jasper Kan.-Cherokee	Mo.- SC (McCracken, 1971, pl. 1) Kan.- S (Jewett, 1951, p. 142)	19	N45°W		Extends westward into Kansas (Fold No. 61).
88	Galena Anticline	Jasper	SC (McCracken, 1971, pl.1)	5	N60°W		May extend into Kansas toward the town of Galena in Cherokee County, Kansas.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
89	Horse Creek Anticline	Mo.-McDonald Ok.-Mayes, Delaware, Ottawa	Mo.- SC (McCracken, 1971, pl. 1) Ok.- S (Arbenz, 1956)	47	E-W to N60°E	W	Gentle 2° dips on N limb, 5° to 18° dips on S limb, Fold No. 2 in Oklahoma.
90	Mt. Shira Uplift	McDonald	S (McCracken, 1971, p. 45) SC (McCracken, 1971, pl. 1)	1.5	N85°W		N flank dips 5°, S flank has more gentle dips.
91	Sulfur Springs Anticline	McDonald	S (McCracken, 1971, p. 62) SC (McCracken, 1971, p. 62, pl. 1)	5	N70°E		May extend a short distance into Arkansas.
92	Washburn Syncline	Barry	S (McCracken, 1971, p. 66) SC (McCracken, 1971, pl. 1)	14	N35°E		May extend a short distance into Arkansas; W limb terminated by Greasy Creek Fault.
93	Osage-Verona Anticline	Mo.-Lawrence, Barry Ark.-Carroll	Mo.- SC (McCracken, 1971, pl. 1) Ark.- S (Croneis, 1930, pl. 1-A)	60	N20°W	NW	Extends into Arkansas as the Osage Anticline (Fold No. 1).
94	Spring Hill Syncline	Livingston	SC (McCracken, 1971, pl. 1)	1.5	N-S		W limb dips 10°.
95	Indian Creek Dome	Jackson	SC (McCracken, 1971, pl. 1)	2	N20°E		
96	South Kansas City Dome	Jackson	SC (McCracken, 1971, pl. 1)	2.5	N40°W		Part of the Centerview-Kansas City Anticline.
97	Lisle Anticline	Cass	SC (McCracken, 1971, pl. 1)	2.5	N20°W		

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
98	Cassville Anticline	Barry	SC(McCracken, 1971, pl. 1)	4	N10°E		
99	Freeman-West Line Syncline	Cass	SC(McCracken, 1971, pl. 1)	4	E-W		Series of small domes.

TABLE 2.5-5

SUMMARY OF FOLDS IN NEBRASKA WITHIN THE REGIONAL AREA

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
1	Brownville Syncline	Neb.-Nemaha, Richardson, Kan.-Brown, Nemaha, Jackson, Pottawatomie, Wabaunsee, Morris, Chase	Neb.- SC(Burchett, 1971, fig. 4) Kan.- SC(Merriam, 1963, p. 103, fig. 111)	85	N10°W to N30°E		Forms the deepest part of the Forest City Basin in Nebraska; extends into Kansas (Fold No. 5).
2	Denton Arch	Seward, Lancaster	SC(Carlson, 1970, fig. 2)	25	N80°E		
3	Barneston Anticline	Neb.-Johnson, Pawnee Kan.-Marshall	Neb.- SC(Condra and Reed, 1959, fig. 2) Kan.- S (Jewett, 1951, p. 117)	45	N30°E		Extends into Kansas (Fold No. 2).
4		Neb.-Pawnee Kan.-Marshall, Pottawatomie	Neb.- SC(Condra and Reed, 1959, fig. 2) Kan.- S (Jewett, 1951, p. 117)	25±	N30°E		The term Irving Syncline is not used in Nebraska but the structure is an extension of the Irving Syncline of Kansas (Fold No. 3).

WOLF CREEK

a Fold numbers correspond to those shown on Figure 2.5-15.

b
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours
For Sources cited above, see REFERENCES: SECTION 2.5.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
5		Neb.-Cass, Otoe Iowa-Story, Boone, Dallas, Guthrie, Adair, Cass, Montgomery, Mills, Fremont	Neb.- SC(Condra and Reed, 1959, fig. 2; Burchett, 1971, fig. 4) Iowa- SC(Hershey and others, 1960, fig. 17; Parker, 1971, fig. 1; Van Eck, 1973b)	180	N30°E to N65°E		Zone of faulting and/or steep dips; probably corresponds to the Thurman-Redfield Structural Zone of Iowa (Fold No. 9).
6	Bartlett Syncline	Neb.-Cass Iowa-Fremont, Mills	Neb.- SC(Condra and Reed, 1959, fig. 2) Iowa- SC(Hershey and others, 1960, fig. 17)	16	N70°E		Extends into Iowa (Fold No. 3) and in Iowa is part of the Thurman-Redfield Structural Zone.
7	Nehawka Arch	Sarpy, Cass	SC(Burchett, 1971, fig. 4)	26	N30°W to N30°E		Along the trend of the Nemaha Anticline.

TABLE 2.5-6

SUMMARY OF FOLDS IN OKLAHOMA WITHIN THE REGIONAL AREA

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
1	Miami Syncline	Ok.-Ottawa, Craig Kan.-Cherokee	S (Arbenz, 1956)	36	N25°E		Called the Commerce Trough in Kansas (Fold No. 1); in Kansas beds dip 23° on W limb, 6° on E limb. Major movement: Middle-Pennsylvanian (Huffman, 1958, p. 89)
2	Horse Creek Anticline	Ok.-Mayes, Delaware, Ottawa Mo.-McDonald	S (Arbenz, 1956)	47	N60°E	SW	Beds dip 1° to 2° on N side, 5° to 18° on S side; Fold No. 89 in Missouri.
3		Delaware, Adair, Cherokee	S (Arbenz, 1956)	24	N40°	SW	Anticline in trend of Tahlequah Fault; beds dip less than 10°.
4		Cherokee	S (Arbenz, 1956)	4	N35°E	SW	Anticline in trend of Flat Rock Syncline; beds dip less than 10°
5		Cherokee	S (Arbenz, 1956)	6	N40°E	SW	Anticline in trend of Flat Rock Syncline but separated from it by the South Muskogee Fault; beds dip less than 10°.
6	Flat Rock Syncline	Cherokee, Muskogee	S (Arbenz, 1956)	16	N55°E	SW	Asymmetrical; steeply dipping on S limb.
7		Cherokee	S (Arbenz, 1956)	4	N45°E	SW	Anticline in trend of Tahlequah Fault; beds dip less than 10°.

[a] Fold numbers correspond to those shown on Figure 2.5-15.

[b]
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours

For Sources cited above, see REFERENCES: SECTION 2.5.

Fold Number(a)	Name	Location	Identification(b)	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
8		Cherokee	S (Arbenz, 1956)	2	N60°E	SW	Anticline in trend of Tahlequah Fault; beds dip less than 10°.
9		Muskogee	S (Arbenz, 1956)	2; 2; 3	N30°E; N30°E; N60°E	SW	Three anticlinal folds near to and in the trend of Pecan Creek Fault; beds dip less than 10°.
10		Adair	S (Arbenz, 1956)	3; 4; 4	N40°E	SW	Three anticlinal folds; beds dip less than 10°.
11		Muskogee	S (Arbenz, 1956)	8	N60°E	SW	Anticline N and W of Sam Creek Fault; beds dip less than 10°.
12		Muskogee	S (Arbenz, 1956)	3	N55°E	SW	Anticline S of Sam Creek Fault; beds dip less than 10°.
13		Muskogee	S (Arbenz, 1956)	4	N85°E	W	Anticline N of Keefeton Fault; beds dip less than 10°.
14		Muskogee	S (Arbenz, 1956)	3	N40°W	SE	Anticline N of and normal to Rattlesnake Mountain Syncline; beds dip less than 10°.
15	Rattlesnake Mountain Syncline	Muskogee, Haskell, McIntosh	S (Arbenz, 1956)	25	N55°E	SW	Trends directly into an anti-clinal fold to the NE; beds dip less than 10°.
16		Cherokee, Sequoyah, Muskogee	S (Arbenz, 1956)	14	N50°E	SW	Syncline in trend of Rattlesnake Syncline; beds dip less than 10°.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
17		Muskogee, Haskell	S (Arbenz, 1956)	2; 3; 4	N55°E	SW	Two anticlines and one syncline S of the Rattlesnake Syncline; beds dip less than 10°.
18		McIntosh, Haskell	S (Arbenz, 1956)	23	N35°E to N70°E	SW	Anticline just N of and probably associated with Warner Horst South Fault; beds dip less than 10°.
19		McIntosh	S (Arbenz, 1956)	12	N55°E	SW	Anticline just S of and probably associated with Warner Horst North Fault; beds dip less than 10°.
20	Porum Syncline	McIntosh, Haskell, Sequoyah	S (Arbenz, 1956)	42	N50°E	SW	
21		Sequoyah	S (Arbenz, 1956)	5	N40°E	SW	Anticline NW of Blackgum Fault; beds dip less than 10°.
22		Haskell	S (Arbenz, 1956)	2; 2; 4	E-W	W	One syncline and one anticline west of Lone Star Anticline; beds dip less than 10°.
23	Marble City Syncline	Sequoyah	S (Arbenz, 1956)	16	N55°E	SW	Beds dip less than 10°.
24	Lone Star Anticline	Haskell	S (Arbenz, 1956)	11	N30°E to N55°E	SW	Beds dip greater than 10°.
25	Stigler Syncline	Haskell	S (Arbenz, 1956)	15	N55°E	SW	Beds dip greater than 10°.

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
26	Sallisaw Syncline	Sequoyah	S (Arbenz, 1956)	16	E-W to N40°E	SW	Beds dip less than 10°.
27		Sequoyah	S (Arbenz, 1956)	4; 5	N70°E		One anticline and one syncline NW of and in trend of Gans Anticline; beds dip less than 10°.
28	Gans Anticline	Sequoyah	S (Arbenz, 1956)	6	N75°E	SW	Beds dip less than 10°.
29	Bushy Anticline	Sequoyah	S (Arbenz, 1956)	6	E-W	W	Beds dip less than 10°.
30		Sequoyah	S (Arbenz, 1956)	4	N60°W	Doubly Plunging	Anticline NE of Bushy Anticline; beds dip less than 10°.
31	Mervine Anticline	Kay	S (Arbenz, 1956)	6	N10°E	Doubly Plunging	Beds dip less than 10°.
32		Okmulgee	S (Arbenz, 1956)	6	N15°E		Anticline; beds dip less than 10°.
33	Nigger Hollow Anticline	Muskogee, Cherokee	S (Huffman, 1958, p. 95)	5	N70°E		Beds dip 3° on S flank, 8° to 15° on N flank.
34		Cherokee	S (Arbenz, 1956)	5	N40°E	SW	Syncline S of South Muskogee Fault; beds dip less than 10°.
35		Cherokee	S (Arbenz, 1956)	6	N50°E	SW	Anticline S of South Muskogee Fault; beds dip less than 10°.

TABLE 2.5-6 (continued)

Fold Number[a]	Name	Location	Identification[b]	Length of Axis (miles)	Strike of Axis	Plunge of Axis	Remarks
36		Sequoyah	S (Arbenz, 1956)	4	N60°E	SW	Anticline N of and in trend of Marble City Fault; bed dips less than 10°.
37		Adair, Sequoyah	S (Huffman, 1958)	3	N20°E		Syncline E of Lyons Fault.
38		Adair	S (Huffman, 1958)	1.5	N85°W		Anticline S of Little Lee Creek Fault.
39		Adair	S (Huffman, 1958)	1	N45°E		Anticline E of Baron Graben.
40		Adair	S (Huffman, 1958)	2.5	N40°E		Anticline NE of and in trend of Qualls-Welling Fault.
41		Cherokee	S (Huffman, 1958)	1.5	N60°E		Anticline SE of Cedar Creek Fault.
42		Cherokee	S (Huffman, 1958)	3	N35°E		Anticline.

TABLE 2.5-7

MAJOR PERIODS OF FOLDING WITHIN THE REGIONAL AREA

State	Major Periods of Folding	Source*
Kansas	Mississippian through Pennsylvanian	Merriam, 1963
Nebraska	Ordovician and Mississippian	Burchett, 1973b
Iowa	Precambrian and Pennsylvanian	Van Eck, 1973b
Missouri	Precambrian, Ordovician, Silurian, Devonian, post-Pennsylvanian	Fellows, 1973b
Arkansas	Ordovician, Silurian Mississippian, Pennsylvanian	Denison and others, 1977
Oklahoma	Pennsylvanian and Permian	Johnson, 1973b

* For Sources cited above, see REFERENCES: SECTION 2.5.

TABLE 2.5-8

SUMMARY OF FAULTS IN ARKANSAS WITHIN THE REGIONAL AREA

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
1	Long Creek	Boone	S (Croneis, 1930, p. 198)	N	1.5	N20°W		SW side down less than 50 ft (Croneis, 1930, p. 198)	
2	Green Forest	Carroll	S (Croneis, 1930, p. 197) SC (Caplan, 1960, pl. III)	N	9	N45°W to N-S		NE side down a maximum of 300 ft (Croneis, 1930, p. 197)	NE limb of the Osage Anticline
3	Osage	Newton	S (Croneis, 1930, p. 199)	N	2.5	E-W		S side down less than 100 ft (Croneis, 1930, p. 199)	
4	Moody Hollow	Madison, Carroll	S (Croneis, 1930, p. 199)	N	9.5 2	N40°E		SE side down 100 ft (Croneis, 1930, p. 199)	NE extension of the Drakes Creek zone of faulting
5	Clifty Creek	Benton, Carroll	S (Croneis, 1930, p. 195)	N	2; 4; 2	N80°W		Western fault S side down at least 75 ft; eastern faults N side down an average of 50 ft (Croneis, 1930, p. 195)	The western and eastern faults of the Clifty Creek faulting are in the same trend, but are not continuous (Croneis, 1930, p. 195)
6	Glade	Benton	S (Croneis, 1930, p. 197) S (McCracken, 1971, p. 60)	N	4	N40°E		SE side down an average of 100 ft (Croneis, 1930, p. 170)	Southwestward extensions of this zone of disturbance are the Price Mountain, Onda, and Glade Creek Faults. Possible southwestward extension of Shell Knob-Eagle Rock structure in Missouri

[a] Fault numbers correspond to those shown on Figure 2.5-16.

[b] A = Aerial Photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface Mapping
SC = Structure Contours

[c] G = Graben
H = Horst
N = Normal
T = Thrust
R = Reverse

[d] N, S, E, W = Directions
H = High Angle

Note: For sources cited above, see References: Section 2.5.

TABLE 2.5-8 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
7	Reed Creek	Madison	S (Croneis, 1930, p. 203) S (Haley and others, 1976)	N	5.5	N63°W		SW side down approximately 400 ft (Croneis, 1930, fig. 14)	Almost normal to the Drakes Creek zone of faulting. A more easterly trending fault zone.
8	Drakes Creek	Madison, Washington, Carroll	S (Croneis, 1930, p. 196) S (Haley and others, 1976)	N	50	N45°E		SE side down a maximum of 400 ft (Croneis, 1930, p. 196)	NE extension is the Moody Hollow Fault. Extended SW (Haley and others, 1976)
9	Brush Creek	Washington, Madison	S (Croneis, 1930, p. 192)	N	17±	N50°E to N50°W		S side down from 100 to 300 ft (Croneis, 1930, p. 192)	Terminates at the Drakes Creek Fault
10	White River	Washington, Madison	S (Croneis, 1930, p. 206) S (Haley and others, 1976)	N	18.5	N65°E to E-W to N65°W		S side down on E-W section up to 300 ft; W side down on NE-SW section (Croneis, 1930, p. 206)	Crosses the Price Mountain and Brush Creek Faults. Does not cross cut but may be extension of Brush Creek Fault. Northwestward extension of Rhea Fault.
11	Price Mountain	Washington, Benton	S (Croneis, 1930, p. 202) S (Bush and others, 1977, p. 5 and cross section) S (Haley and others, 1976) S (McCracken, 1971, p. 60)	N	12 68 (combined)	N45°E		SE side down an average of less than 200 ft; maximum of 300 ft (Croneis, 1930, p. 202)	Northeastward extension of zone of disturbance is the Glade Fault; southwestward extensions are the Onda and Cove Creek Faults. Possible southwestward extension of Shell Knob-Eagle Rock structure in Missouri.
12	Rhea	Washington	S (Croneis, 1930, p. 203)	N	8.5	N58°E		SE side down 100 ft (Croneis, 1930, p. 203)	May continue a short distance into Oklahoma. NE extension is the White River Fault.
13	Onda	Washington	S (Croneis, 1930, p. 199) S (Haley and others, 1976)	N	2.5; 2.5 extended	E-W and N50°E		S side down 50 ft on E-W section; SE side down less than 50 ft on NE-SW section (Croneis, 1930, p. 199)	The main fault is part of a zone of disturbance that includes the Glade and Price Mountain Faults to the north and the Cove Creek Fault to the south; main fault is terminated by the E-W fault. Through-going according to Haley and others, 1976.
14	Frisco	Crawford	S (Croneis, 1930, p. 331) S (Haley and others, 1976)	N	5 extended-16	N80°E to E-W		S side down	Part of the Boston Mountains. Cross cuts the Drakes Creek Fault.

TABLE 2.5-8 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
15	Evansville	Washington	S (Croneis, 1930, p. 196)	N	10	N60°W to N80°W		N side down 100 ft (Croneis, 1930, p. 196)	Part of the Boston Mountains.
16	Cove Creek	Crawford, Washington	S (Croneis, 1930, p. 196) SC (Caplan, 1957, pls. IV, VI, VII, X, XIV)	N	5.5	N25°E		SE side down	Crosses the Evansville Fault.
17	Davidson	Crawford	S (Croneis, 1930, pl. 1-A)	G	3; 3	N70°W		S side down	
18		Washington	S (Haley and others, 1976)	N	varies	E-W			Group of E-W faults north of Frisco, south of White River faults.
19	Compton	Newton, Madison	S (Croneis, 1930, pl. 1-A, p. 195-196) S (Haley and others, 1976) S (Bush and others, 1977, pl. 4)	N	12	N70°E		S side down approximately 300 ft S side down S side down approximately 150 ft	
20	Sneeds Creek Faults	Newton	S (Croneis, 1930, pl. 1-A, p. 204-205)	N	varies	N80°W		Varies	Structurally related to Sneeds Creek dome.
21		Benton	S (Haley and others, 1976)	N	16	N45°E			May continue SW into Oklahoma.
22		Benton, Washington	S (Haley and others, 1976)	N	40	N35°-40°E			May extend SW into Oklahoma and NE into Missouri as the Greasy Creek Fault.
23		Madison	S (Haley and others, 1976)	N	varies	E-W		Varies	Group of E-W faults.
24		Crawford, Franklin	S (Haley and others, 1976)	N	varies	E-W		Varies	Group of E-W faults.
25		Crawford	S (Haley and others, 1976)	N	15	N30°E			Subparallel to Drakes Creek Fault.
26	.	Carroll	S (Bush and others, 1977, pl. 2)	N	1.4+	N50°-75°E		SE side down	
27		Carroll	S (Bush and others, 1977, pl. 3)	N	2+	N50°W		SW side down	

TABLE 2.5-9

SUMMARY OF FAULTS IN IOWA WITHIN THE REGIONAL AREA

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
1	Thurman-Redfield Structural Zone	Iowa-Story, Boone, Dallas, Guthrie, Adair, Cass, Montgomery, Mills, Fremont Neb.-Cass, Otoe	Gm (IGS, 1970, p. 11 and sheet)		180	N50°E			A structural zone believed to represent a change in the lithology of the basement rocks and to be bounded by faults. This structural zone is inferred to be continuous with a structural trend in Nebraska (No. 1) and to extend through Iowa (Parker, 1971, p. 2, fig. 1). It represents a zone of both folding and faulting.

[a] Fault numbers correspond to those shown on Figure 2.5-16.

[b] A = Aerial photgraphs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours
For Sources cited above, see REFERENCES: SECTION 2.5.

[c] G = Graben
H = Horst
N = Normal
T = Thrust
R = Reverse

[d] N,S,E,W = Directions
H = High-angle

WOLF CREEK

TABLE 2.5-10

SUMMARY OF FAULTS IN KANSAS WITHIN THE REGIONAL AREA

Fault Number[(a)]	Name	Location	Identification[(b)]	Type of Fault[(c)]	Length of Fault (miles)	Strike	Dip[(d)]	Relative Displacement	Remarks
1	Chesapeake Fault Zone	KS - Linn, Bourbon MO - Vernon(?), Barton(?), Dade(?), Lawrence, Christian(?), Stone(?)	KS - SC (Cole, 1976) MO - SC (McCracken, 1971, pl. 1, p. 19-20)	N	30(?) 25 proven	N50°W	H	NE side down 100 ft Cole, 1976; McCracken, 1971, pl. 1)	In Kansas, possibly only fracturing (Cole, 1973b). Age of last movement: Post-U. Mississippian (Merriam, 1963, p. 212); pre-Pennsylvanian (McCracken, 1971, p. 19)
2	Humboldt	KS - Wabaunsee, Pottawatomie, Nemaha NB - Richardson, Nemaha, Otoe, Cass, Sarpy, Douglas	KS - SC (Cole, 1962; Merriam and Smith, 1961; Merriam and Kelly, 1960; Merriam, 1960) B (Cole, 1973b) S (DuBois, 1978) NB - S (Condra, 1927, p. 15) SC (Burchett, 1966, fig. 7 and Carlson, 1965, figs. 9 and 12 in Burchett and Carlson, 1966)	R	163	N70°E to N-S		At surface, E side down 100 ft (Condra, 1927, p. 15); on the basement, E side down 1000 ft (Cole, 1962)	Located on the east flank of the Nemaha Anticline. Evidence of thrusting, repeated members in pre-Mississippian strata (Merriam, 1963, p. 222). Age of last movement: pre-Mississippian (Merriam, 1960; Merriam, 1963, p. 204). Post-Permian inferred in Nemaha County, Kansas and southeastern Nebraska (DuBois, 1978, p. 14-18)
3		KS - Cherokee			2	N40°W			
4		Crawford	KS - SC (Merriam, 1960)		1.5 to 5	N55°W N15°E N35°E		W side down	A group of 3 small faults; the longest is shown on the structure contour maps.

[a]Fault numbers correspond to those shown on Figure 2.5-16.

[b]A = Aerial Photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface Mapping
SC = Structure Contours

[c]G = Graben
H = Horst
N = Normal
T = Thrust
R = Reverse

[d]N, S, E, W = Directions
H = High Angle

Note: For sources cited above, see References: Section 2.5

WOLF CREEK

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
5		KS - Allen, Anderson	KS - S (Miller, 1969, p. 20)	N	0.7	N35°W	H	NW side down (Miller, 1969, pl. 1)	May not extend to depth (Cole, 1962; Cole, 1976)
6	Silver City Dome	Woodson	S (Wagner, 1954)		1.2	E-W to N60°W	N,H	N side down 20 to 200 ft (Wagner, 1954)	On the north side of the Silver City Dome, associated with emplacement. Age of last movement: Cretaceous (Zartman and others, 1967)
7		Wilson, Neosho	SC (Cole, 1962)	N	27	N55°W		SW side down approximately 300 ft (Cole, 1962)	Fracture line on Pre-Cambrian, possibly not faulting (Cole, 1973b). Age of last movement: Pre-Pennsylvanian (Merriam, 1960)
8		Coffey, Osage	S (O'Connor, 1955, p. 19)		2	N60°W	H	N side down 20 to 50 ft (O'Connor, 1955, p. 19, pl. 1)	May not extend to depth (Cole, 1962; Cole, 1976)
9		Osage	S (O'Connor, 1955, pl. 1)		1	N45°E		NW side down (O'Connor, 1955, pl. 1)	May not extend to depth (Cole, 1962; Cole, 1976)
10		Osage, Franklin	S (O'Connor, 1955, p. 19)		2	N60°E		SE side down 30 to 40 ft (O'Connor, 1955, p. 19)	May not extend to depth (Cole, 1962; Cole, 1976)
11		Franklin	S (Ball, Ball and Laughlin, 1963, p. 38)		1.5	N40°E	H	NW side down (Ball, Ball and Laughlin, 1963, pl. 1)	May not extend to depth (Cole, 1962; Cole, 1976)
12	Worden	Douglas, Franklin	S (O'Connor, 1960, p. 65-67; Ball, Ball and Laughlin, 1963, p. 38)		15	N-S to E-W		S and E sides down	May not extend to depth (Cole, 1962; Cole, 1976. May be a series of en echelon faults (O'Connor, 1960, p. 65) Age of last movement: Lower-Pennsylvanian (O'Connor, 1960, p. 65)
13		Douglas	S (O'Connor, 1960, p. 65 and pl. 1)		1.5	N35°W		SW side down	Probably slump faulting
14		Jefferson, Leavenworth	SC (Merriam and Kelly, 1960; Merriam, 1960)		5	N65°W		S side down	
15		KS - Cherokee OK - Ottawa	KS - SC (Cole, 1962)		15	N10°E		E side down approximately 700 ft (Cole, 1962)	
16		KS - Pottawatomie	S (Merriam, 1963, p. 252)		2	N45°E			

TABLE 2.5-10 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
17		KS - Nemaha	KS - SC (Cole, 1962)	N	5	N15°E	H	E side down 518 ft (Cole, 1962)	Associated with the Humboldt Fault.
18		Pottawatomie	S (Chelikowsky, 1972, p. 11) SC (Cole, 1962)	N	22	N25°E	H	E side down 170 ft (Chelikowsky 1972, p. 11) 700 ft on Pre-Cambrian (Cole, 1962)	On the west side of Nemaha Anticline.
19	Tuttle Creek Reservoir	Riley, Pottawatomie	S (Chelikowsky, 1972, p. 11)	N	2	N80°E	H	N side down 25 ft (Chelikowsky, 1972, p. 11)	
20		Wabaunsee, Riley	SC (Cole, 1962) Gs (Cole, 1973b)	G	8	N40°W		3200 ft (Cole, 1962)	
21		Ottawa	S (Mack, 1962, p. 24)		5	N60°W	H	NE side down 20 ft (Mack, 1962, p. 24; Cole, 1973b)	Probably does not extend deep.
22		Wabaunsee, Morris	SC (Cole, 1962; Merriam, 1963, p.237-8, fig. 134-B, -C, -E, 135-A)	N	23.5	N25°E	H	SE side down 100 ft (Cole, 1962)	Part of Nemaha Fault System; associated with John Creek, Mill Creek, Davis Ranch and Ashburn oil fields.
23		Chase	SC (Cole, 1962)	N	18	N20°E	H	E side down 960 ft (Cole, 1962)	Part of the Nemaha Fault System.
24	Chase County	Chase, Greenwood	SC (Cole, 1962)	G	29, 19	N45°W, N35°W	H	Deep graben SE side down 200 to 1400 ft; SW side down 200 to 750 ft (Cole, 1962)	Part of the Nemaha Fault System. Age of last movement: Pre-Late Pennsylvanian (Merriam, Winchell and Atkinson, 1958)
25		Butler	SC (Cole, 1962)	N	2 to 3	N30°W to N50°W	H		Three small faults on west side of Fault No. 26; part of the Nemaha Fault System; flanking the Robinson, Wilson and Chesney Domes.
26		Chase, Butler, Cowley		N	46	N20°E	H	E side down 1400 ft (Cole, 1962)	On east flank of Burns Dome; part of the Nemaha Fault System.
27	Elbing	Marion, Butler	SC (Cole, 1973) B Tilted block, beds 58% thicker (Cole, 1973)	N	10	N10°W	H	E side down 475 ft (Cole, 1973b)	Part of the Nemaha Fault System.
28		Butler	SC (Cole, 1962)	N	2	N50°W	H	SW side down 500 ft (Cole, 1962)	Part of the Nemaha Fault System.

WOLF CREEK

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
29		KS - Butler	KS - SC (Cole, 1962)	N	3.5	N20°E	H	E side down 200 ft (Cole, 1962)	Part of the Nemaha Fault System.
30		Butler	SC (Cole, 1962)	N	2	N50°W	H	Tilted block, throw from a few feet to 200 ft (Cole, 1962)	Part of the Nemaha Fault System.
31	Augosta West	Butler	SC (Cole, 1962)	N	3	N15°E	H	W side down (Cole, 1962), probably only tight fold	Part of the Nemaha Fault System.
32		Butler	SC (Cole, 1962)	N	4.5	N25°E	H		Part of the Nemaha Fault System.
33	Augosta East	Butler	SC (Cole, 1962)	N	4	N30°E	H	E side down 500 ft (Cole, 1962)	Part of the Nemaha Fault System.
34		Butler, Cowley	SC (Cole, 1962)	H	4.5 and 5	N25°E		700 ft maximum throw on each side (Cole, 1962)	Part of the Nemaha Fault System.
35	Hittle Pool	Cowley	SC (Cole, 1962)	N	4	N5°E	H	E side down 250 ft (Cole, 1962)	
36	Winfield	Cowley	SC (Cole, 1962)	N	4	N35°W	H	NE side down 500 ft (Cole, 1962)	Winfield oil field; Precambrian is faulted, probably only a very sharp dip on younger strata.
37	Churchill Field	Cowley, Sumner	SC (Cole, 1962)	H	9	N25°E	H	1000 ft throw on W, 500 ft throw on E (Cole, 1962)	Part of the Nemaha Fault System.
38	Oxford Field	Sumner	SC (Cole, 1962)	H	4	N25°E	H	700 ft throw on W, 700 ft throw on E (Cole, 1962)	Part of the Nemaha Fault System.
39	Voshell	McPherson, Harvey, Reno	B (Cole, 1973b) SC (Merriam and Smith, 1961; Cole, 1962)	R	35	N20°E		W side down 200 ft (Merriam and Smith, 1961); 400 ft on basement (Cole, 1962)	Associated with the Voshell Anticline; thrust repeated members in at least 6 wells. Age of last movement: Pre-Cretaceous (Merriam, 1963, p. 254).
40	Ellsworth	Ellsworth, Russell	SC (Merriam and Smith, 1961; Cole, 1962)	N	32	N60°W		SE side down 200 ft (Merriam and Smith, 1961)	Associated with the Ellsworth Anticline. Age of last movement: Pre-Cretaceous (Merriam, 1963, p. 254).
41	Geneseo-Edwards Fields	Ellsworth, Rice	SC (Cole, 1962)	N	8	N20°W	H	SW side down 350 ft (Cole, 1962)	May be en echelon; Dakota as folded.

Fault Number[(a)]	Name	Location	Identification[(b)]	Type of Fault[(c)]	Length of Fault (miles)	Strike	Dip[(d)]	Relative Displacement	Remarks
42	Lyons and Lyons SW Fields	KS - Rice	KS - SC (Cole, 1962)	H	9	N20°E		Two narrow horsts; north one has from 100 to 200 ft throw on Arbuckle; south one has 100 to 300 ft throw on Arbuckle (Cole, 1973b)	Highly fractured area - condemned for storage of nuclear waste.
43	Tobias Field	Rice, Reno	SC (Cole, 1962)	H	7 to 9	N30°E	H	E side down 300 ft on Arbuckle (Cole, 1973b)	
44	Wisby Field	Reno	SC (Cole, 1962) Gs (Donnelly, 1965, p. 290)	N	3.5	N25°E	H	E side down 350 ft (Cole, 1962)	Two other faults associated with structure (Donnelly, 1965, p. 295). Age of last movement: Pre-Pennsylvanian (Donnelly, 1965, p. 292).
45		Reno	SC (Cole, 1962)	N	6	N5°E	H	E side down	Fracture line on Precambrian surface, possibly not faulting (Cole, 1973b).
46	Peace Creek	Reno, Stafford	SC (Cole, 1962)	N	14	N35°E	H	SE side down 300 ft (Cole, 1962)	Associated with oil and gas field.
47		Stafford	SC (Cole, 1962)	N	6	N25°E	H	NW side down 125 ft (Cole, 1962)	
48		Ness, Rush, Pawnee, Stafford	SC (Merriam and Smith, 1961; Cole, 1962; Merriam, 1963)	N	65	N40°W	H	SW side down 200 ft (Cole, 1973)	Tilted block on southeast end (Fault Nos. 48 and 49).
49	Leesburg Field	Stafford	SC (Cole, 1962)	N	11	N45°W	H	SW side down 600 ft (Cole, 1962)	
50	Chance Pool	Pratt	SC (Cole, 1962)	N	6	N20°E	H	E side down 150 ft (Cole, 1962)	
51	Cunningham Field	Kingman, Pratt	SC (Cole, 1962)	H	8	N45°E	H	NW side 100 ft throw, SE side 100 to 300 ft throw (Cole, 1962)	
52	Brehm Pool	Pratt	SC (Cole, 1962)	H	3 each	N40°E	H	E side down 325 ft on Arbuckle (Cole, 1962)	Age of last movement: Pre-Pennsylvanian

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
53	Coats-Clara Pools	KS - Pratt, Barber	KS - SC (Cole, 1962)	H	4,5	N45°E		Narrow horst; SE end down 250 ft on Arbuckle, NW end down 200 ft on Arbuckle	Age of last movement: Pre-Pennsylvanian
54		Pratt	SC (Cole, 1962)	N	3	N35°E	H	SE side down	Long fracture line extending into Barber County (Cole, 1973b).
55		Barber, Comanche	SC (Cole, 1962)	H	3	N40°E	H	NW side down 175 ft (Cole, 1962)	In light of recent development, no horst is present; may be more faulting.
56?		Smith	SC (Cole, 1962)	N	6	N40°W	H	NE side down 300 ft (Cole, 1962)	May not exist (Cole, 1976).
57		Rooks, Osborne	SC (Cole, 1962)	N	45	N70°W	H	SW side down 300 ft (Cole, 1962)	May well be right lateral strike-slip fault with displacement as much as 6 mi.
58	Fairport	Ellis, Russell, Osborne	SC (Merriam and Smith, 1961; Cole, 1962)	N	25	N-S to N10°E	H	W side down 100 ft (Merriam and Smith, 1961)	Age of last movement: Pre-Cretaceous (Merriam, 1963, p. 254); faulting possibly Pre-Permian (Cole, 1973c).
59		Russell	SC (Cole, 1962)	N	7.5	N30°W		SW side down 100 to 150 ft (Cole, 1962)	Age of last movement: Pre-Pennsylvanian
60		Russell	SC (Cole, 1973)	N	2.5	N75°W	H		
61	Gorham	Ellis, Russell	SC (Cole, 1962)	N	11	N40°W	H	SW side down 430 ft (Cole, 1962)	Age of last movement: Pre-Pennsylvanian
62	Rush County Horst (Rush Rib)	Trego, Ellis, Rush, Barton, Stafford	SC (Cole, 1962)	H	43, 60	N45°W, N20°W	H	SW side down 375 ft, NE side down 250 ft (Cole, 1962)	Faulting mainly in Pre-Cambrian time. Age of last movement: Pre-Pennsylvanian
63	Asmusson	Butler	SC (Cole, 1962)	N	7	N15°E	H	SE side down 650 ft (Cole, 1962)	Part of the Nemaha Fault System.
64	Alameda	Kingman	SC (King, 1965, p. 7, 9, and 10)	N	4	N35°E	H	NW side down 70 ft (King, 1965, p. 7, *in* KGS V. IV)	Associated with Alameda Oil Field. Age of last movement: Pre-M. Pennsylvanian (King, 1965, p. 4)
65	Donald	Barber	SC (Elster, 1965, p. 68)	N	2	N20°E	H	NW side down 200 ft (Elster, 1965, p. 74, *in* KGS V. IV)	Associated with Donald Oil Field.

WOLF CREEK

TABLE 2.5-10 (continued)

Fault Number[(a)]	Name	Location	Identification[(b)]	Type of Fault[(c)]	Length of Fault (miles)	Strike	Dip[(d)]	Relative Displacement	Remarks
66	Gillian	KS - Sedgwick	KS - SC (Shawver, 1965, p. 84-85) Gs (Shawver, 1965, p. 78)	H	3	N20°E	H	NW side down 220 ft, SE side down 70 ft (Shawver, 1965, p. 78)	Associated with Gillian Oil Field; two faults forming a tilted block. Age of last movement: Pre-Mississippian (Shawver, 1965, p. 78).
67	O.S.A.	Sedgwick	SC (Shawver, 1965, p. 179-181) Gs (Shawver, 1965, p. 175)	N	4	N20°E	H	NW side down 200 ft (Shawver, 1965, p. 175)	Associated with O.S.A. Oil Field. Age of last movement: Pre-Pennsylvanian (Shawver, 1965, p. 177).
68	Rino	Rice, Reno	SC (Richardson, 1965, p. 193) Gs (Richardson, 1965, p.193)	N	1.5	N60°W	H	SW side down 100 ft (Richardson, 1965, p. 197)	Seismic suggests other faults in immediate area. Age of last movement: Pre-Pennsylvanian (Richardson, 1965, p. 194).
69		Linn	SC (Cole, 1976)	N	20	N60°W	H	SW side down approximately 50 ft (Cole, 1976)	Basement surface valley shown on Cole, 1962. Possible NW extension of Eldorado Springs North Fault in Missouri (McCracken, 1971, p. 27). Age of last movement: Pre-Middle Ordovician (Merriam, 1963, p. 204).
70		Bourbon, Linn	SC (Cole, 1976)	N	21.5	N55°W	H	SW side down 100+ ft (Cole, 1976)	Basement surface valley shown on Cole, 1962. Very sparse control. No extension mapped in Missouri (Anderson and others, 1976). Age of last movement: Pre-Middle Ordovician (Merriam, 1963, p. 204)

Table 2.5-10a

COMPARISON OF CALCULATED PEAK GROUND ACCELERATION (PGA) VALUES

		EQUATION	REFERENCE	FSAR EQN. NO.	PGA	PGA	NOTE
(a)	m_b = 5.25 within 25 km: (i.e., random event)				(R=25km)	(R=17.7km)	
1.	Computer Sciences Corp. (using Trifunac & Brady data)	$\log a = 0.25\ I + 0.23$	Murphy & O'Brien, 1978	2.5-12	.097	.097	I = VII
2.	Computer Sciences Corp. (using worldwide data)	$\log a = 0.24\ I + 0.26$	Murphy & O'Brien, 1978	2.5-13	.089	.089	I = VII
3.	Computer Sciences Corp. (using 145 Western US records)	$\log a = 0.83 + 0.17\ I + 0.07\ I_o - 0.45 \log R$	Murphy & O'Brien, 1978	2.5-14	.078	.091	$I < I_o$ = VII
4.	Derived (using Gupta attenuation)	$\log a = 0.24\ I_o + 1.23 - 0.00054\ R - 0.75 \log R$	FSAR	2.5-16	.072	.094	
5.	NUREG/CR-1582 (1981) (distance weighted)	$\ln a = -0.005 + 1.14\ m_b - 0.0026\ R - 0.501 \ln R$	NUREG/CR-1582, Vol. 4, p. 14, eqn. 3-8 (1981)	-	.075	.091	distance-weighted model
6.	NUREG/CR-1582 (1981) (magnitude weighted)	$\ln a = 0.74 + 1.12\ m_b - 0.0007\ R - 0.733 \ln R$	NUREG/CR-1582, Vol. 4, p. 17, eqn. 3-13 (1981)	-	.071	.092	magnitude-weighted model
	Campbell/TERA (1981):						
7.	Eqn. 7, using fault distance	$PGA = 0.0142e^{.79M}\ (R+0.0286e^{.778M})^{-.862} e^{-\gamma R}$	K.W. Campbell, "A Ground Motion Model for the Central United States Based on Near-Source Acceleration Data" p. 213-232, Vol. 1, Earthquakes and Earthquake Engineering: the Eastern United States, conf. Sept. 14-16, 1981, Knoxville, TN, Ann Arbor Science Publishers, Ann Arbor, MI 48106	-	.063	.086	R = fault distance
8.	Eqn. 8, using epicentral distance	$PGA = 0.0823e^{.922M}(R+25.7)^{-1.27} e^{-\gamma R}$ where $M = 1.02\ m_b + 0.30\ (m_b < 5.59)$, $M = 1.64\ m_b - 3.16\ (m_b > 5.59)$ $\gamma = \gamma_c = 0.023 - 0.0048\ M + 0.00028\ M^2$		-	.092	.116	R = epicentral distance
(b)	m_b = 5.75 at 50 miles (80 km): (i.e., Nemaha-associated event)			2.5-16	(R=80km)		
	Eqn. 4 above (derived)	(see above)		-	.049		
	Eqn. 7 above (C/TERA)	(see above)		-	.031		
	Eqn. 8 above (C/TERA)	(see above)		-	.050		
	Eqn. 5 above (NUREG)	(see above)		-	.064		
	Eqn. 6 above (NUREG)	(see above)		-	.050		

TABLE 2.5-11

SUMMARY OF FAULTS IN MISSOURI WITHIN THE REGIONAL AREA

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
1	Chesapeake Fault Zone	MO - Vernon(?), Barton(?), Dade(?), Lawrence, Christian(?), Stone(?) KS - Linn, Bourbon	MO - SC (McCracken, 1971, pl.1, p. 19-20) KS - SC (Cole, 1976)	N	25 proven	N50°W	H	NE side down 100 ft. (Cole, 1976; McCracken, 1971, pl. 1);	In Kansas, possibly only fracturing (Cole, 1973b). Age of last movement: Post U. - Mississippian (Merriam, 1963, p. 212) Pre-Pennsylvanian (McCracken, 1971, p. 19)
2	Seneca	MO - Newton OK - Ottawa, Delaware, Mayes	MO - B (McCracken, 1971, p. 59) OK - S (Reed, Schoff and Branson, 1955, pp. 33-34; Marcher and Bingham, 1971)	G	65	N50°E		100 to 370 ft. (McCracken, 1971, p. 59); 90 to 140 ft. (Reed, Schoff and Branson, 1955, p. 33)	In Missouri, the downdropped block is 200 to 1,500 ft. wide; in Oklahoma, the graben structure dies out to the southwest but faulting is present.
3	Shell Knob-Eagle Rock Structure	Barry	S (McCracken, 1971, p. 60) SC (McCracken, 1971, pl. 1)	N	13	N35°E		SE side down 100 ft. (McCracken, 1971, p. 60)	Possibly an extension of the Price Mountan Fault and Syncline of Arkansas.

[a] Fault numbers correspond to those shown on Figure 2.5-16.

[b] A = Aerial Photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface Mapping
SC = Structure Contours
For sources cited above, see REFERENCES: Section 2.5.

[c] G = Graben
H = Horst
N = Normal
T = Thrust
R = Reverse

[d] N,S,E,W = Directions
H = High-angle

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
4	Greasy Creek	Barry, McDonald	S (Winslow, 1894 p. 429) SC (McCracken, 1971, pl. 1) (Haley, 1976)	N	25	N40°E		SE side down 250 ft. (McCracken, 1971, p. 33)	May extend through NW Arkansas into Oklahoma.
5	South West City	McDonald	S (McCracken 1971, p. 61) SC (McCracken, 1971, p. 61)	N	14	E-W to N85°E	27°N	N side down 120 ft. at surface, 220 ft.in the subsurface (McCracken, 1971, p. 61)	
6	Pineville	McDonald, Newton	S (McCracken 1971, p. 49)	N	21	N20°E		N side down 50 to 100 ft. (McCracken, 1971, p. 50)	
7	Brush Creek	McDonald	S (McCracken, 1971, p. 15)	N	2	N85°E		N side down 50 to 100 ft. (McCracken, 1971, p. 15)	May be the eastward extension of the South West City Fault (No. 5).
8	Lampe	Stone	S (Winslow, 1894, p. 429) SC (McCracken, 1971, pl. 1)	N	12.5	N30°E		SE side down 100 ft. (McCracken, 1971, p. 40)	
9	Granby	Newton	S (McCracken, 1971, p. 33)	N	3	N70°E		N side down	
10	Ritchey	Lawrence, Newton	S (McCracken, 1971, p. 54) SC (McCracken, 1971, pl. 1) Gm (McCracken, 1971, pp. 52-54)	N	29	E-W		S side down 150 ft. (McCracken, 1971, p. 54)	Age of last movement: Pre-Pennsylvanian (McCracken, 1971, p. 54).
11	Silver Creek	Newton	S (McCracken, 1971, p. 60) A (McCracken, 1971, p. 60)	Scissors	2.5	N60°E		SW side down 60 ft.; NW side down 20 ft. (McCracken, 1971, p. 60)	Minor fault
12	Portland	Jasper	S (McCracken, 1971, p. 51)	N	1	N60°E		SE side down 25 ft. (McCracken, 1971, p.51)	Minor fault

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
13	Alba-Neck City Structures	Jasper	S (McCracken, 1971, p. 8)						Area of complex minor flexures, brecciation and minor faulting; on east flank of Galesburg-Pittsburg Anticline.
14	Ten O'Clock Run	Taney, Stone	S (Winslow, 1894, p. 430) SC (McCracken, 1971, pl. 1)	N	28	N20°W to N60°W		SW side down	Also mapped in old mine workings.
15	Eldorado Springs North	Bates, Vernon	S (McCracken, (1971, p. 27) SC McCracken, 1971, p. 27) S (Gentile, 1976, p. 36)	N	39	N60°W		SW side down 150 ft. (McCracken, 1971, p. 27)	May be the subsurface expression of the Schell City-Rich Hill Anticline; probably part of the Bolivar-Mansfield Fault System. Possible surface branch is Pre-Upper Pennsylvanian.
16	Eldorado Springs	Cedar	S (McCracken, 1971, p. 27) SC (McCracken, 1971, p. 27)	N	9	E-W to N40°W		SW side down 150 to 270 ft. (McCracken 1971, p. 27)	Probably part of the Bolivar-Mansfield Fault System.
17	Caplinger Mills	Cedar	S (McCracken, 1971, p. 17)	N	4	E-W	H	S side down approximately 60 ft. (McCracken, 19671, p. 17)	May be related to the Eldorado Springs Fault; probably part of the Bolivar-Mansfield Fault System
18	Weaubleau Creek Structural Complex	St. Clair, Hickory	S (Beveridge, 1951, pp. 60, 77-81)	N and R	1 to 2	N-S, E-W, NE, NW		Generally, NE side down less than 80 ft. (McCracken, 1971, p. 66)	Age of last movement: Pre-Pennsylvanian (McCracken, 1971, p. 66)
19	Stockton Faulting	Cedar	S (McCracken, 1971, p. 62)	N	6	E-W to NW arc		NE side down 30 to 110 ft. (McCracken, 1971, p. 62)	Probably part of the Bolivar-Mansfield Fault System.
20	Dade County	Dade	S (McCracken, 1971, p. 22)	N	2 to 3	N35°W		SW side down	Three faults mapped by reconnaissance work.
21	Fair Play	Polk	S (McCracken, 1971, p. 29)	N	17	N30°W to N80°W	H	NE side down	Part of the Bolivar-Mansfield Fault System.

WOLF CREEK

Fault Number[(a)]	Name	Location	Identification[(b)]	Type of Fault[(c)]	Length of Fault (miles)	Strike	Dip[(d)]	Relative Displacement	Remarks
22	Bolivar	Polk	S (McCracken, 1971, p. 13)	N	6+	N55°W and N75°W		SW side down 30 to 150 ft.	Part of the Bolivar-Mansfield Fault System.
23	Huron	Polk	S (McCracken, 1971, p. 35)	N	4, 5, 3	N50°W		SW side down	Includes three faults approximately along the same trend; part of the Bolivar-Mansfield Fault System.
24	Schofield	Polk	S (McCracken, 1971, p. 59)	G	3 to 4	N70°W		NE side down	Forms a graben with the E end of the Huron Fault; part of the Bolivar-Mansfield Fault System.
25	Fair Grove	Dallas, Greene	S (McCracken, 1971, p. 29)	N	3.5	N50°E and N20°W	H	W Side down 150 ft.	Part of the Bolivar-Mansfield Fault System.
26	Graydon Springs Fault Zone	Polk, Greene	S (McCracken, 1971, p. 33)	N	19	N75°W		N side down 2 to 200 ft.	Probably a segment of the Bolivar-Mansfield Fault System.
27	Stafford	Greene, Webster	S (McCracken, 1971, p. 62)	N	15+	N-S and N80°W		N side down 100 ft.	Forms the southern boundary of the Strafford Graben. Part of the Valley Mills Fault Zone.
28	Valley Mills Fault zone	Greene, Webster	S (McCracken, 1971, p. 64)	N	20	E-W		N side down maximum of 170 ft.	
29	Pearson Creek Fault System	Greene	S (McCracken, 1971, p. 49)	N	2 to 3	N55°W		N side down 10 to 20 ft.	
30	Danforth Graben	Greene	S (McCracken, 1971, p. 22) B (McCracken, 1971, p. 22)	G	3	N60°W		70 to 100 ft.	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
31	Kinser Bridge	Greene	S (McCracken, 1971, p. 38) B (McCracken, 1971, p. 38)	N	4	N75°W		S side down 50 ft.	
32	Sycamore Creek	Greene	S (McCracken, 1971, p. 63)	N	6+	NE		N side down 130 to 170 ft.	
33	Sac River	Greene, Lawrence, Christian	S (McCracken, 1971, p. 55)	N	22	N50°W		NE side down 50 80 ft.	
34	Johnson Mill	Lawrence	S (McCracken, 1971, p. 37)	N	3	N70°E		NW side down 75 ft.	
35	Strafford Graben	Greene, Webster	S (McCracken, 1971, p. 62)	G	9	E-W to N80°W		125 ft.	Between the Graydon Springs Fault Zone and the Strafford Fault.
36	Dry Creek Fault Complex	Webster	S (McCracken, 1971, p. 24)	N	6+	N35°W			Associated with Dry Creek Anticline.
37	Fordland	Webster	S (McCracken, 1971, p. 31)	N	4.5	E-W		N side down 45 ft.	Forms north boundary of Fordland Anticline; part of the Bolivar-Mansfield Fault System.
38	Diggins	Webster, Wright	S (McCracken, 1971, p. 23)	N	12 to 15	N70°W		S side down 15 to 140 ft.	Part of the Bolivar-Mansfield Fault System.
39	Sarvis Point	Webster	S (McCracken, 1971, p. 58)	Scissors	7	N25°W to N55°W		NE side down at SE end SW side down at NW end	
40	Dogwood	Webster, Douglas	S (McCracken, 1971, p. 24)	Scissors	6.5	N55°W		NE side down at SE end SW side down at NW end	Part of the Bolivar-Mansfield Fault System.
41	Mansfield	Wright, Douglas, Webster	S (McCracken, (1971, p. 43) B (McCracken, 1971, p. 43)	N	22.5	N35°W to N40°W		NE side down	Part of the Bolivar-Mansfield Fault System.

TABLE 2.5-11 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
42	Bryant Creek	Douglas	S (McCracken, 1971, p. 16)	N	1.2	N30°E		NW side down maximum of 80 ft.	
43	Highland-ville	Christian, Stone	S (McCracken, 1971, p. 34)	N	13	N60°W		SW side down	
44	Ponce de Leon	Stone	S (McCracken, 1971, p. 51)	N	8	N30°W to N65°W		SW side down 50 to 60 ft. (McCracken, 1971, p. 51)	
45	Galena Graben	Stone	S (McCracken, 1971, p. 32)	G	2	E-W	H	Down approximately 40 ft. (McCracken, 1971, p. 32)	
46	Red Arrow	Camden	S (McCracken, 1971, p. 52) SC (McCracken, 1971, pl. 1) Gm (McCracken, 1971, p. 52)	N	5.5	N50°W		SW side down approximately 100 ft. (Mc Cracken, 1971, p. 52)	
47	Decatur-ville Structure	Camden	S (McCracken, 1971, p. 23)		Diam. 1				Brecciated core, astrobleme, cryptovolcano, crypto-explosive structure.
48	Hazelgreen Volcanics	Laclede	B (Snyder & Gerdemann, 1965, p. 483)						Volcanic ash found in single drill core in basal Paleozoic (upper Cambrian) sandstone.
49	Wardsville	Cole	S (McCracken, 1971, p. 66) B (McCracken, 1971, p. 66)	N and H	4 and 1	N30°W		NE side down 100 ft. (McCracken, 1971, p. 66)	Horst on north end; brec-ciated chert and fault gouge.
50	Fox Hollow	Boone	S (McCracken, 1971, p. 31)	N	1	N-S		W side down 120 ft. (McCracken, 1971, p. 31)	Small fault.
51	Everett Fault Complex	Cass	S (Clair, 1943, p. 50)	G	3				

Fault Number(a)	Name	Location	Identification(b)	Type of Fault(c)	Length of Fault (miles)	Strike	Dip(d)	Relative Displacement	Remarks
52	Belton Fault Complex	Cass	S (Clair, 1943, p. 44)	G	Diam. 3			Down 25 ft. along S boundary; down 143 ft. in N part	
53	Salt Fork	Saline	S (McCracken, 1971, p. 58) SC (McCracken, 1971, p. 58)	N	13	N50°W	H	SE side down 200 to 250 ft. (McCracken, 1971, p. 58)	
54	Saline City	Saline	S (McCracken, 1971, pp. 57-58)	N	22	N45°W		SW side down 100+ ft. (McCracken, 1971, p. 58)	Associated with Fish Creek Anticline.
55	Gallatin	Daviess	S (McCracken, 1971, p. 32)	N	1.8	N-S		E side down	
56	Bolivar-Mansfield Fault System	Bates, Vernon, St. Clair, Cedar, Dallas, Dade, Polk, Greene, Webster, Douglas	S (McCracken, 1971, p. 13)	N and G		N50°W		Up to 300 ft. (McCracken, 1971) p. 13)	Includes the following faults: Eldorado Springs North, Eldorado Springs, Caplinger Mills, Stockton, Bolivar, Fair Play, Fair Grove, Mansfield, Graydon Springs, Huron, Diggins, Fordland, Dogwood.
57	Unnamed	Several; Lake of the Ozarks Region	S (Anderson and others, 1979)	N (many)	Varies	Varies; many N50°W		Varies; many NE side down down	

TABLE 2.5-12

SUMMARY OF FAULTS IN NEBRASKA WITHIN THE REGIONAL AREA

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
1		Neb.-Cass, Otoe Iowa-Story, Boone, Dallas, Guthrie, Adair, Cass, Montgomery, Mills, Fremont	SC (Burchett, 1966, fig. 7; Carlson, 1965, figs. 9 and 12, in Burchett and Carlson, 1966)		180	N60°E		SE side down	Formerly referred to as the Thurman-Wilson trend in Neb. (Burchett and Reed, 1967, p. 17). Probably represents a zone of both folding and faulting. The Union Fault is a localized structural feature located along the trend and exposed in the Missouri River bluff (Carlson, 1969, fig. 2 in Carlson, 1970). The structural trend is probably an extension of the Thurman-Redfield Structural Zone in Iowa (Fault No. 1).

a Fault numbers correspond to those shown on Figure 2.5-16.

b
A = Aerial photgraphs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours
For Sources cited above, see REFERENCES: SECTION 2.5.

c
G = Graben
H = Horst
N = Normal
T = Thrust
R = Reverse

d
N,S,E,W = Directions
H = High-angle

TABLE 2.5-12 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
2	Humboldt	Neb.-Richardson, Nemaha, Otoe, Cass, Sarpy, Douglas Kan.-Wabaunsee, Pottawatomie, Nemaha	Neb.- S (Condra, 1927, p. 15) SC (Burchett, 1966, fig. 7; Carlson, 1965, figs. 9 and 12 in Burchett and Carlson, 1966) Kan.- SC (Cole, 1962; Merriam and Smith, 1961; Merriam and Kelly, 1960; Merriam, 1960) B (Cole, 1973b)	T	163	N70°E to N-S	H	At surface, E side down 100 ft. (Condra, 1927, p. 15); on the basement, E side down 1000 ft. (Cole, 1962)	Located on the east side of the Nemaha Anticline. Evidence of thrusting, repeated members in pre-Mississippian strata (Merriam, 1963, p. 222) Age of last movement: Pre-Mississippian (Merriam, 1960; Merriam, 1963, p. 204)
3	Crete	Saline, Seward, Lancaster	SC (Carlson, 1967, fig. 2 in Carlson, 1970)		20	N30°E		SE side down	

TABLE 2.5-13

SUMMARY OF FAULTS IN OKLAHOMA WITHIN THE REGIONAL AREA

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
1	Welch Fault	Craig	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	N	7.5	N20°E		NW side down 25 to 50 ft. (Branson and others, 1965, pp. 47-49)	
2	Steppe Ford Fault	Ottawa	S (Reed, Schoff and Branson, 1955, p. 34; Marcher and Bingham, 1971, Map HA-2, Sheet 1) A (Reed, Schoff and Branson, 1955, p. 34)		3.5	N50°E		NW side down 30 ft. (Reed, Schoff and Branson, 1955, p. 34)	
3		Ottawa	S (Reed, Schoff and Branson, 1955, pl. I; Marcher and Bingham, 1971, Map HA-2, Sheet 1)		3	N30°E		NW side down	On west flank of Miami Syncline (Commerce Trough).

a
Fault numbers correspond to those shown on Figure 2.5-17.

b
A = Aerial photographs
B = Borehole
Gg = Gravity
Gm = Magnetics
Gs = Seismic
S = Surface mapping
Sc = Structure contours
For Sources cited above, see REFERENCES: SECTION 2.5.

c
G = Graben
H = Horst
N = Normal
T = Thrust
R = Reverse

d
N,S,E,W = Directions
H = High-angle

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
4		Ottawa	S (Reed, Schoff and Branson, 1955, pl. I; Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1	N30°E		NW side down	On west flank of Miami Syncline (Commerce Trough).
5		Ottawa	S (Reed, Schoff and Branson, 1955, pl. I; Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1.5	N40°E		NW side down	On west flank of Miami Syncline (Commerce Trough).
6		Ottawa	S (Reed, Schoff and Branson, 1955, pl. I; Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2	N30°E		NW side down	On west flank of Miami Syncline (Commerce Trough).
7		Ottawa	S (Marcher and Bingham, 1971 Map HA-2, Sheet 1)		2	N45°E		NW side down	
8		Ottawa	S (Reed, Schoff and Branson, 1955, pl. I; Marcher and Bingham, 1971, Map HA-2, Sheet 1)	G	2	N50°W		SW side down	Forms NE side of graben with Fault No. 9.
9		Ottawa	S (Reed, Schoff and Branson, 1955, pl. I; Marcher and Bingham, 1971, Map HA-2, Sheet 1)	G	2	N45°W		NE side down	Forms SW side of graben with Fault No. 8.

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
10		Ottawa	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2	N25°E		NW side down	
11	Dupree Fault	Craig	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	N	6	N20°E to N-S		SE side down 90 ft. (Branson and others, 1965, p. 48)	
12	Whiteoak Creek Fault	Craig	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1) Gm (Jones and Lyons, 1964, Map GM-6)	N	16	N80°W to N25°E		N side down more than 100 ft. (Branson and others, 1965, p. 48)	Magnetic low suggests basement faulting (Lyons, Jones and Jacobson, 1964, p. 11).
13	Seneca Fault	Ok.-Ottawa, Delaware, Mayes Mo. -Newton	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1) B (McCracken, 1971, p. 59)	G	68.5	N40°E to N50°E		90 to 200 ft. in Oklahoma (Reed, Schoff and Branson, 1955, p. 33); 100 to 370 ft. in Missouri (McCracken, 1971, p. 59)	In Oklahoma, the line of faulting continues further SW, but the graben structure ends and only single displacement is evident; in Missouri, width of downdropped block is 200 to 1500 ft. (McCracken, 1971, p. 59); Fault No. 2 in Missouri.
14	Big Cabin Fault	Craig, Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1) Gm (Jones and Lyons, 1964, Map GM-6)	N	4.5	N30°E to N45°E		NW side down 25 ft. or more (Branson and others, 1965, p. 48)	Magnetic low suggests basement faulting (Lyons, Jones and Jacobson, 1964, p. 11).
15	Condry School Fault	Craig, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	N	2	N60°E		SE side down 35 ft. (Branson and others, 1965, p. 48)	
16	Little Pryor Creek Fault	Craig, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	N	5	N45°E		NW side down 75 to 100 ft. (Branson and others, 1965, p. 48)	Terminates to the SW in Fault No. 17.

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
17		Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		4	N40°W		SW side down	
18	Booker School Fault	Craig, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	N	5	N45°E		NW side down 65 ft. (Branson and others, 1965, p. 48)	
19		Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		3	N25°W		NE side down	
20		Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1.5	N20°W		NE side down	
21		Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2	N5°E			
22		Nowata	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1.5	N20°E		SE side down	
23		Mayes, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		3	N45°E		NW side down	
24		Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		5	N65°E		NW side down	
25		Craig	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2.5	N35°E		SE side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
26		Delaware	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		5.5	N50°E to N80°E		S side down	
27		Delaware	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		5.5	N30°E		NW side down	
28	Locust Grove Fault	Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	N	10	N-S to N15°E		NW side down a maximum of 200 ft. (Huffman, 1958, p. 91)	
29		Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		7.5	N40°E		NW side down	Along the trend of the Seneca Fault.
30		Mayes, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		10; 4; 2	N30°E		NW side down	Three intersecting faults.
31		Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		4	N55°E		SE side down	
32		Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2	N40°E		NW side down	
33		Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		5.5	N30°E		NW side down	
34		Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1.5; 1; 1	N60°E; N50°E; N5°W		W sides down	Three faults.

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
35		Mayes, Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)		12	N30°E		NW side down	
36		Mayes, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2	N40°E		SE side down	Along the trend of the Seneca Fault.
37		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2.5	N50°E		SE side down	Along the trend of the Seneca Fault.
38		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		3.5	N45°E		SE side down	Along the trend of the Seneca Fault.
39		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)		17	N20°E		NW side down	
40		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		4	N20°E		SE side down	
41		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		3	N25°E		NW side down	
42		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		6	N30°E		SE side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
43		Mayes, Rogers	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		9	N40°E		SE side down	Along the trend of the Seneca Fault.
44		Rogers, Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1		6.5	N15°E to N30°E		SE side down	Along the trend of the Seneca Fault.
45		Mayes, Rogers, Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		9.5	N30°E		SE side down	
46		Mayes, Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)		7.5	N20°E		NW side down	
47		Mayes	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1.5	N45°E		SE side down	
48		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)		8	N25°E to N60°E		NW side down	
49		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)	G	2.5	N80°E			
50		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)		3	N45°E		SE side down	

TABLE 2.5-13 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
51		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)		3	N20°E to N50°E		NW side down	
52		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		0.5 to 1.5	N-S to E-W			Five faults.
53		Wagoner	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		1.2	E-W		S side down	
54	Lost City Fault	Cherokee	S (Marcher and Bingham, 1971; Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1	H	14; 3; 3	E-W to N60°E		SE side down 150 to 300 ft. (Huffman, 1958, p. 91); NW side down	A complex of 3 faults; the short westernmost fault forms a horst structure.
55	Fourteen Mile Creek Fault	Cherokee	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)	H	15	N60°E		NW side down a maximum of 200 ft. (Huffman, 1958, p. 91)	Branches at SW end to form horst structure.
56	Double Springs Creek Fault	Cherokee	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1; Marcher, 1969, Map HA-1, Sheet 1)	N	20	N60°E to N80°E		NW side down a maximum of 275 ft. (Huffman, 1958, p. 92)	
57		Adair	S (Marcher and Bingham, 1971, Map HA-2, Sheet 1)		2	N60°E		NW side down	

TABLE 2.5-13 (continued)

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
58		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		2; 1.5	N10°E to N25°E		W side down	Two small faults.
59		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		5; 2; 1.5	N30°E; N40°E; N65°E			One main fault with two small branching faults.
60	Tahlequah Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	6	E-W to N40°E		NW side down	
61	Flower Creek Faults	Wagoner, Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	6; 6	N70°E		NW side down 50 ft. (Huffman, 1958, p. 92)	Two en echelon faults.
62	Hulbert Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	6.5	E-W to N60°E		NW side down 155 ft. (Huffman, 1958, p. 92)	
63	South Muskogee Fault	Muskogee, Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	18	N65°E		NW side down a maximum of 250 to 300 ft. (Huffman, 1958, p. 92)	
64	Qualls-Welling Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	19	N45°E		NW side down 325 ft. (Huffman, 1958, p.93)	
65	Wauhillau Fault	Adair, Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	5	N40°E		SE side down	Forms small graben with South Cookson Fault.
66	North Cookson Fault	Adair, Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	13	N40°E		NW side down 200 to 310 ft. (Huffman, 1958, p. 94)	
67		Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)		2	N70°E		NW side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
68		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		3.5	N45°E		NW side down	
69	Keefeton Fault	Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		17	E-W		N side down	
70	Webber's Cove Fault	Sequoyah, Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	3	N60°E		SE side down 50 to 130 ft. (Huffman, 1958, p. 96)	May be continuous with Cedar Creek Fault to west.
71	Red Springs Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	5	N50°E		NW side down 200 ft. (Huffman, 1958, p. 95)	
72	Blackgum Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	7	N60°E		NW side down 250 to 300 ft. (Huffman, 1958, p. 95)	Forms a graben with South Cookson Fault; may be southern extension of Porum Syncline.
73	Baron Graben	Adair	S (Marcher, 1969, Map HA-1, Sheet 1)	G	7; 3.5	N40°E	75° on E side	Maximum of 200 ft. (Huffman, 1958, p. 97)	
74		Adair	S (Marcher, 1969, Map HA-1, Sheet 1)	G	2; 2	N25°E to N50°E			
75	Evansville Fault	Adair	S (Huffman, 1958, p. 97, map)	N	2	E-W			May be a continuation of the Evansville Fault of Arkansas.
76	Marble City Fault	Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)	N	18	N80°W to N50°E		SE side down more than 700 ft. (Huffman, 1958, p. 96)	Intersects the south end of Lyons Fault.
77	Church Fault	Adair	S (Marcher, 1969, Map HA-1, Sheet 1)	N	10	N65°E		SE side down a maximum of 200 ft. (Huffman, 1958, p. 96)	Forms a graben with Greasy Creek Fault at west end.

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
78	Little Lee Creek Fault	Adair	S (Marcher, 1969, Map HA-1, Sheet 1)	N	6	E-W		S side down	
79	Lyons Fault	Adair, Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)	N	13	N25°E		SE side down 700 ft. (Huffman, 1958, p. 96)	Intersects the north end of the Marble City Fault.
80	Greasy Creek Fault	Sequoyah, Adair	S (Marcher, 1969, Map HA-1, Sheet 1)	N	14	N60°W to N60°E		N side down a maximum of 530 ft. (Huffman, 1958, p. 97)	Intersects the north end of the Akins Fault.
81		Adair	S (Marcher, 1969, Map HA-1, Sheet 1)		2	N80°W		N side down	
82		Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)		16	N20°E to N80°E		SE side down	North end intersects the middle of the Akins Fault.
83	North and South Davidson Faults	Ok.-Adair Ark.-Crawford	Ok.- S (Marcher, 1969, Map HA-1, Sheet 1) Ark.- S (Croneis, 1930, pl. 1-A)	G	4; 4	N85°E to N70°W		North fault has displacement of 150 ft., south fault has less (Huffman, 1958, p.97)	Continuations of the Davidson Faults (No. 17) of Arkansas.
84		Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)		E-W 14;18 N-S 4;3	E-W; N20°E		E-W faults down on S sides N-S faults down on W sides	Four faults.
85	Warner Horst North	Muskogee, McIntosh	S (Marcher, 1969, Map HA-1, Sheet 1)		13	N60°E		NW side down	
86		Haskell	S (Marcher, 1969, Map HA-1, Sheet 1)		11	E-W to N50°E		S side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
87		Haskell	S (Marcher, 1969, Map HA-1, Sheet 1)		4	N30°E		SE side down	South end intersects middle of Fault No. 86.
88		Haskell	S (Marcher, 1969, Map HA-1, Sheet 1)	H	2; 5; 10	N60°E			Three faults to form horst structure.
89		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		5	N40°E		NW side down	
90		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		4.5	N20°E to N60°E		Unknown	
91	Pecan Creek Fault	Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		4.5	N40°E		NW side down	
92		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		1.5	N35°E		SE side down	
93		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		5	E-W to N80°E		N side down	Has two faults branching from south side.
94		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		4.5	N-S to N80°E		NW side down	
95	Muskogee Fault	Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		21	N60°E to N80°W		N side down	
96		Okmulgee	S (Marcher, 1969, Map HA-1, Sheet 1)		5; 6.5	N40°E		SE sides down	Two parallel faults.
97		Okmulgee	S (Marcher, 1969, Map HA-1, Sheet 1)		8	N20°E		SE side down	

Fault Number(a)	Name	Location	Identification(b)	Type of Fault(c)	Length of Fault (miles)	Strike	Dip(d)	Relative Displacement	Remarks
98	Sam Creek Fault	Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		2; 3.5	E-W to N55°E		S sides down	Two intersecting faults.
99	South Qualls Faults	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	6	N40°E		SE side down 40 to 250 ft. (Huffman, 1958, p. 94)	Southern part forms horst with northern part of Greenleaf Lake Fault.
100		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		2	N80°W		S side down	
101	Warner Horst South	Muskogee, McIntosh	S (Marcher, 1969, Map HA-1, Sheet 1)		16	E-W to N20°E		SE side down	May continue to northeast as Cedar Creek Fault.
102	Gifford Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	4.5	N70°E		S side down	E end intersects southern part of Fourteen Mile Creek Fault.
103		Kay	SC (Jordan, 1962)		3	N15°E to N30°W		NW side down	
104		Kay	SC (Jordan, 1962)		4	N70°W		SW side down	
105		Kay	SC (Jordan, 1962)		4	N10°E		SE side down	Northern end intersects southern end of Fault No. 104.
106		Kay	SC (Jordan, 1962)		5	N5°E		W side down	
107		Kay	SC (Jordan, 1962)		4	N10°E		W side down	
108		Kay	SC (Jordan, 1962)	H	3; 3	N70°E; N40°E			Two faults intersecting to form wedge shape.
109		Kay; Noble	SC (Jordan, 1962)		4	N40°W		NE side down	
110		Grant	SC (Jordan, 1962)		5	N10°E		E side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
111		Noble	SC (Jordan, 1962)	H	4; 5	N30°E; N85°W			Two faults intersecting to form wedge shape.
112		Garfield	SC (Jordan, 1962)	H	4; 6; 12	N30°E; N-S; N40°E			Three intersecting faults.
113		Garfield	SC (Jordan, 1962)	G	3; 6.5	N-S; N60°E		SE side down	Two intersecting faults; forms a graben with southern part of No. 112.
114		Noble, Payne	SC (Jordan, 1962)		8	N10°W to N20°W		SW side down	
115		Garfield, Logan, Kingfisher	SC (Jordan, 1962)		7	N20°E		NW side down	
116		Pawnee	SC (Jordan, 1962)		4	N20°E		NW side down	
117		Creek	SC (Jordan, 1962)		11	N15°E		SE side down	
118		Payne	SC (Jordan, 1962)		4	E-W		N side down	
119		Payne	SC (Jordan, 1962)		2	N30°E		SE side down	
120		Kingfisher, Logan	SC (Jordan, 1962)		56	N10°W		W side down	Series of similarly trending faults.
121		Creek	SC (Jordan, 1962)		14	N20°E		SE side down	
122		Wagoner, Muskogee	SC (Tarr, Jordan and Rowland, 1965)	G	10; 12	N40°E			Two parallel faults.
123		Muskogee, Okmulgee	SC (Tarr, Jordan and Rowland, 1965)		12	N20°E		NW side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
124	Fulcher Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)		5	E-W to N50°E		SE side down	
125	Greenleaf Lake Fault	Cherokee, Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	11	N45°E to N80°E		NW side down 40 to 175 ft. (Huffman, 1958, p. 93)	Northern part forms horst with southern part of South Qualls Fault.
126	South Cookson Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	12	N60°E		SE side down a maximum of 300 ft. (Huffman, 1958, p. 94)	Forms graben with Blackgum Fault; may be southern extension of Porum Syncline.
127	Barber Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	3	N60°E		SE side down a maximum of 300 ft. (Huffman, 1958, p. 95)	
128	Akins Fault	Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)		6	N40°E		SE side down	Intersects south end of Greasy Creek Fault.
129	Crittenden Fault	Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)	N	2.5	N60°E		SE side down a maximum of 100 ft. (Huffman, 1958, p. 92)	
130	Linder Bend Fault	Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)	N	1.5	N30°E		SE side down from 30 to over 200 ft. (Huffman, 1958, p. 95)	South end intersects northern part of Webber's Cove Fault.
131		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		5	N10°E to N30°E		SE side down	
132		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		5	N10°E to N35°E		SE side down	
133		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		4.5	N55°E		SE side down	

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
134		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		5	N45°E		SE side down	
135		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)	G	5	N35°E		SE side down	Forms graben with Fault No. 136.
136		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)	G	3.5	N5°W to N35°E		NW side down	Forms graben with Fault No. 135.
137		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)	H	2; 6.5	N15°E to N30°E		NW side down	Forms horst with Fault No. 138.
138		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)	H	5	N-S to N30°E		SE side down	Forms horst with Fault No. 137.
139		Wagoner	S (Marcher, 1969, Map HA-1, Sheet 1)		2	N15°E		SE side down	
140		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		1.5	N15°E		NW side down	
141		Muskogee	S (Marcher, 1969, Map HA-1, Sheet 1)		1	N70°W		NE side down	
142		Cherokee	S (Marcher, 1969, Map HA-1, Sheet 1)		3	N25°E		NW side down	
143		Adair	S (Marcher, 1969, Map HA-1, Sheet 1)	G	2; 2.5	N25°E; N45°E			Two intersecting faults to form graben.

Fault Number[a]	Name	Location	Identification[b]	Type of Fault[c]	Length of Fault (miles)	Strike	Dip[d]	Relative Displacement	Remarks
144		Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)		9.5; 10.5	N55°E		SE side down	Two parallel faults.
145		Haskell	S (Marcher, 1969, Map HA-1, Sheet 1)		2	N70°E		NW side down	
146		Ok.-Ottawa Kan.-Cherokee	S (Cole, 1962)		15	N10°E		E side down	Fault No. 15 in Kansas.
147	Cedar Creek Fault	Muskogee, Sequoyah	S (Marcher, 1969, Map HA-1, Sheet 1)	N	3	E-W to N40°E		SE side down	May be continuous with Webber's Cove Fault to east and Warner Horst South to west.
148		Osage, Pawnee, Payne, Creek Tulsa, Lincoln, Okmulgee, Okfuskee	S (Arbenz, 1956; Miser, 1954)		1 to 5	Mostly NW-SE		Variable	Series of faults in Pennsylvanian strata along the Pennsylvanian-Permian contact.
149		Kay, Grant, Garfield, Noble, Logan, Oklahoma, Cleveland, McClain	SC (Lutz, 1978, pl. I)		5 to 15	NNW to NNE			Shown on map of basement rocks.

TABLE 2.5-14

LETTER FROM THE DIRECTOR OF THE

KANSAS GEOLOGICAL SURVEY (August 6, 1973)

KANSAS GEOLOGICAL SURVEY
Office of the Director

The University of Kansas
Lawrence, Kansas 66044
913-864-3101

August 6, 1973

Dr. John S. Trapp
Dames & Moore
1550 Northwest Highway
Park Ridge, Illinois 60068

Dear Dr. Trapp:

I am replying to your letter of July 24, 1973 to Mr. Charles K. Bayne, Associate Director of the Geological Survey, regarding the most recent age of faulting and folding within the area of interest of the proposed Wolf Creek Nuclear Plant for the Kansas Gas & Electric Company. I understand that the Atomic Energy Commission defines an active fault as one which has moved at or near the earth's surface once in the past 35,000 years or more than once in the past 500,000 years.

Regrettably, there is no known stratigraphic evidence to prove or disprove fault movement or tectonic folding in Kansas during the past half-million years. Tertiary and younger sediments in eastern Kansas are unconsolidated sands, gravels, silts, and clays, which are not suitable indicators for dating structural movement. We have no evidence to indicate that known surface faults have moved at or near the earth's surface once in the last 35,000 years or more than once in the last 500,000 years.

The clustering of earthquake epicenters of historic record along the trend of the Nemaha Anticline in Nebraska, Kansas, and Oklahoma, indicates that this structure is tectonically active at the present time. The location of earthquake epicenters on or near other known geological structures in Kansas may indicate that they are also tectonically active (Merriam, 1963, Geologic History of Kansas, Kansas Geological Survey Bulletin 162, pp. 221-225).

Very cordial regards,

William W. Hambleton
Director

WWH/dc

KANSAS GEOLOGICAL SURVEY
Environmental Geology Section

1930 Avenue "A", Campus West
The University of Kansas
Lawrence, Kansas 66044
913-864-4991

TABLE 2.5-14a

LETTER FROM THE KANSAS GEOLOGICAL SURVEY
(DECEMBER 28, 1981)

December 28, 1981

Mr. David F. Fenster
Project Geologist
Dames & Moore
1550 Northwest Highway
Park Ridge, Illinois 60068

DAMES & MOORE
JAN 04 1982
Park Ridge, Illinois

Dear Mr. Fenster:

This is in response to your telephoned request for an updated opinion of the age of most recent faulting at or near the surface in eastern Kansas.

Based on the results of our USNRC-sponsored studies to date, we believe we have geologic, geomorphic and geophysical evidence of post-Kansan faulting near the surface in several areas in extreme northeastern Kansas.

The most clear-cut example is an area near Baileyville, in western Nemaha County. This area was discussed previously by S. M. DuBois (NUREG/CR-0321, 1978, p. 12-14, Figure 5). DuBois described a linear stream system with asymmetric tributaries and paralleling narrow, linear stream divides. The streams are shallowly incised into unconsolidated soil and underlying glacial till deposits in an area of relatively low-surface relief. DuBois estimated from sparse water-well data that the depth to bedrock was approximately 30-60 ft. Two power auger holes drilled subsequently near the streams used up all the available auger stem, slightly more than 100 ft, without encountering bedrock. A later seismic reflection line across the stream trend indicated that the thickness of unconsolidated deposits, mainly Kansas glacial till and thin surficial soils, was approximately 150 ft.

DuBois pointed out that north-flowing Negro Creek, because of the angle and the way its tributaries join the main stream (see figure attached), previously had flowed south. She concluded that "recent" uplift of the land surface had caused **piracy** of Negro Creek by an east-flowing tributary of Turkey Creek near the northwest corner of the area.

Because of the asymmetric tributaries on the west and the fact that the crest of the narrow, linear stream divide on the west was approximately 40 ft higher than that on the east (see topographic profile attached), it was assumed that the relative uplift was on the west. Although not stated, offset by faulting was suspected to be the most likely cause of these anomalous geomorphic features.

As stated earlier, a seismic profile was run at approximate right angles to and across the trend of the streams at a later date. This line was reduced and computer processed about a month ago. About 30 to 50 ft of offset in shallow subsurface marker beds is indicated beneath the creeks. Surprisingly,

however, the offset is down to the west.

Groundwater levels in the auger holes drilled near and on opposite sides of the two streams and in available nearby water wells indicate an abrupt approximate 30 ft gradient to the west, probably indicating offset of permeable zones in the till. The till in this area is silty to fine sandy. No abrupt changes in lithology are apparent, thus we do not think the streams are related to the effects of till lithology such as differential compaction adjacent to a buried sandybody or bedrock channel.

Although it cannot be rigorously proven without core drilling into bedrock, I believe that the above evidence strongly suggests post-Kansan faulting. The narrow linear stream divides and the almost total absence of tributaries on the east side of the two streams further suggest to me that faulting, if present, occurred after the development of the subdued topographic surface or during Recent (Holocene) time.

I have noted a number of similar streams and divides in areas overlain by several hundred feet of glacial till in northeastern Kansas and northwestern Missouri. In most instances, however, the short or absent tributaries and the long, narrow linear stream divides are on the west. All trend close to 15°NW.

If these linear parallel, ridge-stream systems are the geomorphic signature of geologically young faulting, it is interesting to note that the 15°NW trend is approximately 90° to the principal horizontal compressive stress field in the central Midcontinent as reported by Sbar and Sykes and more recently by Zoback and Zoback. Under those conditions, it would be expected that any reactivation of existing faults would produce up-to-the east reverse faulting and a geomorphic signature or erosion similar to the more pervasive ones cited immediately above which have long tributaries on the east or on the uplifted side and short or no tributaries on the west, adjacent to the linear ridge marking the edge of the down-dropped side.

The fact that the sense of bedrock movement of the Baileyville feature is opposite to what I would expect suggests to me that it may be caused by fairly recent reverse reactivation of a pre-existing fault by differential movement resulting from glacial rebound. The area is adjacent to the inferred boundary of the Nebraskan ice sheet and about 30 miles east of the western margin of the Kansan ice sheet (see figure attached).

The area is also adjacent to a major inferred bounding fault on the southeast flank of the Central North American Rift System. This bounding fault is believed to have been reactivated as a right lateral wrench fault during the Cretaceous. The Baileyville feature is properly aligned to have been a minor thrust or reverse fault associated with that sense of movement. If my interpretation is correct, then the inferred Recent movement may be associated with glacial rebound and is not strictly tectonic.

The longer features in NE Kansas and NW Missouri may be associated with the contemporary stress field. This has not been and, perhaps, cannot be proven. The White Cloud earthquake of 1927 occurred on the projection of one of those linear streams and we have recorded microearthquakes in the same area.

Because geologically young deposits are rare in the unglaciated part of eastern Kansas, it is difficult to determine the age of most recent faulting. However, under my direction and NRC funding, Kim Eccles recently completed an M.S. thesis at Kansas State University. His work consisted of field studies of an area underlain by the trace of the Humboldt fault zone in northwestern Wabaunsee County, southeast of Manhattan, Kansas. His study covered an area of a prominent northwest trending subsurface graben that cross-cuts the NNE trending Humboldt zone.

Eccles (unpublished thesis, 1980) determined that faulting broke the surface in Permian rocks over some of the subsurface faults. He also stated that from airphoto studies, one of the faults appeared to offset undifferentiated Quaternary glacio-fluvial deposits, presumably of Kansan age. I have not confirmed this in the field.

In summary, the youngest surface faulting that we can document is post-Kansan. Recent movement on an inferred fault near Baileyville may be related to continued glacial rebound.

Sincerely,

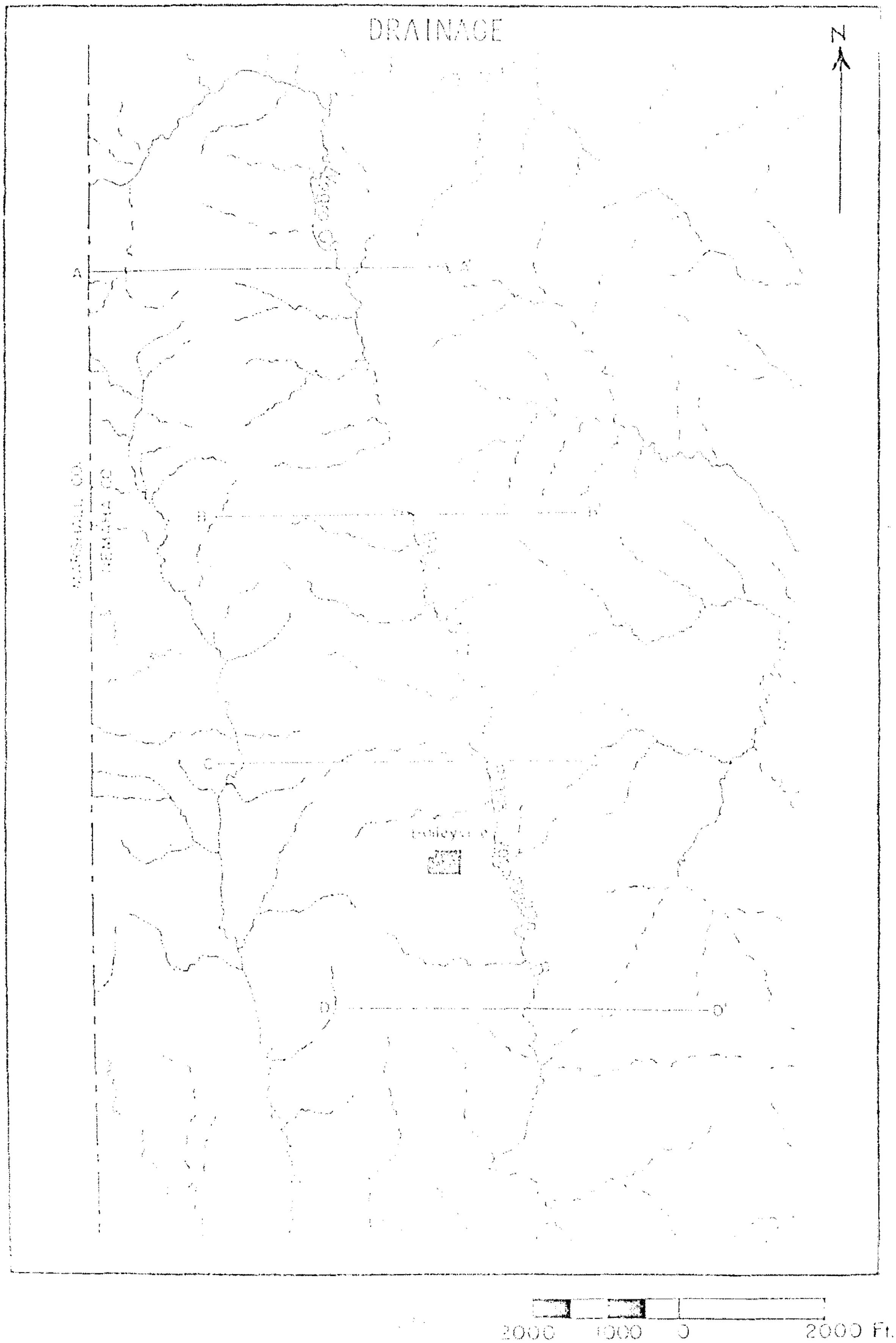
Frank W. Wilson
Senior Geologist

FWW:ep

cc: W. W. Hambleton, KGS
T. Schmidt, USNRC
H. LeFevre, USNRC

TABLE 2.5-14a (continued)

BAILEYVILLE VICINITY



TOPOGRAPHIC PROFILE
(Vertical exaggeraton: 20x)

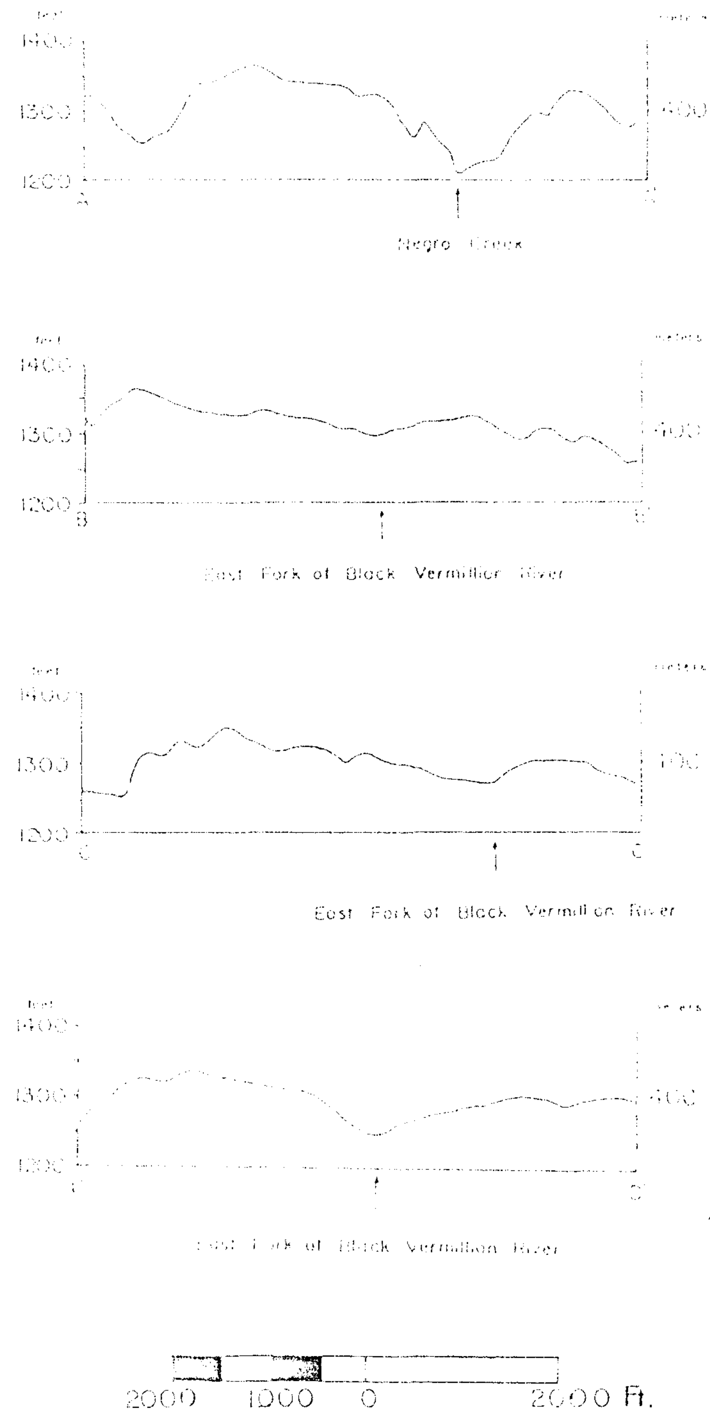


Figure Five

Rev. 0

TABLE 2.5-14a (continued)

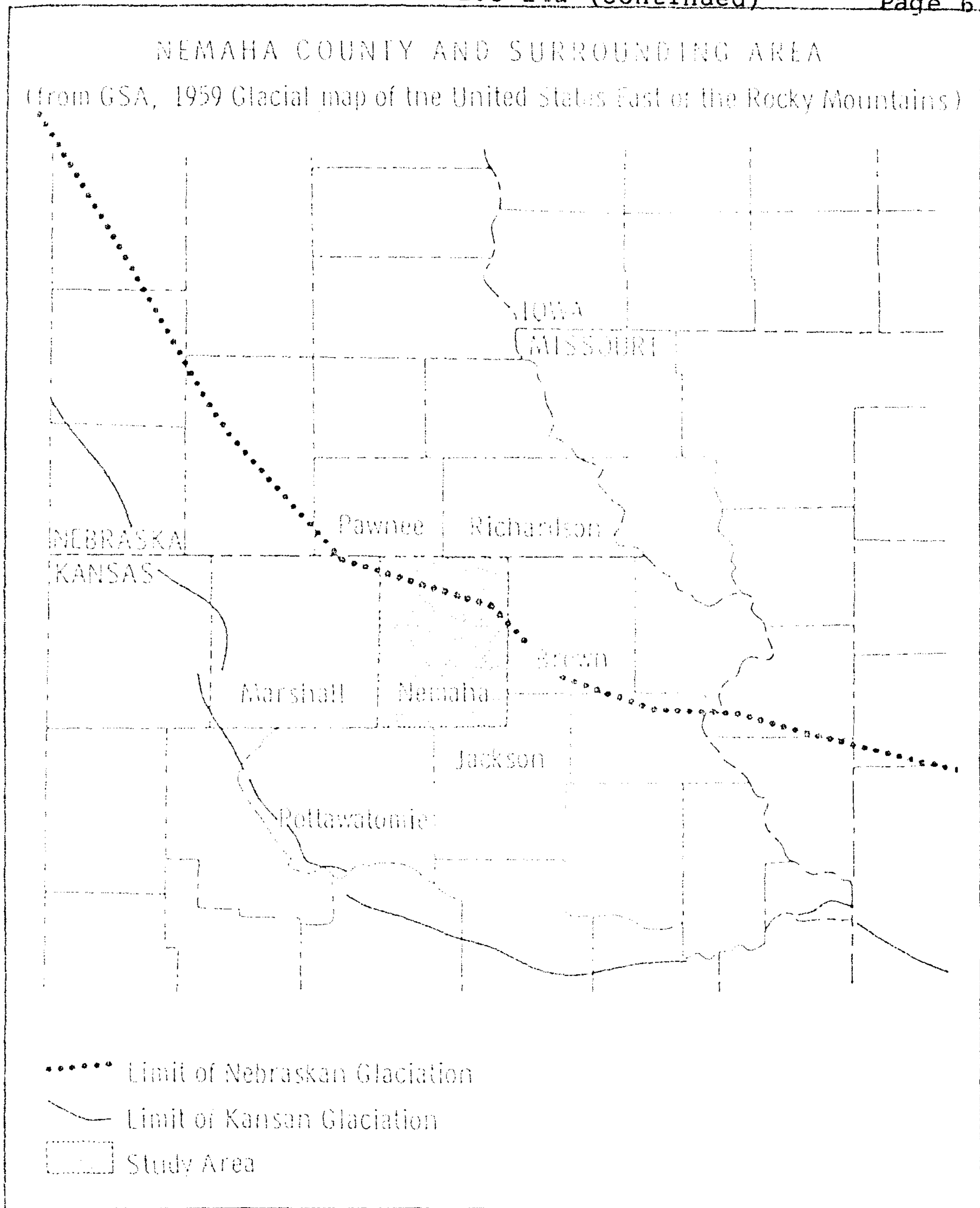


Figure three

TABLE 2.5-15

AGE OF YOUNGEST FAULTING WITHIN THE REGIONAL AREA

State	Youngest Age of Faulting	Source[(a)]
Kansas	Post Pennsylvanian[(b)] Inferred post-Kansan[(c)]	Table 2.5-14 Table 2.5-14a
Nebraska	Definitely pre-Pleistocene, probably post-Permian	Burchett, 1973a
Iowa	Definitely pre-Pleistocene, probably pre-Cretaceous	Van Eck, 1973a
Missouri	Post Pennsylvanian[(b)]	
Arkansas	End of Pennsylvanian	Caplan, 1960, p. 10
Oklahoma	Probably pre-Triassic, definitely pre-Quaternary	Johnson, 1973a

[a] For sources cited above, see REFERENCES: Section 2.5.

[b] Cannot be determined more accurately from stratigraphic information. From evidence in adjacent states generally dated as pre-Pleistocene (Hambleton, 1973b; Fellows, 1973a).

[c] Post-Kansan faulting due to differential glacial rebound has been inferred by Wilson, 1981, written communication (Table 2.5-14a).

Table 2.5-15a

SUMMARY OF DEFORMATION ZONES
HEUMADER SHALE MEMBER

Feature Number[(a)]	Site Location	Type(s) of Deformation(s)	Report Reference[(b)]
1	Saddle Dam IV	4 shear planes	D&M 1979b Figure 12B
2	Saddle Dam IV	3 shear planes	D&M 1979b Figure 12A
3	Saddle Dam IV	8 shear planes, 1 fault	D&M 1979b Figure 12E
4	Main Dam	1 shear zone, 2 shear planes	D&M 1979b Figure 10A
5	Main Dam	5 shear planes	D&M 1979b Figure 10C
6	Main Dam	1 shear plane	D&M 1979b Figure 10F
7	Reactor Building	1 shear plane	D&M 1978 Figure 3D
8	Reactor Building	1 shear plane	D&M 1978 Figure 3E
9	Reactor Building	1 shear zone, 1 shear plane	D&M 1978 Figure 3I
10	Reactor Building	1 shear plane	D&M 1978 Figure 3I
11	Reactor Building	1 shear plane	D&M 1978 Figure 3I
12	Fuel Building	1 shear plane	D&M 1978 Figure 10C
13	Fuel Building	1 shear plane	D&M 1978 Figure 10C
14	Fuel Building	1 shear plane	D&M 1978 Figure 10C
15	Fuel Building	1 shear plane	D&M 1978 Figure 10D
16	Fuel Building	2 shear planes	D&M 1978 Figure 10D
17	Fuel Building	1 inferred shear plane	D&M 1978 Figure 10D
18	Fuel Building	1 fault, 12 shear planes	D&M 1978 Figures 10F, 10G, 10H

[a]Feature numbers correspond to locations of deformation zones shown on Figures 231.1-1 through 231.1-4.

[b]D&M 1978 = Dames & Moore, 1978 (see FSAR Site Addendum, Section 2.5.7 for complete reference).
D&M 1979b = Dames & Moore, 1979b (see FSAR Site Addendum, Section 2.5.7 for complete reference).
D&M 1981 = Dames & Moore, 1981, Results of geologic excavation mapping, Wolf Creek Generating Station, Unit No. 1, for Kansas Gas & Electric Company and Kansas City Power & Light Company: Dames & Moore (August 13).

Table 2.5-15a (continued)

Feature Number[(a)]	Site Location	Type(s) of Deformation(s)	Report Reference[(b)]
19	Fuel Building	4 shear zones, 10 shear planes	D&M 1978 Figure 10I
20	Fuel Building	1 shear zone	D&M 1978 Figure 10A
21	Fuel Building	1 shear zone	D&M 1978 Figure 10A
22	Radwaste Building	1 shear plane	D&M 1978 Figures 11M and 11N
23	Radwaste Building	1 shear zone	D&M 1978 Figure 11M
24	Radwaste Building	1 shear zone	D&M 1978 Figure 11K
25	Radwaste Building	1 shear plane	D&M 1978 Figure 11C
26	Diesel Generator Building	1 shear zone	D&M 1978 Figure 6A
27	Diesel Generator Building	1 shear zone, 1 shear plane	D&M 1978 Figures 6C, 6E, 6F
28	Diesel Generator Building	1 shear plane	D&M 1978 Figure 6C
29	Control Building	1 shear plane	D&M 1978 Figure 7B
30	Communication Corridor	1 shear plane	D&M 1978 Figure 8B
31	Communication Corridor	1 shear plane	D&M 1978 Figure 8B
32	Control Building	1 shear plane	D&M 1978 Figure 7C
33	Communication Corridor	1 shear plane	D&M 1978 Figure 8B
34	Turbine Building	1 shear zone	D&M 1978 Figure 9I
35	Communication Corridor	1 shear plane	D&M 1978 Figure 8C
36	Communication Corridor	4 shear planes	D&M 1978 Figure 8C
37	Communication Corridor	1 shear plane	D&M 1978 Figure 8D
38	Auxiliary Building	1 shear plane	D&M 1978 Figure 5G
39	Turbine Building	1 shear plane	D&M 1978 Figure 9D
40	Turbine Building	1 shear plane	D&M 1978 Figure 9L

Table 2.5-15a (continued)

Feature Number[(a)]	Site Location	Type(s) of Deformation(s)	Report Reference[(b)]
41	Turbine Buiding	2 shear planes	D&M 1978 Figure 9Q
42	Turbine Buiding	1 shear plane	D&M 1978 Figure 9Q
43	Turbine Buiding	1 shear plane	D&M 1978 Figure 9EE
44	Turbine Building	1 shear zone	D&M 1978 Figures 9V and 9W
45	Turbine Building	1 shear plane	D&M 1978 Figure 9U
46	Turbine Building	2 shear zones	D&M 1978 Figure 9DD
47	Turbine Building	3 shear planes	D&M 1978 Figure 9CC
48	Turbine Building	3 shear planes, 1 shear zone	D&M 1978 Figure 9U
49	Turbine Building	1 shear plane	D&M 1978 Figure 9T
50	Turbine Building	1 shear plane	D&M 1978 Figure 9S
51	Turbine Building	a few shear planes	D&M 1978 Figure 9AA
52	Circulating Water System Discharge Excavation	1 shear zone	D&M 1979b Figure 8O
53	Circulating Water System Discharge Excavation	2 shear zones, 1 shear plane	D&M 1979b Figure 8N
54	Circulating Water System Discharge Excavation	1 shear zone	D&M 1979b Figure 8N
55	Circulating Water System Discharge Excavation	1 shear zone	D&M 1979b Figure 8N
56	Circulating Water System Discharge Excavation	1 shear zone	D&M 1979b Figure 8N
57	Circulating Water System Intake Excavation	4 shear planes	D&M 1979b Figure 8J
58	Circulating Water System Intake Excavation	1 shear plane	D&M 1979b Figure 8I
59	Circulating Water System Intake Excavation	2 shear zones, 1 shear plane	D&M 1979b Figure 8H
60	Circulating Water System Intake Excavation	3 shear planes, slightly folded and sheared area	D&M 1979b Figures 8H and 8HH
61	Circulating Water System Intake Excavation	1 shear zone	D&M 1979b Figure 8F
62	Circulating Water System Intake Excavation	a few small shear zones	D&M 1979b Figure 8F

Table 2.5-15a (continued)

Feature Number[a]	Site Location	Type(s) of Deformation(s)	Report Reference[b]
63	Circulating Water System Intake Excavation	2 shear planes	D&M 1979b Figure 8F
64	Circulating Water System Intake Excavation	5 shear planes plus 3 possible shear planes	D&M 1979b Figures 8F and 8FF
65	Circulating Water System Intake Excavation	1 shear plane	D&M 1979b Figure 8F
66	Circulating Water System Intake Excavation (Unit 2)	1 shear plane	D&M 1979b Figure 8C
67	Circulating Water System Intake Excavation (Unit 2)	1 shear plane	D&M 1979b Figure 8D
68	Circulating Water System Intake Excavation (Unit 2)	1 shear plane	D&M 1979b Figure 8D
69	Circulating Water System Intake Excavation (Unit 2)	1 shear zone, 2 shear planes	D&M 1979b Figures 8C and 8CC
70	Circulating Water System Intake Excavation (Unit 2)	1 shear plane	D&M 1979b Figure 8E
71	Circulating Water System Intake Excavation (Unit 2)	1 shear plane	D&M 1979b Figure 8E
72	Circulating Water System Intake Excavation	1 shear plane	D&M 1979b Figure 8B
73	Circulating Water System Intake Excavation	1 shear zone	D&M 1979b Figures 8B and 8BB
74	Circulating Water System Intake Excavation	1 shear plane	D&M 1979b Figure 8B
75	Circulating Water System Intake Excavation	2 shear zones	D&M 1979b Figures 8A and 8AA
76	Circulating Water System Pumphouse & Intake Channels	2 faults, 2 shear zones	D&M 1981 Figures 10A, 10A-2, 10B-2, 10B-3, 10B-5, 10B-6, 10B-8
77	Essential Service Water System	1 shear plane	D&M 1981 Figures 5C and 5D
78	Essential Service Water System	3 shear planes	D&M 1981 Figure 5E
79	Essential Service Water System	1 shear zone	D&M 1981 Figure 5H
80	Essential Service Water System	1 shear plane	D&M 1979b Figure 6A
81	Essential Service Water System	1 shear zone, 2 shear planes	D&M 1979b Figure 6A
82	Essential Service Water System	1 shear plane	D&M 1979b Figure 6A
83	Essential Service Water System	1 shear plane	D&M 1979b Figure 6B
84	Essential Service Water System	2 shear zones	D&M 1979b Figure 6C

Table 2.5-15a (continued)

Feature Number[a]	Site Location	Type(s) of Deformation(s)	Report Reference[b]
85	Essential Service Water System	1 shear zone	D&M 1979b Figures 6G
86	Essential Service Water System	2 shear zones, 5 shear planes	D&M 1979b Figure 6F
87	Essential Service Water System	2 shear planes	D&M 1979b Figure 6C
88	Essential Service Water System	1 shear plane	D&M 1979b Figure 6D
89	Essential Service Water System	1 shear plane	D&M 1979b Figure 6I
90	Essential Service Water System	1 shear plane	D&M 1979b Figure 6I
91	Essential Service Water System	3 shear planes	D&M 1979b Figure 6H
92	Essential Service Water System	2 shear planes	D&M 1979b Figure 6N
93	Essential Service Water System	1 shear plane	D&M 1979b Figures 6M
94	Essential Service Water System	2 shear planes	D&M 1979b Figure 6R
95	Essential Service Water System	1 fault	D&M 1979b Figure 6U
96	Essential Service Water System	1 shear plane	D&M 1979b Figure 6X
97	Essential Service Water System	2 shear planes	D&M 1979b Figure 6W
98	Essential Service Water System	1 shear plane	D&M 1979b Figure 6AA
99	Essential Service Water System	1 shear zone	D&M 1979b Figure 6HH
100	Essential Service Water System	1 fault	D&M 1981 Figure 6B and 6D
101	Essential Service Water System	1 shear plane	D&M 1981 Figure 6K
102	Essential Service Water System	1 possible shear plane	D&M 1981 Figure 6L
103	Essential Service Water System	1 shear plane	D&M 1981 Figure 6P
104	Essential Service Water System	1 shear plane	D&M 1981 Figure 6V V
105	Essential Service Water System	1 shear zone	D&M 1981 Figure 6O
106	Essential Service Water System	1 shear zone	D&M 1981 Figure 6M

Table 2.5-15a (continued)

Feature Number[(a)]	Site Location	Type(s) of Deformation(s)	Report Reference[(b)]
107	Essential Service Water System	1 apparent shear zone, 1 possible shear plane	D&M 1981 Figure 6ZZ
108	Essential Service Water System	1 possible shear plane	D&M 1981 Figure 6DDD
109	Essential Service Water System	1 shear plane	D&M 1981 Figure 6EEE
110	Essential Service Water System	1 fault	D&M 1981 Figurea 6DDD, 6GGG, 6HHH
111	Essential Service Water System	1 fault	D&M 1981 Figure 6HHH
112	Essential Service Water System	1 fault, 1 shear plane	D&M 1981 Figure 6FFF
113	Essential Service Water System	1 fault	D&M 1981 Figures 7B, 7C, 7D, 7E
114	Essential Service Water System	1 fault	D&M 1981 Figure 6GG
115	Essential Service Water System	2 shear planes	D&M 1981 Figures 6HH
116	Essential Service Water System	2 shear planes	D&M 1971 Figure 6JJ
117	Essential Service Water System	1 fault	D&M 1981 Figure 6KK
118	Essential Service Water System	1 fault	D&M 1981 Figure 6KK
119	Essential Service Water System	1 shear plane	D&M 1981 Figure 6JJ
120	Essential Service Water System	several shears	D&M 1981 Figures 6LL and 6MM
121	Essential Service Water System	1 fault	D&M 1971 Figure 6OO
122	Essential Service Water System	3 faults	D&M 1981 Figure 6PP
123	Essential Service Water System	1 possible shear zone	D&M 1981 Figure 6V
124	Essential Service Water System	1 shear zone, 1 shear plane	D&M 1981 Figure 6V
125	Essential Service Water System	3 shear zones	D&M 1981 Figure 6EE
126	Essential Service Water System	1 fault	D&M 1981 Figures 6FF, 6QQ, 6RR
127	Essential Service Water System	some apparent shears	D&M 1981 Figure 6SS

TABLE 2.5-15b

SUMMARY OF DEFORMATION ZONES
GEOLOGIC UNITS OTHER THAN THE HEUMADER SHALE MEMBER

Feature Number[a]	Site Location	Type(s) of Deformation(s) and Geologic Unit	Report Reference[b]
128	Low-level outlet tunnel	Normal fault Unnamed Member of the Lawrence Formation	D&M 1979b Figure 10V; revised in D&M 1981 as Figure A-1
129	Auxiliary spillway N. exc. slope	Shear zone Heebner Shale Member	D&M 1981 Figures 11Q and 11R
130	Service spillway	Shears, soft sediment deformation features #1, #11-#17 (no deformation at #12) Ireland Sandstone Member	D&M 1981 Figures 11H and 11U Figures 11J, 11W, 11X, and 11Y
131	Service spillway	Shears, soft sediment deformation features #2-#10 Ireland Sandstone Member	D&M 1981 Figures 11L and 11V Figure 11H[c]

[a]Feature numbers correspond to locations of deformation zones shown on Figure 231.1-1.

[b]D&M 1979b = Dames & Moore, 1979b (see FSAR Site Addendum, Section 2.5.7 for complete reference).

D&M 1981 = Dames & Moore, 1981, Results of geologic excavation mapping, Wolf Creek Generating Station, Unit No. 1, for Kansas Gas & Electric Company and Kansas City Power & Light Company: Dames & Moore (August 13).

[c]Feature #2 is located at Station 7+15, in the face of the 3:1 slope, 17 feet east of the west excavation slope. This feature is not visible at the scale of Figure 11H but is similar in appearance to the other mapped features.

TABLE 2.5-16 Sheet 1 of 5

OIL WELLS DRILLED
IN THE VICINITY OF THE SITE

Well Number[a]	Completion Date	Total Depth (feet)	Unit at Total Depth	Comments
1	11-19-23	1,198	--	Dry
2	5-29-72	2,160	Arbuckle	Dry
3	6-05-72	2,185	Arbuckle	Dry
4	3-04-23	2,060	Arbuckle	Dry
5	11-20-39	1,639	Mississippian	Dry
6	7-23-74	1,953	Arbuckle	Dry
7	7-23-74	1,955	Arbuckle	Dry
8	12-18-22	1,970	--	Dry
9	--	1,578	Mississippian	Dry
10	9-22-39	2,222	Arbuckle	Dry
11	5-20-73	2,100	Arbuckle	Dry
12	4-19-53	1,400	--	Dry
13	--	1,590	Mississippian	Dry
14	11-05-24	1,896	Arbuckle	Dry
15	2-27-74	1,863	Arbuckle	Dry
16	11-13-74	1,896	Arbuckle	Dry

[a]Well numbers correspond to those shown on Figure 2.5-20.

Source: Information contained in the proprietary files of the Bensen Mineral Group, Incorporated (Independence, Kansas) and the open files of the Kansas Geological Survey and the State Corporation Commission of Kansas and Petroleum Information Corporation, Mid-Continent Region Newsletter(s) 1973-1981. Dashes indicate no data available.

TABLE 2.5-16 (continued) Sheet 2 of 5

Well Number[a]	Completion Date	Total Depth (feet)	Unit at Total Depth	Comments
17	6-04-23	2,425	Arbuckle	Dry
18	5-06-53	--	Simpson	Dry
19	10-28-63	1,445	Mississippian	Dry
20	10-30-61	1,600	--	Dry
21	4-23-60	1,515	--	Dry
22	11-08-43	1,245	--	Dry
23	7-07-74	1,910	Viola	Dry
24	8-05-74	--	--	Abandon Location
25	1-31-28	1,654	--	Dry
26	12-06-73	2,012	Arbuckle	Dry
27	8-09-51	1,216	--	Dry
28	12-30-51	1,612	Mississippian	Dry
29	2-08-30	1,516	Mississippian	Dry
30(b)	10-19-72	1,765	Arbuckle	Dry
31(b)	9-19-72	1,780	Arbuckle	Dry BHP[c] 523-514
32(b)	10-30-73	1,688	Viola	IPP[d] 25
33(b)	5-04-73	1,777	Arbuckle	Dry BHP 565-565
34(b)	10-30-73	1,698	Viola	IPP 25 BHP 590-580

[b] Wells in Avon Field.

[c] BHP = Bottom Hole Pressure in pounds per square inch.

[d] IPP = Initial Performance Pumping in barrels of oil per day.

TABLE 2.5-16 (continued) Sheet 3 of 5

Well Number[(a)]	Completion Date	Total Depth (feet)	Unit at Total Depth	Comments
35[(b)]	4-29-74	1,750	Simpson	Dry BHP 40-20
36[(b)]	4-24-74	1,699	Viola	Dry
37[(b)]	4-05-74	1,680	Viola	IPP 45
38[(b)]	1-28-74	1,696	Viola	IPP 30
39[(b)]	9-28-73	1,859	Arbuckle	Dry
40[(b)]	6-07-74	1,686	Viola	IPP 15
41[(b)]	8-21-74	--	--	Abandoned
42[(b)]	7-25-74	1,017	Pennsylvanian	Dry
43	5-22-51	1,685	--	Dry
44	7-29-74	1,058	Pennsylvanian	Dry
45[(b)]	9-10-74	1,693	Viola	IPP 25
46[(b)]	9-10-74	1,725	Viola	IPP 25
47	7-15-74	1,910	Arbuckle	Dry
48	9-26-74	1,790	--	Dry
49[(b)]	11-03-74	1,765	Simpson	Dry
50	3-19-75	2,229	Arbuckle	Dry
51	4-01-75	2,071	Arbuckle	Dry
52	4-07-75	2,036	Arbuckle	Dry
53	4-16-75	1,824	Arbuckle	Dry
54	5-12-75	1,900	Arbuckle	Dry
55	4-30-75	1,840	Simpson	Dry
56	4-25-75	1,722	Viola	Dry

TABLE 2.5-16 (continued) Sheet 4 of 5

Well Number[(a)]	Completion Date	Total Depth (feet)	Unit at Total Depth	Comments
57	7-30-75	1,822	Simpson	Dry
58	8-05-75	1,900	Arbuckle	Dry
59	7-26-75	1,850	Arbuckle	Dry
60	11-02-75	1,822	Simpson	Dry
61	10-18-75	1,900	Arbuckle	Dry
62	10-07-75	1,913	Arbuckle	Dry
63	11-11-75	1,748	Viola-Simpson	Dry
64	1-22-76	1,751	Simpson	Dry
65	3-05-76	1,937	Simpson	IPP 20 BOPD
66	3-05-76	1,934	Simpson	IPP 20 BOPD
67	3-04-76	2,007	Arbuckle	Dry
68	5-22-76	1,975	Arbuckle	Dry
69	6-08-76	1,993	Arbuckle	Dry
70	6-06-76	1,860	Arbuckle	Dry
71	5-29-76	1,925	Arbuckle	Dry
72	6-29-76	1,939	Viola	IPP 16 BO + 104 BWDP
73	10-11-76	1,953	Arbuckle	Dry
74	10-16-76	1,964	Simpson	Dry
75	11-18-76	2,285	Arbuckle	Dry
76	4-10-77	1,040	Squirrel	8 BOPD
77	12-19-77	2,018	Simpson	Dry
78	11-04-77	2,010	Arbuckle	Dry

TABLE 2.5-16 (continued)

Well Number[a]	Completion Date	Total Depth (feet)	Unit at Total Depth	Comments
79	9-17-78	1,746	Simpson	Dry
80	7-13-79	1,670	Arbuckle	Dry

TABLE 2.5-17

LETTER FROM THE DIRECTOR OF THE

KANSAS GEOLOGICAL SURVEY (August 3, 1973)

KANSAS GEOLOGICAL SURVEY
Office of the Director

1930 Avenue "A", Campus West
The University of Kansas
Lawrence, Kansas 66044
913-864-3965

August 3, 1973

Dr. John S. Trapp
Dames & Moore
1550 Northwest Highway
Park Ridge, Illinois 60608

Dear Dr. Trapp:

The State Geological Survey of Kansas, organized on a continuing basis in 1889, has accumulated and analyzed data in printed and file form concerning the geology of Kansas over that period. These data relating to oil and gas fields in eastern Kansas reveal no known cases of ground subsidence resulting from the removal of oil and gas.

Mr. Frank Wilson, Engineering Geologist with our Environmental Geology Section, has been in close contact with this subject through personal experience and inquiry, and has contacted other appropriate people who may be knowledgeable about the subject. Prior to joining the Kansas Geological Survey in 1969, Mr. Wilson served as an Engineering Geologist for the Kansas Highway Commission for 17 years. Most of his work was in eastern and southeastern Kansas. Because of the relative abundance of oil and gas fields in southeastern Kansas, many of the proposed highway routes which he investigated were in or near such oil- or gas-producing fields. During the 17 years he was in the field in that area, and during the subsequent four years as Engineering Geologist with the Kansas Geological Survey, he has not observed or heard of any subsidence as the result of oil and gas production.

Mr. Wilson has consulted with Margaret Oros, Head of the Oil and Gas Division of the Geological Survey, and with Dr. Paul Hilpman, formerly of the Oil and Gas Division and now Chief of the Environmental Geology Section of the Kansas Geological Survey. No reported or observed instances of land-surface subsidence in eastern Kansas resulting from withdrawal of oil, gas, or water from deep reservoirs are known to them.

Dr. John S. Trapp -2- August 3, 1973

Mr. Wilson also has consulted with Mr. Bruce Latta, Chief of the Oil Field Section of the State Board of Health concerning your question. His geologists constantly are in the oil fields monitoring brine disposal problems. They would be the first to notice or to be informed of any subsidence or problems associated with subsidence. Mr. Latta has stated that he is not aware of any observations or reports of subsidence due to oil and gas production in eastern Kansas.

The State Geological Survey of Kansas knows of no cases where repressurization of producing fields by oil, gas, or water has resulted in surface uplift. Again, Mr. Wilson during 17 years in the field in the area and subsequent investigations as Engineering Geologist with the Kansas Geological Survey, has not observed or heard of any uplift due to secondary repressuring of oil producing zones in the area of Kansas east of the subcrop of the Permian salt horizons.

Our staff agree that if any subsidence has occurred, it would be evident most likely in the area of the El Dorado field in Butler County. This is one of the oldest fields in Kansas, and it produces both oil and gas from multiple horizons ranging from the Permian down to the "granite wash." There are two U.S. Coast and Geodetic second-order level lines through or near the area of possible subsidence. These are the Strong City to El Dorado, Kansas, second-order line, no. 90, first surveyed in 1940; and the Florence to Augusta second-order line, no. 27, first surveyed in 1934. These lines have been resurveyed and adjusted periodically. You may wish to compare the elevations of bench marks in the El Dorado oil field area over the period of record to determine if there is any evidence of progressive downward adjustment.

Please call upon us if we can be of further service to you.

Very cordial regards,

William W. Hambleton

William W. Hambleton
Director

WWH/dc

TABLE 2.5-18

MODIFIED MERCALLI INTENSITY (DAMAGE) SCALE OF 1931

(Abridged)

I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale.)

II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale.)

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing of truck. Duration estimated. (III Rossi-Forel Scale.)

IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sounds. Sensation like heavy truck striking building. Standing motorcars rocked noticeably. (IV to V Rossi-Forel Scale.)

V. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale.)

VI. Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale.)

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars. (VIII Rossi-Forel Scale.)

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed. (VIII+ to IX Rossi-Forel Scale.)

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale.)

X. Some well-built wooded structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale.)

XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII. Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown upward into the air.

TABLE 2.5-19

SEISMIC EVENTS SIGNIFICANT TO THE SITE

Sources*	Year**	Date	Modified Mercalli Intensity	Body Wave Magnitude***	Location	Latitude	Longitude	Area (mi^2)
1	1811(b)	Dec 16	X-XI	6.8-7.3	New Madrid, Missouri	36.6	89.6	2,000,000
1	1812(b)	Jan 22	XI-XII	7.3-7.8	New Madrid, Missouri	36.6	89.6	2,000,000
1	1812(b)	Feb 7	XI-XII	7.3-7.8	New Madrid, Missouri	36.6	89.6	2,000,000
1,2,3,4	1867(b)	Apr 24	VII	5.3	Manhattan (Wamego), Kansas	39.5	96.7	300,000
1,2,3,4	1875(a)	Nov 8	V	4.3	Valley Falls, Kansas	39.3	95.5	8,000
2	1877(b)	Nov 15	VII(2)	5.3	East Nebraska	41.0	97.0	140,000
2,3,5	1879	Mar	IV-V	3.8-4.3	Kirwin, Kansas	39.3	99.0	---
2,3,7	1881(a)	May 19	III	3.3	Lawrence, Kansas	38.9	95.2	---
1,2,8	1882(b)	Oct 22	VII	5.3	Bonham, Texas	33.6	95.6	135,000
2,9	1885(a)	Feb 21	III	3.3	Carthage, Missouri	37.2	94.3	---
1,2	1895(b)	Oct 31	VIII	5.8	Charleston, Missouri	37.0	89.4	1,000,000
2,3,4,9	1897(a)	Dec 2	IV	3.8	Eastern Kansas	-	-	45,000
2,9	1901(a)	Jan 3	V	4.3	El Dorado Springs, Missouri	37.5	94.0	2,000
2,7	1903(a)	Jan 13	I-II	2.3-2.8	Baldwin, Kansas	38.5	95.2	---
1,2,3,4	1904	Oct 27	IV-V	3.8-4.3	Dodge City, Kansas	37.7	100.0	2,700
1,2,3,4,7	1906(a,b)	Jan 7	VII	5.3	Manhattan, Kansas	39.2	96.5	36,000
3,7,10	1906 (a)	Jan 8	III	3.3	Manhattan, Kansas	39.3	96.6	---

*For list of Sources, see Pages 4 and 5.

**Events with Intensity V or greater at distances of 100 to 200 miles from the site are listed in the table. All events within 100 miles of the site are indicated in the table and are denoted with (a). All events perceptible at the site are denoted with (b).

***Body wave magnitude (M_b) is calculated from the relationship $I_o = 2(M_b) - 3.5$ (Reference 9).

WOLF CREEK

TABLE 2.5-19 (continued)

Sources*	Year**	Date	Modified Mercalli Intensity	Body Wave Magnitude***	Location	Latitude	Longitude	Area (mi^2)
2,3,4,7	1906(a)	Jan 15	II-III	2.8-3.3	Manhattan, Kansas	39.3	96.6	---
2,3,4,7	1906(a)	Jan 19	II-III	2.8-3.3	Manhattan, Kansas	39.3	96.6	---
2,3,4,7	1906(a)	Jan 23	III(2)	3.3	Manhattan, Kansas	39.3	96.6	---
2,3,4,7	1907(a)	Jan 2	IV	3.8	Arkansas City, Kansas	37.1	97.0	---
2,3,4,7	1907(a)	Jan 11	IV	3.8	Arkansas City, Kansas	37.1	97.0	---
1,2	1917	Mar 28	VI	4.8	Texas Panhandle	35.3	101.2	Local
1,2	1918	Sep 1	V-VI	4.3-4.8	El Reno, Oklahoma	35.5	97.9	400
1,2	1918	Sep 10	V	4.3	El Reno, Oklahoma	35.5	98.0	1,000
2,3,4,7	1919(a)	May 26	IV	3.8	Wichita, Kansas	37.7	97.3	9,500
2,3,4,9	1919(a)	Jul 26	IV-V	3.8-4.3	Wichita, Kansas	37.7	97.3	4,000-10,000
2	1920(a)	Oct 3	III	3.3	Harrisonville, Missouri	38.2	94.1	3,000
6	1924	Jun 6	III	3.3	Near Cleveland, Oklahoma	36.3	96.5	---
1,2	1925(b)	Jul 30	VI	4.8	Texas Panhandle	35.4	101.3	200,000
1,2	1926	Jun 20	V	4.3	Oklahoma-Arkansas Border	35.5	94.9	18,000
2,3,4,9	1927(a)	Jan 7	IV-V	3.8-4.3	McPherson, Kansas	38.4	97.7	4,000
1,2,3,4	1927	Mar 18	V-VI	4.3-4.8	White Cloud, Kansas	40.0	95.3	300
1,2,3,4	1928(a)	Nov 8	IV	3.8	Beloit, Kansas	39.5	98.1	Local
1,2,3,4,10	1929(a,b)	Sep 23	V(2)	4.3	Manhattan, Kansas	39.2	96.3	15,000
1,2,3,4,10	1929(a,b)	Oct 21	V	4.3	Junction City, Kansas	39.2	96.5	8,000
2,3,4,10	1929(a)	Oct 23	II-III	2.8-3.3	Junction City, Kansas	39.0	96.8	---
2,3,4,10	1929	Nov 26	IV	3.8	Ashland, Kansas	37.2	99.7	---
1,2,3,4,10	1929(a,b)	Dec 7	V	4.3	Manhattan, Kansas	39.2	96.5	1,000
1,2,10	1929	Dec 27	VI	4.8	El Reno, Oklahoma	35.5	98.0	3,000

TABLE 2.5-19 (continued)

Sources*	Year**	Date	Modified Mercalli Intensity	Body Wave Magnitude***	Location	Latitude	Longitude	Area (mi^2)
2,3,4,6,10	1931(a)	Aug 9	VI	4.8	Turner, Kansas	39.1	94.7	300
1,2,3,4,6,10	1932	Jan 28	V	4.3	Ellis, Kansas	39.0	99.6	2,000
1,2,4,10	1933	Feb 20	V-VI	4.3-4.8	Norton, Kansas	39.8	99.8	5,700-6,000
1,2,6,10	1933	Aug 19	V-VI	4.3-4.8	El Reno, Oklahoma	35.5	97.8	500
1,2,10	1935(b)	Mar 1	VII	5.3	Tecumseh, Nebraska	40.3	96.2	50,000
1,2,10	1936	Jun 19	VI	4.8	Borger, Texas	35.8	101.3	44,000
6	1937	Jun 8	IV	3.8	Near Shawnee, Oklahoma	35.3	96.9	25,000
1,2,10	1939(b)	Nov 23	V	4.3	Griggs, Illinois	38.2	90.1	150,000
6	1941	Oct 18	V	4.3	Near Cordell, Oklahoma	35.4	99.0	250
2,3,4,10	1942	Sep 10	IV	3.8	Hays, Kansas	38.9	99.3	---
1,2,10	1948	Mar 11	VI	4.8	Dalhart, Texas	36.0	102.5	115,000
4,6	1948	Apr 2	IV	3.8	Beechwood, Kansas	37.7	97.2	---
1,2,10	1950	Feb 8	V	4.3	Lebanon, Missouri	37.4	92.4	5,500
1,2,10	1951	Jun 20	VI	4.8	Amarillo, Texas	35.5	103.0	25,000
1,2,10	1952(b)	Apr 9	VII	5.3	El Reno, Oklahoma	35.4	97.8	247,000
6	1952	Apr 11	IV	3.8	Near Tabler, Oklahoma	35.1	97.8	140,000
1,2,10	1952	Apr 16	V	4.3	El Reno, Oklahoma	35.4	97.8	8,000
1,2,10	1953	Mar 17	VI(2)	4.8	Concho, Oklahoma	35.6	97.8	2,700
1,2,4,6	1956	Jan 6	V-VI	4.3-4.8	Barber County, Kansas	37.3	98.5	22,500
1,2,10	1956	Feb 16	VI	4.8	Edmond, Oklahoma	35.4	97.3	5,000
1	1956	Oct 30	VI-VII	4.8-5.3	Catoosa, Oklahoma	36.2	95.7	3,700
1,4	1961	Apr 13	V	4.3	Norton, Kansas	39.9	100.0	1,400
1	1961	Apr 27	V	4.3	Southeast Oklahoma	35.0	95.0	8,000

Sources*	Year**	Date	Modified Mercalli Intensity	Body Wave Magnitude***	Location	Latitude	Longitude	Area (mi^2)
1	1961(a)	Dec 25	V	4.3	Excelsior Springs, Missouri	39.1	94.6	11,000
1	1965(b)	Oct 20	VI	4.8	Eastern Missouri	37.7	91.1	160,000
1	1966	Jul 20	V	4.3	Borger, Texas	35.7	101.2	12,000
1	1968	May 2	V	4.3	Oklahoma	35.2	96.3	---
1	1968(b)	Nov 9	VII	5.3	South Central Illinois	38.0	88.5	500,000
5	1969	May 2	V	4.3	Oklahoma (Eastern)	35.2	96.3	13,000
8	1969	Jul 1	II-III	3.0	Belle Plaine, Kansas	37.4	97.0	---
5	1974	Feb 15	V	4.3	Northwest Texas (near Groom)	35.2	100.7	---
5	1976	Apr 16	IV	3.8	Texas Oklahoma border	36.1	99.9	---
5	1976	Apr 19	IV	3.8	Near Arnett, Oklahoma	36.1	99.8	---

WOLF CREEK

Sources:

1 Coffman, J.L. and Von Hake, C.A., 1973, Earthquake history of the United States: National Oceanographic and Atmospheric Administration, Boulder, Colorado.

2 Coulter, H.W., Waldron, H.H. and Devine, J.F., 1973, Seismic and design considerations for nuclear facilities: Proceedings of the Fifth World Conference on Earthquake Engineering, Rome, Italy, Paper No. 302.

3 Docekal, J., 1970, Earthquake history of the stable interior: Unpublished Ph.D. dissertation, University of Nebraska, Lincoln, Nebraska.

4 DuBois, S.M. and Wilson, F., 1978, List of earthquake intensities for Kansas, 1867-1977: Kansas Geological Survey, Environmental Geology Series 2, 56 pp.

5 National Oceanic and Atmospheric Administration, 1978, Earthquake data file, area 35-42N, 87-103W, unpublished computer printout.

6 Merriam, D. F., 1956, History of earthquakes in Kansas: Seismological Society of America Bulletin, vol. 46, no. 2, pp. 87-96.

7 _____, 1963, Earthquakes of Kansas, The geologic history of Kansas: State Geological Survey of Kansas, Bulletin 162.

8 Nuttli, O.W., 1974, Magnitude-recurrence relation for central Mississippi Valley earthquakes: Seismological Society of America Bulletin, vol. 64, pp. 189-1207.

9 Nuttli, O.W. and Herrmann, R.B., 1978, State-of-the-art for assessing earthquake hazards in the United States; Credible earthquakes for the central United States: United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Miscellaneous Paper S-73-1, Report 12.

10 Reid, M.W., 1922, Collected earthquake memos: National Oceanographic and Atmospheric Administration, clippings.

11 Rockwood, C., 1882, Some recent earthquakes: American Journal of Science, vol. 23, no. 11, p. 239.

12 Heinrich, R., 1941, Contribution to the earthquake history of Missouri: Seismological Society of America Bulletin, vol. 31, pp. 187-224.

13 U. S. Department of Commerce, 1928-1970, U.S. earthquake yearly list: U.S. Department of Commerce.

TABLE 2.5-20

EARTHQUAKES PERCEPTIBLE AT THE SITE

Year	Date	Location	MMI	Distance from Site (miles)	Site MMI[(a)]
1811	Dec 16	New Madrid, Missouri	X-XI	350	V-VI
1812	Jan 22	New Madrid, Missouri	XI-XII	350	V-VI
1812	Feb 7	New Madrid, Missouri	XI-XII	350	V-VI
1867	Apr 24	Manhattan (Wamego), Kansas	VII[(b)]	105	IV[(c)]
1877	Nov 15	Eastern Nebraska	VII	225	I
1882	Oct 22	Bonham, Texas	VII	240	III-IV
1895	Oct 31	Charleston, Missouri	VIII	350	III
1906	Jan 7	Manhattan, Kansas	VII	85	I-III(?)[(d)]
1925	Jul 30	Texas Panhandle	VI	360	II
1929	Sep 23	Manhattan, Kansas	V	75	I
1929	Oct 21	Manhattan, Kansas	V	80	I
1929	Dec 7	Manhattan, Kansas	V	80	I
1935	Mar 1	Tecumseh, Nebraska	VII	145	III
1939	Nov 23	Griggs, Illinois	V	300	I
1952	Apr 9	El Reno, Oklahoma	VII	225	III-IV
1965	Oct 20	Eastern Missouri	VI	260	II
1968	Nov 9	South Central Illinois	VII	390	II

Note: The primary reference for this table was Docekal, J., 1970, Earthquake history of the stable interior: University of Nebraska, Lincoln, unpublished Ph.D. dissertation. Additional information on the above events may be found in WCGS-1 FSAR Table 2.5-20.

[a] A site intensity of I indicates that the Wolf Creek site was on the outer bounds of the felt area.

[b] Epicentral intensity (MM) was VII-VIII according to DuBois & Wilson, 1978. See Section 2.5.5.1 and WCGS-1 FSAR Section 2.5.2.1 for discussion.

[c] Site intensity (MM) of V according to DuBois, S.M., and Wilson, F., 1978, List of earthquake intensities for Kansas, 1867-1977: Kansas Geological Survey, Environmental Geology Series 2, 56 pp., Figure 3.

[d] Site intensity (MM) of IV according to DuBois and Wilson, 1978, Figure 5.

TABLE 2.5-21

1867 MANHATTAN (WAMEGO), KANSAS, EARTHQUAKE
FELT REPORTS, INTENSITIES ASSIGNED BY DAMES & MOORE

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Manhattan (Wamego), Kansas	VI - VII	6	Glass shaken from lamp (VI)
		6	Shaking & rocking of every house (VI)
		6	General alarm - people fled from buildings (VII)
		5	Walls cracked (VI)
	VIII	6	Special report from 3 mi. S in Wabaunsee Co. - "on the farm of John Cotton,...during the earthquake the earth opened and water was thrown out of the opening in considerable quantities. At another place not far distance from above the earth opened and fire and smoke issued out. So one of our papers states."(VIII)
	VII	6, 14	Light Articles (e.g., stacked photographs) pitched over to SW (V)
		6, 11	Clocks stopped (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Manhattan (Wamego), Kansas (cont'd)		6, 11	Most inhabitants frightened (VI)
		3, 5	Stones loosened from buildings (VI)
		11	Stone buildings shook but not a crack was caused (not VI)
		11	Few stone buildings with weak walls were fractured but none fell (VI not VIII)
		3, 5, 6, 10, 11, 14	Two foot wave on Kansas River observed (VII)
		6, 11, 14	No wave observed on Big Blue River which empties into the Kansas River at Manhattan (not VII)
		6	Aftershock occurred between 3:00 and 4:00 A.M. Thursday (one day later)
		6	Cattle alarmed (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Leavenworth, Kansas	VII	13	No disturbance registered on barometer
		13	Duration estimated (III)
		6	Six-foot saws leaning against wall moved out 6 inches (VII)
		13	Windows rattled slightly (IV)
		6	Stove pipe forced apart, some joints overlapping 4 inches (VII)
		13	Light articles aggitated (V)
		6	Two contiguous buildings lifted up, separated 2 inches, settled back (VII)
		6	Woman received electrical shock from spring water, smoke seen to come from bank (VII)
		6, 13	Pendulum clocks stopped (IV)
		13	Plaster shaken from upper ceiling (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Leavenworth, Kansas (cont'd)		13	Crockery destroyed (VI)
		13	Piles of dry goods overthrown (VI)
		6, 13	In restaurants tables became animated and dishes fell (VI)
		13	Commotion among the people (VI)
		6, 13	Agitation of water in river (VI-VII)
		6	Man shaken off load of hay (VI)
Louisville, Kansas	VII	6, 13	Horses fell down in the streets (VII)
		6, 13	Chimneys toppled and fell (VII)
Paola, Kansas	VII	13	Duration estimated (III)
		6, 13	Those standing on the ground almost thrown down (VII)
		13	Windows rattled (IV)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Paola, Kansas (cont'd)		6	Large brick building which housed the Republican newspaper office much injured - one side knocked down and destroyed west to south-west direction (VIII)
		6	Sound - rolling of large train over railroad (VI)
St. Joseph, Missouri	VII	13	Windows rattled (IV)
		12	Buildings swayed (V)
		13	Direction estimated (IV)
		13	Water in tumblers spilled (IV)
		13	Hanging lamps jostled out of place (V)
		5	Walls cracked (VI)
		6, 13	Almost every man, woman, and child fled into the streets (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
St. Joseph, Missouri (cont'd)		6, 13	Windows broken (VI)
		13	Portions of plastering shaken off in one or two houses (VI)
		6	Rumbling noise (V)
		6	Shaking of entire surface of terra firma (VII)
		6	Ladies fainted, men turned pale (VII)
		13	Boxes thrown from counters (VI)
		4	Brick wall of new school house, standing on elevated piece of ground where street had been cut down, was cracked from the ground several feet up (VI-VII)
		4	Bank on which school house stood rent in a distinct seam (VI-VII)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Solomon, Kansas	VII	6	Train on Pacific RR violently rocked by shock locomotive was stopped and train men abandoned cab for fear the boiler was about to blow up (VII)
Atchison, Kansas	VI	4	Rumbling noise heard (V)
		4	Felt on second and third floors (III)
		4	Windows rattled (IV)
		4	Felt by people sitting on first floor (IV)
		4, 6	Drug store: glass jars rattled, chandeliers vibrated (IV)
		4	Crockery store: glassware, crockery and lamps shook (IV)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Atchison, Kansas (cont'd)		6	People fled from buildings to street (VI)
		4	Many alarmed (V)
		6	Water in White Creek moved rapidly after a standstill for several days (VI-VII)
		6	Vibration passed westward or northward (VI-VII)
		6	Wave moved from south to north (VI-VII)
		6	First oscillation followed by heavier more perceptibly felt swell (VI-VII)
Des Moines, Iowa	VI	6, 13	Rocked persons sitting in chairs (III)
		6, 13	Buildings shook (III-IV)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Dubuque, Iowa	VI	6, 13	Persons upon the ground could hardly detect a shock, but the occupants of second and third stories felt it very plainly (III)
		13	Duration estimated (III)
		6, 13	Window panes rattled (IV)
		6	Three shocks felt (IV)
		6	Openings formed in brick walls (VI)
		6	Gas burners vibrated like pendulum (VI)
		6	Cases shook in newspaper room (VI)
		6, 13	Pictures shook upon walls (V)
		6, 13	Chandeliers swayed to and fro (V)
		12	Direction estimated (IV)
		3, 6	Panic - many fled outside (V-VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Dubuque, Iowa (cont'd)		3, 13	In a few buildings some plaster fell in upper stories (VI)
		6	Persons in chairs undulated backwards and forwards (VI)
Emporia, Kansas	V - VI	6, 7	Rumbling noise heard (V)
			Duration estimated (IV)
		6, 7	Windows rattled (IV)
		6	Brick and stone houses more severly affected than frame houses (VI)
		7	Cans and bottles disturbed (V)
		6, 7	Small books fell from shelves (V-VI)
		6	Panic - people fled from buildings (VI)
Holton, Kansas	VI	6	People fled to streets (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Holton, Kansas (cont'd)		6, 13	Goods and wares fell off the shelves in several dry goods stores (VI)
		6	Shook buildings (VI)
Iola, Kansas	IV	6, 13	Rattled crockery on shelves (IV)
	VI	6	Shook houses (VI)
Junction City, Kansas	VI	6	Very heavy shock
		6	Rocked buildings to and fro, moving several inches (VI)
		20	People in second story went down stairs (V-VI)
		6	Shock seems not to have extended over a quarter of a mile in width
		5, 20	Well being dug destroyed (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Kansas City, Missouri	VI	13	Duration estimated (IV)
		13	Shaking and rocking of every house (IV)
		13	Crockery on shelves rattled (IV)
		13	Direction estimated (V)
		13	Glass on lamps shaken (V)
		13	Moveable articles of furniture moved (VI)
		12	People rushed out of houses (VI)
		12	Portions of plaster were broken off one or two houses (VI)
		13	Breaking of plaster (VI)
		13	Tables moved (VI)
		13	Portions of plastering were shaken off one or two houses but no serious damage was done (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Lawrence, Kansas	VI	3, 6, 9	Rumbling noise heard (V)
		17	Felt on second and third stories (III)
		9	Not felt by people out of doors (not V)
		2	Rattled crockery (V)
		5	Bottles broken on shelves (VI)
		3, 17	Plaster cracked (VI)
		5, 9	Doors and windows broken (VI)
		6, 9	Type thrown down in printing office (VI)
		2, 6	Tumbled some bundles from shelves (VI)
		6, 9	Bottles shaken off drugists shelves (VI)
		9, 14	Walls in some instances slightly cracked (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Lawrence, Kansas (cont'd)		6	Three shocks felt over a period of 30 seconds (IV)
Lecompton, Kansas	V-VI	6	Panic - people fled to streets (VI)
		13	Duration estimated (IV)
		13	Windows and doors rattled (IV)
		13	Direction estimated (V)
Marysville, Kansas	VI	3	Loud rumbling noise heard (V)
		3	Doors and shutters swung back and forth (V)
		6, 21	Windows, doors, shutters, stove pipes rattled, waved, and swung back and forth (V)
		21	In stores bottles and packages rattled (IV)
		5, 6	Temporary alarm of a few (V-VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Marysville, Kansas (cont'd)		5, 6	Bottles fell off shelf (VI)
		6	Felt by people on first and second floor (III)
		6, 9	Some articles shaken from shelves and broken (VI)
		6, 21	Man fishing in Spring Creek sees trees tremble (VI)
Oskoloosa, Kansas	VI	13	Duration short (III)
		6, 11, 13	Moveable objects moved (VI)
		6	Houses vibrated (VI)
		6	Rumbling noise (V)
		6	Cupola of new school house reeled like druken man (VI)
Ottawa, Kansas	V-VI	6	Houses emptied of occupants (V-VI)
			Buildings shaken (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Topeka, Kansas	VI	6	Floor heaved and sank lower than its normal level (VI)
		18	Rumbling noise heard (V)
		6	Horses broke loose from hitching racks and ran toward open country (VI)
		18	Duration estimated (IV)
		5	Windows broken (VI)
		14	People fled from church, many junmping through the broken windows (VI)
Warrensburg, Missouri	VI	6, 13	No damage done
		6	Walls of church heaved "as if moved by a shock from SW" (VI)
		6, 13	Plastering fell from ceiling (V-VI)
		6	Buildings moved (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Wyandotte, Kansas	VI	13	Felt
		13	Duration estimated (IV)
		6, 13	Windows rattled and jarred (VI)
		6, 13	Dishes shaken (IV)
		13	Direction estimated (V)
		6, 13	Those sleeping awakened (V)
		6, 13	Doors jarred open (V)
		6, 13	Houses swayed (VI)
Montgomery County, Kansas	V	1, 6	Shook buildings and dishes off the shelves (IV-V)
		1, 6	Not felt by people riding the stage (not VII)
Mound City, Kansas	V	13	Direction estimated (V)
		6, 13	Water shaken from buckets (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Mound City, Kansas (cont'd)		6, 13	Tumbling of loose articles (V)
		6, 13	Doors of some rooms opened (V)
		6	Houses violently shaken (VI)
Olathe, Kansas	V	13	Duration estimated (III)
		6, 13	Glass ware in the drug store almost thrown from the shelves (V)
		6, 13	Shingles on the roofs of houses were seen to break loose (V)
		6	Houses seen to totter, wave back and forth (VI)
		6	Deep rumbling sound (V)
Jefferson City, Kansas	III	13	Noticed only by a few persons (III)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
St. Louis, Missouri	III	4	Felt slightly (III)
		12	Furniture, crockery, etc. shaken (IV-V)
		19	"Effects of the shock diminished in force after crossing the Missouri River. We are lead to this conclusion from a careful perusal of our St. Louis exchange. At that point, there seems to have been a slight shock, but from our personal knowledge of the temporary structures of which a large portion of that city is composed, we are satisfied it never could have withstood the terrific shock we experienced here without damage to both buildings and human life."
Salina, Kansas	$\geq$ III	13	Duration estimated (IV)
		6	Shaking lasted 10 seconds, no damage reported

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Wathena, Kansas	III	13	"Small earthquake"
		13	Duration estimated (III)
Humbolt, Kansas	*	13	Earthquake felt, no intensity assigned.
Fort Kearney, Nebraska	*	13	Earthquake felt, no intensity assigned.
Omaha, Nebraska	*	13	Earthquake felt, no intensity assigned.
Weston, Missouri	*	13	Earthquake felt, no intensity assigned.
Sedalia, Missouri	*	13	Earthquake felt, no intensity assigned.
Cairo, Illinois	*	13	Earthquake felt, no intensity assigned.

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Carthage, Ohio	*	13	Three mi. S of Carthage on Miami Canal an acre of ground sank 10' leaving a perpendicular wall of 10' on all sides (questionable report).
Nebraska	*	3, 10, 13, 14, 15	Earthquake felt, no intensity assigned.
Arkansas	*	3, 5	Earthquake felt, no intensity assigned.
Missouri	*	3, 5, 10, 13, 14, 15	Earthquake felt, no intensity assigned.
Kentucky	*	3	Earthquake felt, no intensity assigned
Indiana	*	10, 14, 15	Earthquake felt, no intensity assigned

<u>* No intensity assigned</u>

1 Capital, January 8, 1906, Topeka, Kansas.

2 Cardley, Richard, 1867, Reverand, Lawrence, Kansas: written communication, May 7.

3 Coffman, J.L. and Von Hake, C. A., 1973, Earthquake history of the United States: National Oceanographic and Atmospheric Administration, Boulder, Colorado.

4 Daily Free Press, April 25 & 26, 1867, Atchison, Kansas.

5 Docekal, Jerry, 1970, Earthquake history of the stable interior: University of Nebraska, Lincoln, Nebraska, unpublished Ph.D. dissertation.

6 DuBois, Susan M. and Wilson, Frank W. 1978, List of Earthquake Intensities For Kansas, 1867-1977: Environmental Geology Series 2, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas

7 Emporia News, April 26, 1867, Emporia, Kansas.

8 Kansas New Era, Lecompton, Kansas, April 30, 1867.

9 Lykins, H.R., 1867, American Journal of Science, V. 44, . 139.

10 Merriam, D.F., 1963, The geologic history of Kansas: State Geol. Survey of Kansas, Bull. 162.

11 Mudger, B.F., 1867, Professor State Agricultural College, Manhattan, Kansas: written communication, April 30.

12 New York Times, April 25, 1867, New York, New York.

13 Parker, J.D., 1867, Memoranda of the earthquake of April 24, 1867 (scrapbook of manuscripts, notes and mounted clippings): Kansas Collection of the Spencer Research Library, Lawrence, Kansas.

14 _______,1868, American Journal of Science, V. 45, no. 129.

15 Reid, H.F., 1968, A catalogue of earthquakes in the United States prior to 1925 (complied by G.P. Wollard).

16 Snow, Frank H., 1867, Professor State University, Lawrence, Kansas: written communication, May 20.

17 Tribune, April 25, 1867, Lawrence, Kansas.

18 Tribune 17a, April 25, 1867, Topeka, Kansas

19 Tribune, 17b, April 30, 1867, Topeka, Kansas.

20 Union, April 27, 1867, Junction City, Kansas.

21 Williams, W.G., 1867, American Journal of Science, V. 44, p. 139.

TABLE 2.5-22

1877 EASTERN NEBRASKA EARTHQUAKE
FELT REPORTS, INTENSITIES ASSIGNED BY DAMES & MOORE

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Columbus, Nebraska	VII	5	Duration estimated (III)
		2,5,7	Walls cracked (VI-VII)
		6	Bells in public building rang (VII)
Lincoln, Nebraska	VII	5	
Omaha, Nebraska	VI	1,5,6	Duration estimated (III)
		6	Felt especially in upper stories of brick and stone buildings
		5	Direction estimated (V)
		1	Clock moved on wall (V)
		1	Chandelier swung back and forth (V)
		1	Felt in every part of the city (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Omaha, Nebraska	VI	1	Tables and chairs shaken (V-VI)
		1	General stampede of citizens into the streets (VI)
Council Bluffs, Iowa	V	6	No damage resulted
		1,6	Duration estimated (III)
		6,7	Direction estimated (V)
		5	People flee from brick buildings (V)
North Platte, Nebraska	V	2	Duration estimated (III)
		2,5,7	Cracked walls in upper floor (V-VI)
		5	Overturned printing cases (VI)
Sioux City, Iowa	VI	5	Duration estimated (III)
		5	Panic in church (V-VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Sioux City, Iowa (cont'd)	VI	1	Nearly everyone ran into the street (V-VI)
		1,5,2,5	One wall in the high school cracked (VI)
Yankton, South Dakota	V	5,2	Duration estimated (III)
		5,6	Cracked walls in upper stories, glassware broken
		6	People rushed from their houses in fright (V-VI)
		6	Fall of some plaster (VI)
West Point, Nebraska	IV	5	Rattled windows (IV)
Atchison, Kansas	III	4	People from upper stories in several buildings ran into streets (III-IV)
Clarks, Nebraska	III	5	Duration estimated (III)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
St. Joseph, Mo.	III	2	Intensity MM (III)
Wyandotte, Kansas	III	8	Felt by people on high ground and those in brick buildings (III)
Big Springs, Nebraska	*	2	Earthquake felt, no intensity assigned.
De Sota, Nebraska	*	2	Earthquake felt, no intensity assigned.
Fort Hartsuff, Nebraska	*	2	Earthquake felt, no intensity assigned.
Fort McPherson, Nebraska	*	2	Earthquake felt, no intensity assigned.
Genoa, Nebraska	*	2	Earthquake felt, no intensity assigned.
Grand Island, Nebraska	*	2	Earthquake felt, no intensity assigned.
Kearney Junction, Nebraska	*	2	Earthquake felt, no intensity assigned.

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Ogallala, Nebraska	*	2	Earthquake felt, no intensity assigned.
Plattsmouth, Nebraska	*	2	Earthquake felt, no intensity assigned.
Paxton, Nebraska	*	2	Earthquake felt, no intensity assigned.
Potter, Nebraska	*	2	Earthquake felt, no intensity assigned.
Sidney, Nebraska	*	2	Earthquake felt, no intensity assigned.
Sutton, Nebraska	*	2	Earthquake felt, no intensity assigned.
Wisner, Nebraska	*	2	Earthquake felt, no intensity assigned.
Boone, Iowa	*	2	Earthquake felt, no intensity assigned.
Boonsboro, Iowa	*	2	Earthquake felt, no intensity assigned.
Denison, Iowa	*	2	Earthquake felt, no intensity assigned.

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Dubuque, Iowa	*	2	Earthquake felt, no intensity assigned.
Iowa City, Iowa	*	2	Earthquake felt, no intensity assigned.
Logan, Iowa	*	2	Earthquake felt, no intensity assigned.
Monticello, Iowa	*	2	Earthquake felt, no intensity assigned.
Odgen, Iowa	*	2	Earthquake felt, no intensity assigned.
Tabor, Iowa	*	2	Earthquake felt, no intensity assigned.
Lawrence, Kansas	*	5,8	Earthquake felt, no intensity assigned.
Kansas City, Kansas	*	5,8	Earthquake felt, no intensity assigned.
Topeka, Kansas	*	5,8	Earthquake felt, no intensity assigned.

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Fort Tandall, South Dakota	*	2	Earthquake felt, no intensity assigned.
Olivet, South Dakota	*	2	Earthquake felt, no intensity assigned.
Springfield, South Dakota	*	2	Earthquake felt, no intensity assigned.
Albert Lea, Minnesota	*	2	Earthquake felt, no intensity assigned.
Winebago City, Minnesota			Earthquake felt, no intensity assigned.
St. Joseph, Missouri	*	5,2	Earthquake felt, no intensity assigned.
La Crosse, Wisconsin	*	2	Earthquake felt, no intensity assigned.

*No intensity assitned.

1 Chicago Daily News, November 16, 1877, Chicago, Illinois

2 Coffman, J.L. and Von Hake, C.A., 1973, Earthqwuake history of the United States: National Oceanographic and Atmospheric Administration, Boulder, Colorado.

3 Commonwealth, November 16, 1877, Topeka, Kansas.

4 Daily Champion, November 16, 1877, Atchison, Kansas.

5 Docekal, Jerry, 1979, Earthquake history of the stable interior: University of Nebraska, Lincoln, Nebraska, unpublished Ph.D dissertation.

6 New York Times, November 16, 1877, New York, New York.

7 Rockwood, C., 1878, American Journal of Science, V. 115, p. 26 and 238.

8 Wyandotte Herald, November 16, 1877, Kansas City, Kansas.

TABLE 2.5-23

1906 MANHATTAN, KANSAS, EARTHQUAKE
FELT REPORTS, INTENSITIES ASSIGNED BY DAMES & MOORE

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Manhattan, Kansas	VII	1,5	Rumbling noise (V)
		1, 5	Dishes on table shaken together (IV)
		1, 5	Wave from SW to NE (VI)
		1	No damage done (not VI)
		1, 5	Articles fell from shelves (VI)
		1,5	People fled houses terrified (VII)
		6	Plaster cracked (VII)
		3, 5	Some cracks in walls (VII)
		1, 3, 4, 5	Brick chimneys knocked down from school building, Union Pacific freight depot, and several houses (VII)
		5	Lateral motion followed by vertical movement (VI)
		5	Persons in the dining room of the Gillett Hotel rushed out into the street (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Manhattan, Kansas (cont'd)			
		5	Aftershock 20 minutes later
		5	Vase, lamp or bottle broken in every house (VI)
		5	Aftershock January 23 at 8:00 am
Alma, Kansas	VI	5	Walls rocked, floors weaved (VI)
		5	Windows rattled, chinaware jumped (VI)
		5	People felt weak in the knees (VI)
		5	Followed by second shock at 10:30 pm which was slight, and caused no alarm (IV)
		5	Low rumbling sound proceeded shock (V)
Junction City, Kansas	VI	1, 5	Dishes and windows rattled (IV)
		1, 5	Some parts of town: many frightened people left their homes (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Junction City, Kansas (cont'd)		1, 5	In some houses articles were shaken from shelves and tables (VI)
		4, 5	Plaster knocked from walls (VI)
Wamego, Kansas	VI	4, 5	Plaster knocked from walls (VI)
		5	Things tumbled about generally (V)
		5	Pictures shaken from wall (VI)
		5	Bottles shaken from shelves (VI)
Westmoreland, Kansas	VI	5	Plastering jarred off courthouse in places (VI)
Abilene, Kansas	V	1, 5	Rattled dishes (IV)
		1, 5	Water in glass showed considerable motion (V)
		1	Many people alarmed (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Abilene, Kansas		1	Some people did not notice the shock (III)
		5	Movement plainly perceptible (V)
Cleburne, Kansas	V-VI	5	Some dishes broken (V)
		5	Some people very much disturbed, thinking an explosion had occurred (V)
		5	More severe than at Irving (V-VI)
Emporia, Kansas	V-VI	5, 6	3 shocks - Vibrations lasted for about sixty seconds (III)
		5	Many people frightened, several ran outdoors (V)
		5	Dishes rattled, houses shook (VI)
		5	More severe four miles north of town, lighter to the east, hardly felt south of Emporia

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Emporia, Kansas (cont'd)		5	Three distinct shocks all over Lyon Co. (IV)
		5	No damage reported (V)
		5	Buildings trembled (VI)
Hope, Kansas	V	5	Doors slammed shut in houses (V)
St. Joseph, Missouri	V-VI	5	Rattled dishes and tinware (V)
		5	Detached pictures from wall (V)
		5	Frightened small children (V)
		5	Shock came from south and lasted ten seconds
		5	No serious damage (VI)
		5	Tables did freakish stunts, floors swayed, dishes danced (VI)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
St. Joseph, Missouri (cont'd)		5	Plates on racks attached to wall fell to floor (V)
Topeka, Kansas	V-VI	1	Felt on 3rd floor (III)
		1, 5	Rattled glass on glass lamps (IV)
		1	Houses and windows shake (IV)
		1, 5	Dishes, windows, doors rattled (IV)
		5	Roaring sound followed by the shock (VI)
		5	Baby fell from lounge (VI)
		5	Slight shock resulting in curious inquiries at telephone office
		1, 5	Man asleep was awakened (V)
		1	People fled Gillett Hotel (V-VI)
		1	Not felt by man riding bike (not VI)

TABLE 2.5-23 (cont'd)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Auburn, Kansas	IV	5	Stove lids rattled (IV)
		5	Houses shook (VI)
		5	Same reports from Dover, in Shawnee Co.
Blue Rapids, Kansas	IV	5	Many people felt trembling or rocking (IV)
		5	Not severe (IV)
		5	In Great Western Mines, 500-600 tons of rock fell (V)
Irving, Kansas	IV-V	5	Rattled dishes on supper table (IV)
		5	Beds shaken violently (V)
		5	Some people quite alarmed (V)
		5	Similar reports from Bigelow

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Kansas City, Missouri	IV	5,6	Duration 23 seconds (IV)
		6	Shook windows (IV)
		5, 6	Rattled dishes (IV)
		6	Direction: from north (V)
		5	Shook chandeliers (V)
Lawrence, Kansas	IV (?)	5	No doubt about shaking here, (IV) although severer to the west
		5	Did not cause alarm (IV)
Lincoln, Nebraska	IV (?)	5	Shook globes and chandelier fastenings (IV)
		5	Distinctly felt although no damage was reported (IV)
Seneca, Kansas	IV	5	Jarred windows (IV)
		5	Rattled dishes (IV)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Wathena, Kansas	IV-V	5	Severe earthquake accompanied by rumbling sound noticed here (V)
			Traveled N-S (V)
			Houses shaken (V)
			Dishes rattled (IV)
Woodbine, Kansas	IV	6	Buildings shook (IV)
		6	Doors slammed (V)
		5	Dishes rattled in cupboards (IV)
Marysville, Kansas	I-III	6	Noticed by people sitting (II)
Valley Falls, Kansas	II-III	5	Slight but distinct shocks every day or so from Jan. 7 - Jan. 23
White Cloud, Kansas	II-III	5	Felt, but not very severe

TABLE 2.5-23 (cont'd)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Wichita, Kansas	II-III	6	Felt only in large downtown buildings and W side of Arkansas River (III)
		5, 6	Reports from surrounding small towns estimated shock lasted 3-4 seconds (III)
Oskaloosa, Kansas	*	4, 7	Earthquake felt, no intensity assigned.
Henington, Kansas	*	4, 7	Earthquake felt, no intensity assigned.
Beloit, Kansas	*	3, 4, 7	Earthquake felt, no intensity assigned.
Kansas City, Kansas	*	4, 7	Earthquake felt, no intensity assigned.
Salina, Kansas	*	2, 6	Earthquake felt, no intensity assigned.
Skiddy, Kansas	*	5	Most of the wells at Skiddy have gone dry - use to be half full before the earthquake

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Minneapolis, Kansas	*	6	Earthquake felt, no intensity assigned.
Clay Center, Kansas	*	6	Earthquake felt, no intensity assigned.
Plattsmouth, Nebraska	*	3, 4	Earthquake felt, no intensity assigned.
Falls City, Nebraska	*	4	Earthquake felt, no intensity assigned.
Brook, Nebraska	*	4	Earthquake felt, no intensity assigned.
Joplin, Missouri	*	2, 5	Earthquake felt, no intensity assigned.
Bethany, Missouri	*	3, 4	Earthquake felt, no intensity assigned.

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
St. Joseph, Missouri	V	4, 6	Earthquake felt, no intensity assigned.

* No intensity assigned.

1 Capital, January 8, 1906, Topeka, Kansas.

2 Chicago Daily Tribune, January 8, 1906, Chicago, Illinois.

3 Coffman, J.L. and Vontlake, C.A., 1973, Earthquake History of the United States: National Oceanographic and Atmospheric Administration, Boulder, Colorado.

4 Docekal, Jerry, 1970, Earthquake History of the Stable Interior: University of Nebraska, Lincoln, Nebraska, unpublished Ph.D. dissertation.

5 DuBois, Susan M. and Wilson, Frank W. 1978, List of Earthquake Intensities For Kansas, 1867-1977: Environmental Geology Series 2, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas.

6 Inter Ocean, January 8, 1906, Chicago, Illinois.

7 Merriam, D.F., 1963, The Geologic History of Kansas: State Geol. Survey of Kansas, Bull. 162, p. 80-290.

TABLE 2.5-24

1935 TECUMSEH, NEBRASKA EARTHQUAKE
FELT REPORTS, INTENSITIES ASSIGNED BY USCGS

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Tecumesh, Nebraska	VI	2	Two shocks, four minutes apart
		2	Sleepers awaken (V)
		2,3	Chimneys cracked (VI)
		1,2,3	Few windows broken (VI)
		1,2,3	Plaster and stone walls cracked (VI)
		1,2	Few walls cracked (VI)
		2	Dishes broken (VI)
		2,3	Few toppled chimneys (VI-VII)
Humboldt, Nebraska	VI	4	Two shocks
		4	Pictures tilted on wall (V)
		4	Some plaster and walls cracked (VI)
Pawnee City, Nebraska	V	4	Felt by nearly everyone (V)
		4	Many alarmed (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Pawnee City, Nebraska (cont'd)		4	Clock made to strike (V)
		4	Pendulum clocks stopped (V)
Peru, Nebraska	V	4	Pendulum clocks stopped (V)
Shubert, Nebraska	V	4	Frightened many (V)
		4	Damage slight (V)
Stella, Nebraska	V	4	Felt by all (VI)
		4	Frightened many (V)
		4	Pendulum clocks stopped (V)
		4	Bricks loosened in chimney (V)
St. Mary's, Nebraska	V	4	Felt by all (VI)
		4	Frightened many (V)
		4	Pendulum clocks stopped (V)
		4	Bricks loosened in chimney (V)

Location	Assigned Modified Mercalli Intensity	Reference	Earthquake Effects And Intensity Rating
Wymore, Nebraska	V	4	Shock felt, accompanied by roaring noise
		4	Pictures displaced (V)
		4	Pendulum clocks stopped (V)
Riverton, Iowa	V	4	Felt by all (V)
		4	Cemented walls cracked (VI)

"Intensity IV in Nebraska: Auburn, Blue Spring, Crab Orchard, Du Bois Fairbury, Fall City, Fullerton, Holmesville, Howe, Liberty, Lincoln, Nebraska City, Nemaha, Odell, Plattesmouth, Rulo, Salem, Steinaver, Table Rock, Virginia.

Intensity IV in Iowa: Clarinda, Emerson, Keosauqua, Mt. Ayr, Tabor, Thurman.

Intensity IV in Kansas: Atchison, Bern, Burlington, Burr Oak, Clay Center, Downs, Hamlin, Havensille, Hanover, Hiawatha, Holton, Horton, Junction City, Manhattan, Marysville, Okote, Osage City, Salina, St. Mar's, Topeka, Troy, Wamego, Wheaton, White Cloud.

Intensity IV in Missouri: Oregon and St. Joseph.

Intensity III and under in Nebraska: Central City, Columbus, Franklin, Fremont, Friend, Guide Rock, Hastings, Minden, Norfolk, Omaha, Red Cloud, Superior.

"Intensity III and under in Iowa: Albion, Anita, Atlantic, Bedrord, Carroll, Cedar Rapids, Centerville, Chariton, Corydon, Council Bluffs, Creston, Cumberland, Davis City, Des Moines, Elkader, Glenwood, Grundy Center, Hawarden, Logan, Melrose, Missouri Valley, Oakland, Van Meter, Webster City, Winterset.

Intensity III and under in Kansas: Baldwin, Belleville, Centralia, Chapman, Clifton, Cloverbrook, Concordia, Council Grove, Elmdale, Emmett, Emporia, Everest, Fairview, Florence, Fort Scott, Garnett, Heizer, Kansas City, La Cygne, Lawrence, Leavenworth, Lindsborg, Lyndon, Marion, Minneapolis, Morrill, Norton, Onaga, Oneda, Ottawa, Paola, Pomona, Pratt, Republic, Reserve, Russell, Smith Center.

Intensity III and under in Missouri: Carrollton, Excelsior Springs, Harrisonville, Kansas City, Kingston, Langdon, Liberty, Mount City, Rockport, Savannah.

Not felt in Nebraska: Alma, Blair, Kearney, Ravenna.

Not felt in Iowa: Akron, Albia, Alta, Alton, Belle Plaine, Belmond, Clinton, Columbus Junction, Dodge, Esterville, Fairfield, Forest City, Harlan, Humboldt, Inwood, Knoxville, Le Claire, Legrand, Manchester, Marathon, Mason City, Monroe, Muscatine, New Hampton, Oelwein, Ottumwa, Osage, Perry, Pocohontas, Rockwell City, Sac City, Spencer, Toledo, Wapello, Washington.

Not felt in Kansas: Alden, Anthony, Ashland, Bucklin, Carbondale, Cimarron, Colby, Coldwater, Columbus, Cottonwood Falls, Dresden, Elkhart, Eureka, Fredonia, Garden City, Great Bend, Greensburg, Hays, Healy, Hill City, Hudson, Hugoton, Independence, Iola, Jetmore, Johnson, Kismet, Lahm, Leoti, Liberal, Larned, McPherson, Minneola, Minneapolis, Mount Hope, Ness City, Norwich, Oakley, Oberlin, Parsons, Plains, Plainville, Quinter, Randolph, Reading, Richfield, Scott City, Scranton, Sharon Springs, St. Francis, Sublette, Syracuse, Toronto, Tribune, Trousdale, Ulysses, Wagstaff, Wakeeney, Wellington, Winfield.

Not felt in Missouri: Chillicothe, Lamont, Marshall. (Neuman, reference 4.)

1 Coffman, J.L., and Von Hake, C.A., 1973, Earthquake history of the United States: National Ocenographic and Atmospheric Administration, Boulder, Colorado.

2 Docekal, Jerry, 1970, Earthquake history of the stable interior: University of Nebraska, Lincoln, Nebraska, unpublished Ph.D. dissertation.

3 Merriam, D.F., 1963, The geologic history of Kansas: State Geol. Survey of Kansas, Bull. 162, p. 80-290.

4 Neumann, Frank, (no date), United States Earthquakes 1935: United States Coast and Geodetic Survey, p. 16 and 17.

TABLE 2.5-25

RESULTS OF UNCONFINED
COMPRESSION TESTS ON UNDISTURBED SOIL SAMPLES

Boring	Depth (feet)	Shear Strength (psf)	Field Moisture Content (percent)	Dry Density (pcf)	Soil Type
B-1	7.5	5,980	22.1	101.5	CL-CH
B-1	19.0	936	25.4	97.6	CL-CH
B-4	7.5	4,880	17.7	105.6	CL
B-4	10.5	6,160	13.0	119.2	CL
B-4	13.5	6,860	12.5	120.7	CL
B-5	4.0	820	20.8	107.5	CL
B-6	5.0	865	23.6	119.2	CL
B-8	1.5	420	25.7	94.6	CL
B-9	4.5	1,640	20.3	105.9	CL
P-1	2.5	6,440	16.5	111.3	SC
P-8	3.5	857	20.8	85.3	SC
P-12	3.5	2,050	19.4	101.5	ML
P-13	6.0	3,190	15.7	115.3	CL
HS-1	1.0	921	9.0	107.8	CL
HS-1	2.5	1,740	24.4	105.3	CL
HS-1	4.5	1,320	17.4	110.6	SC
HS-1	6.0	2,030	23.6	96.0	SC
HS-2	1.0	1,720	14.0	97.6	ML
HS-2	2.0	2,340	8.5	125.8	CL
HS-2	4.0	2,030	20.5	101.8	CL
HS-2	8.0	1,450	23.3	99.1	CL
HS-5	2.5	1,650	36.7	83.9	CH
HS-6	9.0	774	20.3	102.6	CL
ESW-5	4.5	2,491	16.2	111.9	CL
ESW-6	3.0	1,877	16.3	103.4	CL
ESW-7	3.0	2,631	23.4	108.3	CL
ESW-9	6.6	2,714	18.8	111.5	CH
ESW-11	3.5	2,190	19.5	106.3	CL
ESW-13	5.0	3,243	18.8	113.9	CL
ESW-17	2.0	3,249	25.3	98.1	CH
ESW-20	2.0	1,405	31.1	90.1	CH

TABLE 2.5-26

RESULTS OF UNCONFINED
COMPRESSION TESTS ON RECOMPACTED SOIL SAMPLES

Boring	Depth (feet)	Degree of Compaction* (percent)	Shear Strength (psf)	Moisture Content (percent)	Dry Density (pcf)	Soil Type
B-1	7.5	92.8	2,100	13.7	107.2	CL-CH
B-1	7.5	97.5	4,080	17.1	112.6	CL-CH

* Harvard Miniature Method.

TABLE 2.5-27

RESULTS OF DIRECT SHEAR TEST ON SOIL

Boring	Depth (feet)	Normal Constant Pressure (psf)	Peak Shear Strength (psf)	Yield Shear Strength (psf)	Moisture Content (percent)	Dry Density (pcf)	Soil Type
B-9	1.5	500	520	346	28.4	90.9	SM-ML

TABLE 2.5-28

RESULTS OF UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TESTS ON UNDISTURBED SOIL SAMPLES[a]

Boring	Depth (feet)	Shear Strength (psf)	Confining Pressure (psf)	Field Moisture Content (percent)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
B-4	6.0	1,900	2,000	18.6	--	108.1	ML
B-5	6.5	3,000	2,000	17.9	--	113.1	CL
B-7	1.5	1,245	500	31.7	--	88.7	CH
P-2	2.5	1,769	418	20.4	--	104.1	CL
P-4	6.0	2,435	605	15.7	--	114.0	SM
P-5	2.0	6,720	202	12.1	--	114.7	ML
P-6	2.0	8,162	202	12.6	--	114.3	CL-ML
P-7	4.3	5,488	432	9.8	--	115.5	ML
P-8	2.5	1,757	288	19.4	--	107.0	ML-CL
P-11	3.5	422	346	27.7	--	98.0	CH
HS-14	4.0	998	1,000	27.0	27.2	95.3	CH
HS-14	6.0	1,234	2,000	22.9	23.7	98.9	CH
HS-15	1.0	977	1,000	30.2	33.0	86.6	MH-OH
HS-15	4.0	3,077	1,000	18.7	21.1	109.3	CH
HS-16 [b]	4.0	804	1,000	24.6	27.5	100.2	CL-CH
HS-16 [b]	4.0	822	1,872	24.6	27.5	100.2	CL-CH

[a] Strain rate equals 6.0 inches per hour.

[b] Two-stage test on the same test specimen.

TABLE 2.5-29

RESULTS OF UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TESTS ON RECOMPACTED SOIL SAMPLES[a]

Test Pit	Depth (feet)	Shear Strength (psf)	Confining Pressure (psf)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
TP-1	1.0-3.0	450	600	23.6	102.7	CL
TP-1	1.0-3.0	660	1800	23.5	102.8	CL
TP-2	1.0-4.0	750	600	26.9	97.9	CH
TP-2	1.0-4.0	880	1800	27.0	97.9	CH
TP-3	1.0-5.0	630	600	36.1	87.3	CH
TP-3	1.0-5.0	860	1800	36.5	87.3	CH
TP-4/TP-6	2.0-4.0/1.5-4.5	460	600	37.6	87.7	CH
TP-4/TP-6	2.0-4.0/1.5-4.5	760	1800	37.4	87.7	CH
TP-5	2.0-4.0	410	600	43.1	82.0	CH
TP-5	2.0-4.0	660	1800	41.8	82.0	CH
TP-6	5.0-6.0	390	600	36.2	87.6	CL
TP-6	5.0-6.0	630	1800	36.3	87.6	CL
TP-11	3.0[b]	2223	2160	13.7[c]	112	CL
TP-11	5.0-8.5[b]	6946	2160	14.4[c]	118	CL
TP-12	2.4[b]	6390	2160	18.1[c]	108	CH

[a] Samples recompacted to 95 percent maximum dry density per ASTM D698-70. Strain rate equals 6.9 inches per hour.

[b] Samples recompacted according to ASTM D1557-70.

[c] Not saturated. Represents as tested moisture content.

TABLE 2.5-30

RESULTS OF CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TESTS ON UNDISTURBED SOIL SAMPLES[a]

Boring	Depth (feet)	Effective Cohesion (psf)	Effective Friction Angle (degrees)	Shear Strength[b] (psf)	Consolidation Pressure (psf)	Initial Moisture Content (percent)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
HS-14	4.0	415	20.8	980	1000	27.4	29.4	85.3	CL
HS-14	6.0	415	20.8	1410	2000	22.3	22.9	99.6	CH
HS-15	1.0	575	19.8	1210	1000	29.1	29.2	94.6	MH-OH
HS-15	4.0	1290	14.3	2540	2000	19.2	21.0	99.0	CH
HS-17	2.5	575	22.0	1390	1000	20.4	21.6	105.2	CL
HS-17	4.0	750	21.3	2175	2000	22.4	23.1	104.2	CL
HS-21	1.0	345	27.3	1145	1000	34.3	35.1	83.2	CH
HS-21	2.5	345	27.3	1360	2000	33.0	34.2	87.1	CH

[a]During consolidation, the sample drained from both top and bottom; side filter paper drains were used. Pore pressures were only measured at the bottom of the sample.

[b]Strain rate equals 0.05 inches per hour.

TABLE 2.5-31

RESULTS OF CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TESTS ON RECOMPACTED SOIL SAMPLES[a]

Boring/ Test Pit	Depth (feet)	Strain Rate (inches/ hour)	Consolidation Pressure (psf)	Peak Deviator Stress[b] (psf)	Pore Pressure at Peak Deviator Stress (psf)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
TP-1	1.0-3.0	1.740	600	1080	440	23.6	102.8	CL
TP-1	1.0-3.0	1.740	1200	1140	900	22.6	102.8	CL
TP-1	1.0-3.0	1.140	1800	1400	1300	22.2	102.8	CL
TP-1	1.0-3.0	0.276	600	960	400	23.9	102.7	CL
TP-1	1.0-3.0	0.048	1800	1440	1160	22.1	102.8	CL
TP-2	1.0-4.0	0.960	600	1160	260	22.6	97.9	CH
TP-2	1.0-4.0	0.960	1200	1380	600	25.5	97.9	CH
TP-2	1.0-4.0	0.480	1800	1740	1000	25.2	97.9	CH
TP-2	1.0-4.0	0.072	600	1180	280	26.7	97.9	CH
TP-2	1.0-4.0	0.048	1800	1640	1000	24.9	97.9	CH
TP-3	1.0-5.0	0.660	600	960	440	34.6	87.3	CH
TP-3	1.0-5.0	0.360	1200	1200	800	32.9	87.3	CH
TP-3	1.0-5.0	0.360	1800	1480	1080	31.8	87.3	CH
TP-4/TP-6	2.0-4.0/1.5-4.5	0.660	600	720	480	35.1	87.7	CH
TP-4/TP-6	2.0-4.0/1.5-4.5	0.240	1200	920	620	32.4	87.7	CH
TP-4/TP-6	2.0-4.0/1.5-4.5	0.180	1800	1080	1000	30.9	87.7	CH
TP-4/TP-6	2.0-4.0/1.5-4.5	0.054	1800	1100	960	30.2	87.7	CH
TP-5	2.0-4.0	0.360	600	680	300	41.0	82.2	CH
TP-5	2.0-4.0	0.012	1200	840	570	38.6	82.2	CH
TP-5	2.0-4.0	0.006	1800	1020	940	37.1	82.2	CH
TP-5	2.0-4.0	0.029	1800	660	340	40.3	82.2	CH
TP-6	5.0-6.0	0.066	600	520	280	34.2	87.6	CL
TP-6	5.0-6.0	0.028	1200	700	530	32.2	87.7	CL
TP-6	5.0-6.0	0.010	1800	960	760	30.8	87.7	CL

[a]During consolidation, the sample drained from both top and bottom; side filter paper drains were used. Pore Pressures were measured at top and bottom of the sample; the average pore pressure was used to compute the effective parameters.

[b]Peak deviator stresses correspond to axial strains of less than 10 percent.

TABLE 2.5-31 (continued)

Boring/ Test Pit	Depth (feet)	Strain Rate (inches/ hour)	Consolidation Pressure (psf)	Peak Deviator Stress(b) (psf)	Pore Pressure at Peak Deviator Stress (psf)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
P-16 & 18	3.0-5.0	0.064	575	4060	920	17.8	114	ML
P-17 & 18	5.0-8.0	0.050	1000	3600	450	17.5	114	SC
P-22	3.0-5.0	0.050	1150	2100	520	21.8	115	CL
P-26 & 28	3.0-5.0	0.180	2000	5450	460	18.6	112	CL
TP-9	5.0	0.05	1440	2437	-338	24.2	103.4	CH
TP-9	5.0	0.025	2880	3206	331	23.8	103.1	CH
TP-9	5.0-6.0	0.032	1224	2691	-115	21.5	113.8	CH
TP-9	5.0-7.5	0.05	1296	1581	245	26.1	108.6	CH
TP-10	2.0-3.0	0.024	2160	3281	-115	26.8	101.1	CH
TP-10	2.0-3.0	0.032	1224	1906	1296	31.5	96.0	CH
TP-10	2.0-3.0	0.015	1152	4349	374	25.8	104.4	CH
TP-11	3.0	0.360	1440	6664	-1138	16.4	106.0	CL-ML
TP-11	3.0	0.012	2880	4143	1138	19.0	118.0	CL-ML
TP-11	3.0	0.025	6480	12,949	2189	17.7	118.5	CL-ML
TP-11	5.0-8.5	0.025	1440	3825	-763	21.1	120.0	CL
TP-11	5.0-8.5	0.012	2160	4543	-965	19.1	116.1	CL
TP-11	5.0-8.5	0.025	2880	6982	-1448	18.2	119.5	CL
TP-12	2.4	0.025	1440	4831	72	24.9	106.7	CH
TP-12	2.4	0.003	2880	4421	1541	25.8	109.0	CH
TP-12	2.4	0.032	6480	6297	3629	25.9	111.5	CH

TABLE 2.5-32

RESULTS OF UNCONFINED COMPRESSION TESTS ON ROCK CORE SAMPLES

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Unconfined Compressive Strength (psi)	Static Modulus of Elasticity* times 10^{-6} (psi)	Poisson's Ratio*	Bulk Modulus times 10^{-6} (psi)
P-6	Jackson Park Sandstone	7.4	1099.2	2,220	0.382	0.31	0.34
P-9	Jackson Park Sandy Siltstone	9.9	1094.6	2,330	0.323	0.30	0.27
P-11	Heumader Shale	25.3	1078.1	69	0.00182	0.37	0.0023
B-4	Heumader Shale	22.9	1075.1	300	0.0343	-	-
P-4	Heumader Shale	36.3	1069.3	56	0.00104	0.42	0.0022
P-9	Heumader Shale	35.8	1068.7	131	0.00553	0.40	0.0092
ESW-12	Heumader Shale	17.8	1072.8	161	0.0914	0.42	-
ESW-12	Heumader Shale	30.0	1060.6	103	0.0764	0.43	
P-9	Plattsmouth Limestone	43.1	1061.4	8.600	5.93	0.29	4.7
HS-28	Plattsmouth Limestone	33.0	1058.8	6,690	9.26	0.27	-
HS-29	Plattsmouth Limestone	34.2	1057.2	11,420	8.59	0.22	-
B-4	Plattsmouth Limestone	43.9	1054.6	9,300	9.59	-	-
P-12	Plattsmouth Limestone	48.0	1054.2	7,350	3.80	0.23	2.3

* At 40 percent of unconfined compressive strength

Additional borings (B-100-Series) and compression testing was performed for replacement ESWS piping and the results are similar to what is recorded in the table.

TABLE 2.5-32 (continued)

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Unconfined Compressive Strength (psi)	Static Modulus of Elasticity* times 10^{-6} (psi)	Poisson's Ratio*	Bulk Modulus times 10^{-6} (psi)
B-5	Plattsmouth Limestone	41.5	1052.4	16,440	9.028	-	-
P-6	Plattsmouth Limestone	49.5	1051.1	9,340	10.3	0.22	6.1
HS-28	Plattsmouth Limestone	42.8	1049.0	5,380	4.78	0.29	-
ESW-12	Plattsmouth Limestone	46.9	1043.7	5,970	4,571	0.34	-
ESW-25	Plattsmouth Limestone	4.0	1066.4	4,040	4.0	0.27	-
P-11	Heebner Shale	55.1	1048.3	1,460	0.0968	0.29	0.077
B-4	Heebner Shale	50.3	1048.2	1,490	0.375	-	-
HS-28	Heebner Shale	45.5	1046.4	1,110	0.110	0.30	-
ESW-23	Heebner Shale	46.1	1046.7	710	0.7676	0.39	-
ESW-25	Heebner Shale	11.3	1059.1	2,520	2.353	0.37	-
P-6	Leavenworth Limestone	55.6	1051.0	10,070	7.080	0.25	4.7
P-9	Leavenworth Limestone	57.4	1047.1	6,840	5.29	0.28	4.0
P-12	Leavenworth Limestone	55.4	1046.8	6,800	7.56	0.26	5.2
HS-28	Leavenworth Limestone	47.9	1044.0	10,910	8.43	0.24	-
HS-29	Leavenworth Limestone	49.0	1042.4	11,710	9.89	0.16	-

TABLE 2.5-32 (continued)

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Unconfined Compressive Strength (psi)	Static Modulus of Elasticity* times 10^{-6} (psi)	Poisson's Ratio*	Bulk Modulus times 10^{-6} (psi)
ESW-25	Leavenworth Limestone	12.6	1057.8	14,710	11.538	0.23	-
P-12	Snyderville Shale	57.5	1044.7	93	0.00402	0.35	0.0045
B-5	Snyderville Shale	54.9	1039.0	1,330	0.323	-	-
HS-29	Snyderville Shale	52.6	1038.9	175	0.0127	0.32	-
P-9	Snyderville Shale	65.9	1038.6	90	0.00360	0.36	0.0043
HS-28	Snyderville Shale	56.3	1035.6	151	0.014	0.31	-
ESW-25	Snyderville Shale	14.5	1055.9	176	0.1037	0.39	-
B-4	Toronto Limestone	67.6	1030.9	17,260	10.9	-	-
P-6	Toronto Limestone	75.8	1030.8	9,120	6.32	0.27	4.6
B-5	Toronto Limestone	63.7	1030.2	13,390	8.59	-	-
HS-29	Toronto Limestone	61.8	1029.6	2,910	0.857	0.30	-
HS-28	Toronto Limestone	63.8	1028.0	6,760	3.85	0.24	-
P-12	Toronto Limestone	77.8	1024.4	2,430	0.526	0.32	0.49
P-9	Toronto Limestone	86.2	1018.3	5,580	3.73	0.28	2.8
ESW-25	Toronto Limestone	35.6	1034.8	5,390	4.095	0.31	-

TABLE 2.5-32 (continued)

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Unconfined Compressive Strength (psi)	Static Modulus of Elasticity* times 10^{-6} (psi)	Poisson's Ratio*	Bulk Modulus times 10^{-6} (psi)
B-7	Unnamed Lawrence Shale	99.2	999.3	1,780	1.17	-	-
P-9	Unnamed Lawrence Shale	109.9	994.6	147	0.00867	0.38	0.012
ESW-25	Lawrence Shale	48.9	1021.5	125	0.0694	0.42	-
ESW-25	Lawrence Shale	63.2	1007.2	210	0.14	0.39	-
P-9	Amazonia Limestone	114.9	989.6	4,410	3.15	0.30	2.6
ESW-25	Amazonia Limestone	70.2	1000.2	2,750	2.095	0.35	-
ESW-25	Amazonia Shale	71.2	999.2	118	0.064	0.44	-
B-6	Ireland Shale	149.1	979.3	290	0.0303	-	-
ESW-25	Ireland Shale	78.6	991.8	169	0.1007	0.43	-
P-9	Ireland Siltstone	141.8	962.7	178	0.00623	0.36	0.0074
B-4	Ireland Siltstone	184.5	914.0	1,680	0.438	-	-
B-7	Ireland Siltstone	191.2	907.3	2,190	1.46	-	-

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Unconfined Compressive Strength (psi)	Static Modulus of Elasticity* times 10^{-6} (psi)	Poisson's Ratio*	Bulk Modulus times 10^{-6} (psi)
B-17	Robbins Shale	131.4	969.8	1,190	0.345	-	-
B-11	Robbins Shale	140.4	949.6	1,950	1.31	-	-
P-9	Robbins Shale	235.8	868.7	407	0.0225	0.33	0.022
P-9	Haskell Limestone	262.1	842.4	12,430	13.0	0.21	7.5
P-9	Vinland Sandstone	287.2	817.3	2,170	0.428	0.32	0.40
B-9	Vinland Siltstone	292.3	785.7	2,980	1.02	-	-
B-17	Tonganoxie Shaley Siltstone	219.5	881.7	1,260	0.357	-	-
B-17	Tonganoxie Siltstone	261.3	839.9	2,790	0.957	-	-
B-17	Tonganoxie Siltstone	301.3	799.9	3,130	0.968	-	-
B-9	Tonganoxie Shale	312.4	765.6	1,670	0.368	-	-
B-4	Weston Shale	369.3	729.2	1,250	0.555	-	-

TABLE 2.5-33

RESULTS OF COMPACTION TESTS ON SOIL

Boring/ Test Pit	Depth (feet)	Optimum Moisture Content (percent)	Maximum Dry Density (pcf)	Soil Type	Type of Test*
B-1	9.5-19.0	15.7	115.4	CL-CH	H.M.M.
P-4	5.0	13.0	126.1	SM	H.M.M.
P-6	3.5	13.0	108.2	SM	H.M.M.
P-9	2.0- 3.0	16.2	114.3	SC	H.M.M.
P-12	3.5	14.6	111.7	ML	H.M.M.
TP-1	1.0- 3.0	16.4	108.8	CL	ASTM D698-70
TP-2	1.0- 4.0	20.7	102.9	CH	ASTM D698-70
TP-3	1.0- 5.0	18.2	92.2	CH	ASTM D698-70
TP-4/TP-6	2.0-4.0/1.5-4.5	16.5	92.6	CH	ASTM D698-70
TP-5	2.0- 4.0	25.7	87.4	CH	ASTM D698-70
TP-6	5.0- 6.0	22.4	93.1	CL	ASTM D698-70

* ASTM D698-70 = American Society for Testing and Materials Standard D698-70, Method A
H.M.M. = Harvard Miniature Mold

TABLE 2.5-34

FIELD PERMEABILITY TEST RESULTS
ULTIMATE HEAT SINK

A. PRESSURE WATER-LOSS TESTING

Member	Average Permeability* (cm/sec)	Permeability Range (cm/sec)	Number of Test	Number of No Takes (Ø)
Heumader	3.0×10^{-6}	Ø - 6.0×10^{-6}	8	6
Plattsmouth Ls.	4.0×10^{-6}	Ø - 1.4×10^{-5}	26	15
Heebner	9.0×10^{-6}	Ø - 2.9×10^{-5}	29	16
Leavenworth Ls.	7.0×10^{-6}	Ø - 3.6×10^{-5}	29	13
Snyderville	9.0×10^{-6}	Ø - 4.8×10^{-5}	36	17
Toronto Ls.	2.0×10^{-5}	Ø - 1.0×10^{-4}	22	6

B. CONSTANT HEAD PERMEAMETER TESTING

Boring Number	Slotted Interval (feet)	Member	Permeability (cm/sec)
HS-SP-2	2.5 - 7.0	Soil	1.2×10^{-6}
HS-SP-4	2.0 - 11.5	Soil	1.0×10^{-6}
HS-SP-5	2.0 - 7.0	Soil	4.7×10^{-6}
HS-SP-6	2.0 - 4.4	Soil	6.5×10^{-4}

* Ø = No take recorded. 10^{-6} cm/sec assumed when computing averages.

C. FALLING HEAD PERMEAMETER TESTING

Boring Number	Piezometer	Slotted Interval (feet)	Members Monitored	Permeability (cm/sec)
HS-1	A	2.5 - 19.5	Soil-Plattsmouth Ls.	6.1×10^{-6}
HS-3	B	30.0 - 37.0	Snyderville-Toronto Ls.	2.7×10^{-6}
HS-3	A (test 2)	3.0 - 17.9	Plattsmouth Ls. Toronto Ls.	8.5×10^{-6}
HS-5	A	4.8 - 9.8	Plattsmouth Ls.	9.0×10^{-6}
	B	23.5 - 30.3	Snyderville-Toronto Ls.	5.4×10^{-7}
HS-8	A	4.8 - 9.8	Plattsmouth Ls.	4.4×10^{-6}
	B	31.0 - 39.5	Snyderville-Toronto Ls.	2.2×10^{-6}
HS-20	A (test 2)	2.0 - 18.0	Soil-Plattsmouth Ls.	7.6×10^{-6}
	B	35.0 - 43.0	Toronto Ls.	nil
HSA-1	A	3.0 - 11.5	Soil	nil
	B	15.0 - 22.2	Toronto Ls.	1.7×10^{-5}

TABLE 2.5-35

RESULTS OF LABORATORY FALLING HEAD PERMEABILITY TESTS
ON UNDISTURBED AND RECOMPACTED SOIL SAMPLES

Location	Depth (feet)	Head (feet)	Permeability (cm/sec)	Field or Initial Moisture Content (percent)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
HS-1	2.5	17	$8.8x10^{-8}$	26.8	27.5	97.9	CL
HS-3*	1.0	30	$1.1x10^{-7}$	25.0	-	-	CL
HS-3*	1.0	30	$2.7x10^{-8}$	25.0	27.5	92.1	CL
HS-6*	10.0	20.6	$5.6x10^{-8}$	15.2	-	-	CL
HS-6*	10.0	20.6	No Flow in 2 Days	15.2	16.1	119.9	CL
TP-1*	1.0-3.0	30.3	$2.2x10^{-8}$	17.7		104.1	CL
TP-1*	1.0-3.0	30.3	$4.1x10^{-8}$	17.7		105.3	CL
TP-3*	1.0-5.0	21.7	$5.6x10^{-9}$	19.6		91.9	CH
TP-3*	2.0-5.0	21.7	$7.5x10^{-8}$	19.6		90.5	CH

* Two-stage test on a single test specimen.

TABLE 2.5-36 Sheet 1 of 3

RESULTS OF ATTERBERG LIMITS TESTS

Boring/ Test Pit	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	Soil Type
B-1	3.5	47.0	22.8	24.2	CL
B-4	9.0	40.2	17.6	22.6	CL
B-4	13.5	38.3	18.8	19.5	CL
B-7	1.5	73.2	25.9	47.3	CH
B-8	1.5	33.4	21.6	11.8	CL
B-9	4.5	43.4	20.8	22.6	CL
P-5	2.0	34.7	15.1	19.6	CL
P-6	2.0	40.0	15.9	24.1	CL
P-7	2.5	31.8	13.4	18.4	CL
P-7	4.3	26.6	17.0	9.6	SM
P-8	2.5	34.4	15.7	18.7	CL
P-8	3.5	24.0	15.7	8.3	SC
P-11	3.5	55.2	19.5	35.7	CH
HS-2	4.0	46.8	17.7	29.1	CL
HS-6	4.0	57.6	24.9	32.7	CH
HS-6	8.0	38.2	18.4	19.8	CL
HS-14	4.0	57.0	27.5	29.5	CH
HS-14	6.0	52.2	21.9	30.3	CH
HS-15	1.0	50.1	28.1	22.0	MH-OH
HS-15	4.0	51.1	20.4	30.7	CH
HS-16	1.0	48.4	23.0	25.4	CL
HS-16	4.0	90.7	32.2	58.5	CH
HS-17	2.5	49.8	19.4	30.4	CL
HS-17	4.5	61.5	23.8	37.7	CH
HS-21	2.5	73.0	31.8	41.2	CH
TP-1	1.0-3.0	41	19	22	CL
TP-2	1.0-2.0	67	28	39	CH
TP-2	2.0-4.0	66	25	41	CH
TP-3	1.0-3.0	64	22	42	CH
TP-3	3.0-5.0	62	21	41	CH
TP-4	2.0-4.0	63	23	40	CH
TP-5	1.5-3.0	77	26	51	CH
TP-6	1.5-4.5	69	26	43	CH
TP-6	5.0-6.0	48	24	24	CL

TABLE 2.5-36 (continued)

Boring/ Test Pit	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	Soil Type
TP-9	2.0-4.0	70	26	44	CH
TP-9	5.0-6.0	65	21	44	CH
TP-9	6.0-7.5	63	22	41	CH
TP-10	2.0-3.0	80	23	57	CH
TP-11	2.2	32	18	14	CL
TP-11	3.0	26	19	7	CL-ML
TP-11	5.0	40	20	20	CL
TP-11	8.5	41	21	20	CL
TP-12	2.4	61	22	39	CE
TP-12	5.0	38	23	15	CL
ESW-2	3.5	36	15	21	CL
ESW-5	4.5	32	18	14	CL
ESW-6	3.0	34	17	17	CL
ESW-7	3.0	48	25	23	CL
ESW-11	3.5	38	19	19	CL
ESW-13	5.0	35	21	14	CL
ESW-17	2.0	60	18	42	CH
ESW-20	2.0	71	24	47	CH
B-103	7.5-9.5	47.0	18.0	29.0	CL
B-104	6.2-7.7	49.0	18.0	31.0	CL
B-104	18.5-20	50.0	19.0	31.0	CL
B-105	10.4-12.4	52.0	16.0	36.0	CL
B-106	5-6.85	42.0	14.0	28.0	CL
B-106	13.5-15	49.0	16.0	33.0	CL
B-107	5.1-6.9	39.0	14.0	25.0	CL
B-107	10.0-12.0	53.0	19.0	34.0	CL
B-112	0.0-1.5	39.0	14.0	25.0	CL
B-112L	6.85-7	43.0	27.0	16.0	CL
B-112L	9.5-11	46.0	29.0	17.0	CL
B-112L	12.5-14.5	46.0	29.0	17.0	CL
B-112L	15-17	47.0	29.0	18.0	CL
B-113L	6.9-7	48.0	30.0	18.0	CL
B-113L	10.75-10.95	47.0	30.0	17.0	CL
B-113L	12.5-14	45.0	30.0	15.0	CL
B-114L	7.5-9	44.0	27.0	17.0	CL
B-114L	15.7-15.85	44.0	27.0	17.0	CL
B-115L	16.65-17	44.0	28.0	16.0	CL
B-120	25.5	45.0	31.0	14.0	CL
B-120	28.0	46.0	31.0	15.0	CL
B-122	26.6	48.0	33.0	15.0	CL
B-124	30.5	40.0	24.0	16.0	CL
B-125	28.4	44.0	30.0	14.0	CL
B-125	31.0	42.0	26.0	16.0	CL
B-131	2.5-4.5	69.0	21.0	48.0	CL
B-131	5-6.5	69.0	19.0	50.0	CL
B-131	7.5-9	53.0	18.0	35.0	CL
B-131	12.5-14	70.0	53.0	17.0	CL
B-140	6.0-7.5	69.0	20.0	49.0	CL
B-140	18.5-20.0	46.0	15.0	31.0	CL

TABLE 2.5-36 (continued) Sheet 3 of 3

Boring/ Test Pit	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	Soil Type
B-141	18.5-10	48.0	18.0	30.0	CL
B-142	5.3-6.9	46.0	16.0	30.0	CL
B-142	18.5-19.8	44.0	18.0	26.0	CL
B-143	3.4-4.9	60.0	15.0	45.0	CL
B-145	5-7.0	47.0	17.0	30.0	CL
B-148	3.5-5	49.0	14.0	35.0	CL
TP-102	1.5-3	25.0	15.0	10.0	CL
TP-102	5.5-6.5	48.0	19.0	29.0	CL
TP-104	9-10.0	45.0	15.0	30.0	CL
TP-107	6.5-7	57.0	18.0	39.0	CL
TP-107	17-18	45.0	15.0	30.0	CL
TP-108	3-3.5	55.0	17.0	38.0	CL
TP-108	7-7.5	59.0	17.0	42.0	CL
TP-109	4-4.5	55.0	15.0	40.0	CL
TP-109	10-11.0	45.0	15.0	30.0	CL
Test Pit 1	4-4.5	42.0	13.0	29.0	CL
Test Pit 2	1.5-3	64.0	16.0	48.0	CL
Test Pit 2	5.5-6.5	64.0	18.0	46.0	CL
Test Pit 3	1.5-2.5	62.0	15.0	47.0	CL
Test Pit 3	5-6.0	55.0	15.0	40.0	CL
Test Pit 3	9-10.0	53.0	17.0	36.0	CL
Test Pit 3	14-15	50.0	17.0	33.0	CL

TABLE 2.5-37

RESULTS OF MOISTURE AND DENSITY DETERMINATIONS ON SOIL

Boring	Depth (feet)	Field Moisture Content (percent)	Dry Density (pcf)	SOIL TYPE
B-1	3.5	25.5	97.8	CL
B-1	7.5	22.1	101.5	CL-CH
B-1	9.5	20.1	107.2	CL-CH
B-1	14.0	24.3	99.0	CL-CH
B-1	19.0	25.4	97.6	CL-CH
B-4	6.0	18.6	108.1	ML
B-4	7.5	17.7	105.7	CL
B-4	9.0	20.6	106.8	CL
B-4	10.5	13.0	119.2	CL
B-4	12.0	17.2	116.6	CL
B-4	13.5	12.5	120.7	CL
B-5	1.5	23.2	99.1	CL
B-5	4.0	20.8	107.5	CL
B-5	6.5	17.9	113.1	CL
B-6	2.0	17.6	103.6	CL
B-6	3.0	18.6	108.6	CL
B-6	5.0	23.6	119.2	CL
B-7	1.5	31.7	88.7	CH
B-8	1.5	25.7	94.6	CL
B-9	1.5	28.4	90.9	SM-ML
B-9	3.0	23.4	98.7	ML-CL
B-9	4.5	20.3	105.9	CL
P-1	2.5	16.5	111.3	SC
P-2	2.5	20.4	104.1	CL
P-2	3.5	17.7	110.7	SC
P-4	4.0	22.1	103.8	ML-CL
P-4	6.0	15.7	114.0	SM
P-5	2.0	12.1	114.7	CL
P-5	3.0	13.0	116.5	SM
P-6	2.0	12.6	114.3	CL
P-7	4.3	9.8	115.5	SM
P-8	2.5	19.4	107.0	CL
P-8	3.5	20.8	85.3	SC

TABLE 2.5-37 (continued)

Boring/ Test Pit	Depth (feet)	Field Moisture Content (percent)	Dry Density (pcf)	Soil Type
P-8	4.0	19.7	127.3	ML-CL
P-11	2.0	17.7	111.4	SC-SM
P-11	2.5	27.7	98.0	SC-SM
P-11	3.5	23.9	102.5	SC-SM
P-12	3.5	19.4	101.5	ML
P-12	4.5	19.0	116.9	SM
P-13	6.0	15.7	115.3	CL
HS-1	1.0	9.0	107.8	CL
HS-1	2.5	25.6*	100.6*	CL
HS-1	4.5	17.4	110.6	SC
HS-2	1.0	14.0	97.6	ML
HS-2	2.0	8.5	125.8	CL
HS-2	4.0	20.5	101.8	CL
HS-2	6.0	22.6*	96.9*	CL
HS-2	8.0	23.3	99.1	CL
HS-5	2.0	35.4	86.4	CH
HS-5	2.5	36.7	83.9	CH
HS-6	4.0	23.3	99.6	CL-ML
HS-6	9.0	20.3	102.6	CL
HS-14	4.0	27.2*	90.3*	CH
HS-14	6.0	22.9	98.9	CH
HS-15	1.0	30.2	86.6	MH-OH
HS-15	4.0	19.0*	104.2*	CH
HS-16	4.0	39.2	82.6	CH
HS-17	2.5	21.4*	104.7*	CH-CL
HS-21	1.0	34.3	83.2	CH
HS-21	2.5	33.0	87.1	CH
ESW-1	4.5	14.1	114.2	CL
ESW-2	3.5	14.1	104.6	CL
TP-9	2.0-4.0	25.51*	-	CH
TP-9	5.0-6.0	21.7*	-	CH
TP-9	6.0-7.5	19.8	-	CH
TP-10	2.0-3.0	23.6*	-	CH
B-103	7.5-9.5	18.4	115.3	CL
B-105	1.4-12.4	22.6	115.8	CL
B-106	5-6.85	22.5	112.2	CL
B-107	5.1-6.9	20.6	116.4	CL
B-107	10-12.0	21.5	116.7	CL
B-113	16.85-17	17.2	116.8	CL
B-114	6.85-7	16.6	115.7	CL
B-114	11.85-12	18.4	114.5	CL

* Average of two tests

TABLE 2.5-37 (continued) Sheet 3 of 3

Boring/ Test Pit	Depth (feet)	Field Moisture Content (percent)	Dry Density (pcf)	Soil Type
B-115	6.85-7	16.7	116.9	CL
B-131	2.5-4.5	32.5	96.1	CL
B-142	5.3-6.9	19.4	122.3	CL
B-143	5.5-7.5	21.8	115.8	CL
B-145	5-7.0	18.3	121.0	CL
B-146	8.1-10	18.5	124.6	CL
B-148	5.5-7.5	23.8	111.3	CL
TP-101	0.5-1.5	10.3	103.4	CL
TP-102	1.5-3.0	9.9	117.8	CL
TP-102	5.5-6.5	18.1	107.5	CL
TP-104	9.0-10.0	17.6	113.9	CL
TP-105	8.0-9.0	21.5	101.0	CL
TP-106	2.5-3.5	16.2	117.5	CL
TP-107	6.5-7.0	23.4	102.7	CL
TP-107	17.0-18.0	13.5	111.5	CL
TP-108	3.0-3.5	18.7	97.6	CL
TP-108	7.0-7.5	21.3	109.4	CL
TP-109	4.0-4.5	8.7	102.0	CL
TP-109	10.0-11.0	15.4	117.0	CL

TABLE 2.5-37a (Sheet 1 of 5)

MISCELLANEOUS SITE WORK
WOLF CREEK GENERATING STATION, UNIT 1

DIVISION 3 - TECHNICAL REQUIREMENTS

301. EARTHWORK

301.1 Earthwork shall conform to the requirements of this Project, Specification and the design drawings.

a. All references to the following publications are to the latest issue of each, together with the latest additions and/or amendments thereto, as of the date of Contract, unless otherwise indicated; references to the sponsoring agencies will be made in accordance with the abbreviations indicated:

a1. ASTM..........American Society for Testing and Materials Standard Specifications

301.2 Borrow Areas:

a. Cohesive material for backfill shall be taken from borrow areas, as indicated on the drawings or as otherwise approved. Selective loading and placing might be required to produce required quality and uniformity of backfill. At all times during operations in borrow areas, Contractor shall maintain adequate drainage to nearest natural drainage outlets.

301.3 Compacted Backfill:

b. Backfill Materials:

b1. Inorganic cohesive backfill material, Type CCF2, shall be approved material from previous excavation or borrow areas. The approval shall be by Resident Geotechnical Engineer.

c. Preparation of Subgrade:

c1. Subgrade to receive compacted backfill shall be inspected by Purchaser to determine if it is suitable and has sufficient bearing capacity for the fill material and loads to be placed over it.

TABLE 2.5-37a (Sheet 2 of 5)

c2. Thoroughly break and turn soil underlying the backfill area to depth of 6 in. before deposition of fill material. Break ground on the same day as placing backfill.

c3. The surfaces on which structural backfill will be placed shall be free of construction debris, loose or decayable matter, soft materials and standing water or free ice.

d. Cohesive compacted backfill shall be Type CCF2 material conforming to the following requirements:

d1. Control tests will be made by the testing laboratory during the progress of the work to ensure that materials are compacted to a dry density equal to or greater than the minimum values specified. The minimum relative compaction is defined as a percentage of the maximum value obtained in the ASTM test designation D698.

d2. Earthfill materials shall be compacted to a minimum dry density to achieve a density equal to or greater than 95 percent of the maximum value. The backfill shall be compacted using a sheep's foot or pneumatic tire compactor. In order to ensure uniform coverage of the fill, and to facilitate construction inspection and control, the compaction of each layer shall proceed in a systematic, orderly and continuous manner.

d3. The moisture content of all earthfill materials shall be as uniform as practicably throughout each layer, except where otherwise indicated, shall be within the range specified at the time of compaction.

d4. The backfill material shall be compacted at a moisture content which shall be between 2 percent below and 2 percent above the optimum moisture content.

d5. The moisture conditioning of earthfill materials shall be performed in the borrow areas by discing, harrowing, plowing, blading, or other suitable means. Moisture conditioning in the backfill shall be limited to minor adjustments prior to compaction.

d6. Compaction of backfill materials shall not commence if the moisture content is not within the

TABLE 2.5-37a (Sheet 3 of 5)

d6. (continued)

specified limits. Any materials which are placed but not compacted prior to drying out or becoming too wet, due to rain or other causes, shall be removed and replaced or reprocessed to obtain the proper moisture content.

d7. Earthfill materials shall be spread in approximately flat layers (horizontal or sloped as required) in such a manner as to obtain layers of relatively uniform thickness without spaces between successively deposited loads. Placing and spreading shall be done in such manner as to prevent segregation. The maximum loose lift thickness for earthfill materials shall not exceed 8 in. where heavy compaction equipment is used. The maximum loose lift thickness shall not exceed 3 in. where power tampers or similar special compaction equipment is used, and it may be necessary to reduce the thickness below this 3 in. maximum in order to obtain the required minimum density.

d8. Where compacted earthfill is to be placed against existing soil cut slopes, each lift shall be keyed into the existing slope by removing existing slope material in steps as each lift is placed and by compacting the lift over the cut surface.

g1. General: Backfill shall be placed to neat lines and grades indicated on the drawings. No brush, roots, sod or other perishable or unsuitable materials shall be placed in backfill.

g2. If the compacted surface of any layer of material is too smooth or too dry to bond properly with the succeeding layer, it shall be roughened or loosened by scarifying, light discing, or by other acceptable means, and it shall be sprinkled before the succeeding layer is placed thereon. If the surface becomes rutted or uneven subsequent to compaction, it shall be flattened and leveled before placing the next layer of material. Hauling equipment shall be routed across the backfill in such a way as to prevent the formation of ruts or lanes in the compacted backfill. Rolling shall be parallel to the building axis except where there is insufficient working room for such operations or where adjacent to structures. Additional cross rolling will be required in the turnaround areas and elsewhere as required to obtain uniform compaction.

TABLE 2.5-37a (Sheet 4 of 5)

g3. The surface of the backfill shall at all times be kept reasonably smooth and free from humps or hollows. The fill surface shall be sloped with a grade of approximately 3 percent in order to ensure drainage during periods of wet weather.

g4. Upon suspension of filling operations for a period in excess of 12 hours or in wet weather, the surface of the backfill shall be rolled smooth to seal it against excessive absorption of moisture and to facilitate runoff. During drying weather, the surface shall be sprinkled as is necessary to minimize drying. Prior to resuming backfill placement and compaction of any area, following the suspension of continuous and systematic operations, the backfill surface shall be scarified and/or disced and moisture conditioned as required. If drying to moisture contents below the specified minimum has reached a depth of more than 2 in., the backfill surface shall be reprocessed and compacted prior to the placement of additional materials.

g5. Backfill operations shall be suspended during periods of extended wet weather. Upon resuming operations, all materials which are excessively wet or soft shall be removed either stockpiled, reprocessed or wasted. The removal of wet or soft material shall be carried to such depth as is necessary to expose firm materials. The exposed surface shall be scarified or lightly disced in order to provide an adequate bond with the subsequent layer of backfill.

g6. Under no circumstances shall ice, snow, or frozen material be incorporated in the backfill. In the event that the fill surface becomes frozen during construction, all frozen materials shall be excavated and wasted before additional material is placed.

g7. Where it is necessary to backfill adjacent portions of the backfill at different times, the connection between the two portions must be constructed in such a way as to provide a uniformly compacted, well-bonded contact. Prior to commencing the lower level backfill, the existing material shall be trimmed back to expose firm, moist material which meets both the moisture content and compaction requirements for the zone.

TABLE 2.5-37a (Sheet 5 of 5)

g8. The trimming may be reprocessed or wasted. The trimmed slope shall not be steeper than 3 horizontal to 1 vertical.

g9. Where ramps are required, they shall be constructed of compacted fill which meets all of the placement moisture content and compaction requirements specified for the adjacent backfill zone.

301.4 Equipment:

a. Compaction Equipment: Equipment to be used for constructing various types of fill may consist of any type normally considered suitable to construct embankments.

b. In addition to the foregoing equipment, the following equipment shall be available at the Project Site:

b1. Power tampers to be used for compaction of material in areas where it is impractical to use a roller or tractor.

b2. A plain cylindrical roller, weighing not less than 1,000 lbs. per lineal foot for rolling the surface of backfill smooth for drainage in case of heavy precipitation.

b3. Discs, harrows and motor graders for drying and maintaining fill.

TABLE 2.5-38

RESULTS OF RESONANT COLUMN TESTS ON ROCK CORE SAMPLES *

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
						0	0.000062	1,860	17.3	8.2
B - 7	8.5	1090.0	Clay Creek Limestone	---	161.8	4,003	0.000063	2,050	21.0	7.2
						5,990	0.000061	2,070	21.6	6.9
P - 9	8.6	1095.9	Jackson Park Sandstone	---	122.9	615	0.000342	2,750	28.9	2.9
						615	0.000676	2,750	28.8	2.9
						1,330	0.000341	2,750	28.9	2.9
						1,330	0.000699	2,750	28.8	3.4
HS-15	9.0	1068.4	Heumader Shale	15.3	107.1	0	0.001333	482	0.89	2.7
						720	0.00116	565	1.23	2.7
						1,440	0.00104	629	1.52	2.7
P - 30	12.1	1091.9	Heumader Shale	---	135.9	1,020	0.004349	676	1.93	4.1
						1,020	0.008346	638	1.72	---
						2,050	0.004191	660	1.84	3.7
						2,050	0.007498	625	1.65	---
						3,050	0.004131	665	1.87	4.5
						3,050	0.007398	638	1.72	---
P - 11	14.6	1088.8	Heumader Shale	---	134.6	1,020	0.005807	524	1.15	---
						1,020	0.009035	496	1.03	---
						1,560	0.005961	531	1.18	5.1
						1,560	0.010214	522	1.14	---
						2,040	0.005537	538	1.21	---
						2,040	0.009782	533	1.19	7.1
						2,560	0.000595	529	1.17	6.0
						2,560	0.000973	517	1.12	---
						2,560	0.001290	491	1.01	---

TABLE 2.5-38 (continued)

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture Content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
B - 4	22.4	1076.1	Heumader Shale	2.0	139.4	0	0.00012	716	2.26	4.9
						4,003	0.00012	729	2.35	---
						5,990	0.00013	818	2.95	3.8
P - 27	31.0	1074.0	Heumader Calcareous Shale	---	143.1	2,040	0.000264	960	4.10	4.0
						2,040	0.000550	963	4.12	---
						2,040	0.000837	965	4.14	4.6
						4,100	0.000283	953	4.04	4.0
						4,100	0.000523	960	4.10	---
						4,100	0.000812	958	4.08	5.7
						6,180	0.000266	969	4.18	4.7
						6,180	0.000501	977	4.28	---
						6,180	0.000737	977	4.28	4.0
P - 4	39.0	1066.6	Plattsmouth Limestone	---	166.2	4,100	0.000179	2,760	39.4	3.3
						4,100	0.000334	2,690	37.3	---
						6,150	0.000171	2,890	43.1	3.28
						6,150	0.000364	2,830	41.2	---
						8,200	0.000151	3,070	48.5	3.5
						8,200	0.000353	2,930	44.1	---
						10,200	0.000199	3,140	50.9	2.8
						10,200	0.000324	3,110	50.0	---
B - 4	40.4	1058.1	Plattsmouth Limestone	---	165.4	0	0.000015	2,060	21.8	---
						4,003	0.000014	2,480	31.7	---
						5,990	0.000014	2,530	32.9	---
HS-14	43.2	1048.5	Plattsmouth Limestone	---	162.3	0	0.000159	2,120	22.6	---

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
P - 9	43.9	1060.6	Plattsmouth Limestone	---	159.6	4,100	0.000199	3,690	67.4	2.0
						4,100	0.000414	3,700	67.8	1.8
						6,170	0.000210	3,680	67.0	1.7
						6,170	0.000433	3,720	68.5	2.1
						8,200	0.000198	3,700	67.8	1.8
						8,200	0.000431	3,720	68.7	2.2
P - 11	51.0	1052.4	Plattsmouth Limestone	---	164.7	3,100	0.000142	2,740	38.5	3.9
						3,100	0.000276	2,650	35.8	---
						4,850	0.000242	3,230	53.4	2.3
						4,850	0.000448	3,220	53.1	---
						6,800	0.000192	3,350	57.4	2.4
						6,800	0.000341	3,430	62.0	---
						8,700	0.000171	3,640	67.8	2.1
						8,700	0.000223	3,520	63.4	---
						8,700	0.000326	3,660	68.6	---
						8,700	0.000390	3,540	64.0	---
						8,700	0.000585	3,670	68.9	---
						0	0.000027	2,210	24.4	8.1
B - 7	67.0	1031.5	Plattsmouth Limestone	---	160.4	4,003	0.000029	2,120	22.4	7.0
						5,990	0.000040	1,420	10.1	9.5
						0	0.000225	1,880	14.9	6.3
HS-15	32.3	1045.1	Heebner Shale	7.1	127.3	720	0.000195	2,030	17.5	4.6
						1,440	0.000178	2,140	19.3	4.2
						0	0.000032	1,470	9.30	7.1
B - 7	74.4	1024.1	Heebner Shale	---	138.6	4,003	0.000040	1,720	12.8	6.1
						5,990	0.000064	1,600	11.0	6.8

TABLE 2.5-38 (continued)

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
HS-14	48.3	1043.4	Leavenworth Limestone	---	168.3	0	0.000094	2,760	39.7	---
P - 4	53.5	1052.1	Leavenworth Limestone	---	159.3	6,150	0.000317	3,780	70.5	1.3
						6,150	0.000622	3,790	71.2	1.5
						8,200	0.000326	3,770	70.4	1.3
						8,200	0.000668	3,790	71.0	1.4
						10,300	0.000346	3,770	70.2	1.3
						10,300	0.000669	3,790	70.9	1.4
						12,300	0.000336	3,770	70.3	1.3
						12,300	0.000668	3,790	71.0	1.4
P - 9	56.4	1048.1	Leavenworth Limestone	---	166.4	6,150	0.000284	3,770	73.6	1.6
						6,150	0.000510	3,770	73.5	2.2
						8,200	0.000285	3,770	73.5	1.6
						8,200	0.000508	3,780	73.8	2.1
						10,300	0.000292	3,780	73.8	1.5
						10,300	0.000507	3,780	73.9	2.3
						12,300	0.000266	3,780	73.8	1.6
						12,300	0.000421	3,780	73.8	2.1
P - 11	56.6	1046.8	Leavenworth Limestone	---	166.5	5,800	0.000321	3,670	69.6	1.3
						5,800	0.000585	3,680	67.0	1.6
						7,750	0.000307	3,670	69.6	1.3
						7,750	0.000586	3,680	69.9	1.6
						9,700	0.000267	3,660	69.3	1.7
						9,700	0.000495	3,670	69.7	0.5
						12,200	0.000196	3,640	68.7	1.8
						12,200	0.000359	3,660	69.3	2.6

TABLE 2.5-38 (continued)

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
P - 11	64.7	1038.7	Snyderville	---	136.4	8,200	0.001408	1,140	5.49	3.4
			Shale			8,200	0.002156	1,130	5.44	---
						8,200	0.002761	1,140	5.47	---
						10,200	0.001366	1,160	5.67	3.4
						10,200	0.002144	1,170	5.78	---
						10,200	0.002757	1,160	5.71	3.4
						12,300	0.001334	1,170	5.79	3.9
						12,300	0.002144	1,180	5.93	---
						12,300	0.002641	1,190	5.96	4.6
						0	0.000065	1,060	5.33	---
B - 11	27.0	1063.0	Toronto	---	152.8	4,003	0.000018	2,300	25.0	---
			Limestone			5,990	0.000017	2,370	26.6	---
						0	0.000071	1,030	5.02	---
B - 4	72.0	1026.5	Toronto	---	151.5	4,003	0.000074	2,810	37.1	8.3
			Limestone			6,005	0.000074	2,820	37.4	9.2
P - 4	75.4	1030.2	Toronto	---	149.1	8,200	0.000378	3,370	52.7	1.5
			Limestone			8,200	0.000778	3,380	53.0	1.6
						10,200	0.000354	3,370	52.6	1.8
						10,200	0.000717	3,380	53.0	1.8
						12,300	0.000188	3,340	51.8	3.2
						12,300	0.000401	3,380	52.8	3.0
						14,300	0.000157	3,350	52.0	3.6
						14,300	0.000351	3,380	53.0	3.4

TABLE 2.5-38 (continued)

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
P - 9	78.1	1026.4	Toronto	---	150.6	8,200	0.000206	3,740	65.4	1.8
			Limestone			8,200	0.000474	3,760	66.1	1.7
						10,300	0.000253	3,750	65.6	1.6
						10,300	0.000519	3,770	66.6	1.5
						12,300	0.000300	3,760	66.0	1.5
						12,300	0.000612	3,790	67.0	1.3
						13,800	0.000327	3,770	66.4	1.1
						13,800	0.000656	3,800	67.4	1.5
						0	0.00026	903	3.72	9.3
B - 7	95.5	1003.0	Toronto	---	146.9	4,003	0.000074	1,310	7.77	8.6
			Limestone			5,990	0.000039	1,500	10.3	8.3
HS-1	54.0	1015.5	Unnamed	8.6	121.6	0	0.000441	1,140	5.30	5.5
			Lawrence			720	0.000388	1,130	6.18	5.3
			Shale			1,440	0.000367	1,270	6.60	5.0
HS-1	81.9	987.6	Amazonia	---	170.3	0	0.000097	2,690	38.3	---
			Limestone							
HS-15	87.9	989.5	Amazonia	8.8	117.0	0	0.000192	1,800	12.8	5.7
			Shale			720	0.000173	1,910	14.3	5.4
						1,400	0.000160	1,990	15.7	4.9
						0	0.000060	975	4.53	---
B - 5	109.7	984.2	Ireland	---	153.4	4,003	0.000062	1,158	6.39	---
			Shale			5,990	0.000071	1,369	8.92	---

TABLE 2.5-38 (continued)

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
						0	0.000034	1,370	8.96	
B - 4	185.0	913.5	Ireland	2.0	151.1	4,003	0.000022	2,090	20.9	4.1
			Siltstone			5,990	0.000019	2,250	24.2	4.8
						0	0.000016	1,630	12.8	7.0
B - 7	191.6	906.9	Ireland	0.2	154.3	4,003	0.000019	1,490	10.7	7.8
			Siltstone			5,990	0.000033	1,610	12.4	7.9
						0	0.000076	1,000	4.70	---
B - 11	141.2	948.8	Robbins	0.2	150.2	4,003	0.000068	1,080	5.41	---
			Shale			5,990	0.000073	1,340	8.40	---
P - 9	261.6	842.9	Haskell	---	161.0	1,440	0.000175	3,910	76.4	2.2
			Limestone			1,440	0.000318	3,890	75.8	2.7
						2,880	0.000199	4,070	82.8	1.7
						2,880	0.000376	4,060	82.6	2.2
						3,750	0.000226	4,040	81.9	1.4
						3,750	0.000458	4,050		1.8
									81.9	
						0	0.000020	2,120	21.1	7.5
B - 9	291.8	786.2	Vinland	2.0	147.7	4,003	0.000034	2,370	26.2	8.1
			Siltstone			6,005	0.000019	2,410	27.2	8.1
B - 17	224.0	877.2	Tonganoxie	4.5	147.5	1	0.000171	504	1.22	6.7
			Siltstone			4,003	0.000040	1,520	11.1	6.0
						5,990	0.000032	1,720	14.1	6.4

TABLE 2.5-38 (continued)

Boring	Depth (feet)	Elevation (feet)	Geologic Unit and Lithology	Moisture content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
						1	0.0000120	997	4.84	---
B - 4	338.2	760.3	Tonganoxie	3.1	152.0	4,003	0.0000032	2,180	23.1	5.7
			Shale			5,990	0.0000027	2,390	27.7	5.3
						0	0.000028	1,810	16.0	5.0
B - 4	368.8	729.7	Weston	2.0	154.2	4,003	0.000031	1,930	18.2	5.0
			Shale			5,990	0.000030	1,980	19.1	5.1

* The validity of the resonant column test results for limestone rock core samples is in question because the rigidity of the testing apparatus is not sufficient to test high strength samples.

TABLE 2.5-39

BULK DENSITIES OF SELECTED ROCK SAMPLES

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Wet Density (pcf)
P-9	Heumader Member; moderately weathered shale	18.8	1085.7	138
P-2	Heumader Member; calcareous, non-clayey, fossiliferous, unweathered shale	28.0	1076.6	160
P-3	Heumader Member; calcareous, non-clayey, unweathered shale	39.2	1074.0	149
P-12	Heumader Member; moderately weathered shale	14.0	1088.2	138
P-6	Heumader Member; clayey, slightly weathered shale	27.0	1079.6	139
P-6	Heumader Member; very calcareous, fossiliferous, unweathered shale	38.0	1068.6	141
P-11	Heumader Member; very calcareous, very clayey, slightly weathered shale	36.1	1067.3	137
P-10	Heebner Member; carbonaceous shale	56.4	1052.0	139
P-10	Heebner Member; carbonaceous shale	56.9	1051.5	137

TABLE 2.5-39 (continued)

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Wet Density (pcf)
P-10	Snyderville Member; very calcareous shale	63.3	1045.1	141
P-10	Unnamed Member of Lawrence Formation; siltstone	91.2	1017.2	144
P-9	Unnamed Member of Lawrence Formation; sandy siltstone	94.2	1013.3	156
P-10	Ireland Member; clayey shale	121.4	987.0	148
P-10	Ireland Member; silty sandstone	140.3	968.1	153
P-9	Ireland Member; siltstone	152.5	952.0	155
P-9	Ireland Member; silty shale	187.8	916.7	156
P-10	Ireland Member; shaley siltstone	221.9	886.5	147
P-10	Robbins Member; shale	232.8	875.6	157
P-9	Robbins Member; shale	256.0	848.5	154
P-10	Robbins Member; shale	267.9	840.5	138
P-10	Vinland Member; carbonaceous shale	284.5	823.9	153
P-10	Vinland Member; siltstone	291.0	817.4	151

Boring	Geologic Unit and Lithology	Depth (feet)	Elevation (feet)	Wet Density (pcf)
P-10	Tonganoxie Member; sandy shale	324.6	783.8	154
P-10	Tonganoxie Member; shale	340.8	767.6	156
P-9	Tonganoxie Member; shale	343.2	761.3	156
P-10	Weston Member; shale	347.3	761.1	155
P-10	Weston Member; shale	356.1	752.3	150
P-9	Weston Member; shale	392.8	711.7	163

TABLE 2.5-40

RESULTS OF RESONANT COLUMN TESTS ON UNDISTURBED SOIL SAMPLES

Boring	Depth (feet)	Soil Type	Moisture Content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Shear Strain Amplitude (percent)	Shear Wave Velocity (ft/sec)	Modulus of Rigidity times 10^{-6} (psf)	Damping (percent)
					0	0.000142	356	0.505	---
B - 4	6.0	ML	18.6	108.1	2,002	0.000112	453	0.817	5.1
					4,003	0.000126	570	1.29	5.6
					5,990	0.000095	610	1.48	6.1
					0	0.000187	258	0.276	2.9
B - 5	6.5	CL	17.9	113.1	1,987	0.000161	381	0.600	3.2
					3,989	0.000153	484	0.972	3.3
					6,005	0.000092	527	1.15	---
P - 2	3.0	CL	17.7	108.5	200	0.00415	318	0.40	6.7
					200	0.00976	288	0.33	---
					405	0.00366	355	0.50	7.2
					405	0.00831	337	0.45	---
					620	0.00353	379	0.57	6.9
					620	0.00781	355	0.50	---
HS-17	4.5	CL-CH	21.2	105.0	0	0.000482	598	1.41	---
					720	0.000339	730	2.11	---
					1440	0.000335	736	2.14	---

TABLE 2.5-41

RESULTS OF SHOCKSCOPE TESTS

Boring	Depth (feet)	Geologic Unit and Lithology	Compressional Wave Velocity (fps)	Dynamic Modulus of Elasticity Times 10^{-6} (psi)	Dynamic Modulus of Rigidity Times 10^{-6} (psi)
P-4	39.0	Plattsmouth Limestone	17,000	7.2	2.8
P-4	53.5	Leavenworth Limestone	15,100	5.7	2.2
P-9	43.9	Plattsmouth Limestone	17,800	7.9	3.0
P-9	56.4	Leavenworth Limestone	17,700	7.9	3.0
P-11	51.0	Plattsmouth Limestone	19,000	9.0	3.5
P-11	56.6	Leavenworth Limestone	17,100	7.4	2.8

TABLE 2.5-42

RESULTS OF DYNAMIC TRIAXIAL COMPRESSION TESTS ON SOIL

Boring	Depth	Elevation	Soil Type	Field Moisture Content (percent)	Dry Density (pcf)	Confining Pressure (psf)	Cyclic Deviator Stress (psf)	Single Amplitude Shear Strain (percent)	Modulus of Rigidity (psf)	Damping (percent)
P - 4	4.0	1101.6	ML-CL	22.1	103.8	520	97.8	0.0087	56.4×10^4	9.7
							182.3	0.0182	50.0×10^4	10.9
							323.2	0.0411	39.3×10^4	11.9
							484.2	0.0828	29.3×10^4	12.6
							650.8	0.158	20.6×10^4	14.1
							990.8	0.260	19.0×10^4	--
							1386.6	0.535	12.9×10^4	--
P - 11	2.0	1101.4	CH	17.7	111.4	390	152.8	0.0062	12.4×10^5	--
							363.7	0.0201	90.7×10^4	12.8
							603.6	0.0446	67.7×10^4	11.1
							765.6	0.0924	41.4×10^4	--
							1391.4	0.172	40.5×10^4	--
							2064.9	0.302	34.2×10^4	--
							3176.7	0.616	25.8×10^4	--
P - 12	4.5	1097.7	SM	19.0	116.9	580	271.5	0.0162	83.8×10^4	10.9
							571.8	0.0378	75.6×10^4	9.3
							1004.8	0.0804	62.5×10^4	--
							1674.6	0.161	52.1×10^4	--
							2284.6	0.258	44.3×10^4	--
							3277.4	0.552	29.7×10^4	--

TABLE 2.5-43

RESULTS OF CLAY MINERALOGY AND SLAKING TESTS ON SHALE SAMPLES

Boring	Depth (feet)	Elevation (feet)	Geologic Unit	Percent Illite[a]	Percent Chlorite[a]	Percent Kaolinite[a]	Id, One Cycle Test[b] (percent)	Id, Two Cycle Test[b] (percent)	Descriptive Slaking Durability[b]
B-19	17.3	1074.9	Jackson Park	50	30	20	93	85	Medium High
B- 6	24.7	1103.7	Jackson Park	40	40	20	81	48	Low
B- 7	36.5	1061.9	Jackson Park	50	40	10	82	44	Low
B- 6	48.0	1080.4	Heumader	50	30	20	85	64	Medium
B-14	42.2	1074.2	Heumader	50	30	20	80	57	Low
B-14	43.3	1073.1	Heumader	50	30	20	76	51	Low
B- 6	78.4	1050.0	Heebner	70	20	10	98	97	High
B-19	63.5	1028.7	Heebner	70	20	10	98	95	High
B- 6	81.8	1046.6	Snyderville	80	15	5	16	3	Very Low
B-19	69.4	1022.8	Snyderville	80	10	10	9	4	Very Low
B-15	55.4	1038.5	Snyderville	80	10	10	13	5	Very Low
B-16	45.3	1059.4	Unnamed Lawrence	50	30	20	52	9	Very Low
B- 5	89.2	1004.7	Unnamed Lawrence	50	40	10	93	79	Medium
B-19	103.3	988.9	Unnamed Lawrence	40	40	20	92	87	Medium High
B- 5	108.5	985.4	Ireland	50	30	20	93	81	Medium
B-19	130.1	962.1	Ireland	50	30	20	90	81	Medium
B-16	99.5	1005.2	Ireland	50	30	20	89	70	Medium
B- 6	226.0	902.4	Robbins	40	40	20	91	76	Medium

[a]Clay mineral data is presented as a percentage of the total clay fraction.

[b]Slake-durability testing is described in Section 2.5.6.

TABLE 2.5-44 Sheet 1 of 3

RESULTS OF SWELLING PRESSURE TESTS ON SHALE

Boring	Depth (feet)	Geologic Unit	Time (minutes)	Swelling Pressure (psf)
B-19	17.3	Jackson Park	0	100
			30	425
			90	675
			1020	850
			1500	900
B-6	24.7	Jackson Park	0	100
			30	150
			60	200
			4320	225
B-7	36.5	Jackson Park	0	100
			420	125
			1440	225
			1740	200
B-6	48.0	Heumader	0	100
			30	225
			60	325
			120	425
			240	511
			1200	630
			1440	675
			4320	725
B-14	42.2	Heumader	0	100
			60	650
			120	760
			1080	850
			1440	900
			2520	900
B-14	43.3	Heumader	0	100
			15	225
			60	275
			2520	480
B-6	78.4	Heebner	0	100
			60	225
			180	325
			1080	511
			1440	550
			2640	560

TABLE 2.5-44 (continued)

Boring	Depth (feet)	Geologic Unit	Time (minutes)	Swelling Pressure (psf)
B-19	63.5	Heebner	0	100
			15	225
			60	425
			1020	800
			1440	830
			2460	835
B-6	81.8	Snyderville	0	100
			15	325
			30	425
			60	630
			1440	1400
			2700	1500
			4320	1600
B-19	69.4	Snyderville	0	100
			60	110
			120	110
			180	125
			2880	130
B-15	55.4	Snyderville	0	100
			360	125
			1440	135
			2880	160
			4320	175
B-16	45.3	Unnamed Lawrence	0	100
			5	225
			15	225
			30	225
			60	230
			120	250
			1440	275
B-5	89.2	Unnamed Lawrence	0	100
			15	250
			60	325
			120	325
			180	325
			1440	300
B-19	103.3	Unnamed Lawrence	0	100
			15	425
			75	875
			3960	1150

TABLE 2.5-44 (continued) Sheet 3 of 3

Boring	Depth (feet)	Geologic Unit	Time (minutes)	Swelling Pressure (psf)
B-5	108.5	Ireland	0	100
			30	325
			900	750
			1800	800
			2400	830
B-19	130.1	Ireland	0	100
			30	775
			90	1030
			1200	1250
			1560	1300
			2760	1425
B-16	99.5	Ireland	0	100
			60	560
			180	725
			420	760
			1740	850
			4260	900
B-6	226.0	Robbins	0	100
			15	275
			180	2100
			240	2400
			420	2800
			1260	3425
			1800	3500
			2640	3550
			2880	3560
			6720	3725

TABLE 2.5-45

DESIGN STATIC AND DYNAMIC PROPERTIES OF SUBSURFACE MATERIALS AT THE PLANT SITE

Foundation Material	Average Elevation (feet)	Average Depth (feet)	Modulus of Elasticity (psf) Static	Modulus of Elasticity (psf) Dynamic[(a)]	Modulus of Rigidity (psf) Static	Modulus of Rigidity (psf) Dynamic[(a)]	Poisson's Ratio	Wet Density (pcf)	Damping[(c)] (percent)
Overburden Soil	1105 - 1100	0 - 5	0.5×10^6 [(b)]	1.5×10^6	0.2×10^6 [(b)]	0.4×10^6	0.4	130	11
Jackson Park Shale (sandstone facies)	1100 - 1092	5 - 13	46×10^6	79×10^6	18×10^6	29×10^6	0.3	125	3
Upper Heumader Shale	1092 - 1072	13 - 28	1×10^6	---	0.4×10^6	--- (a)	0.4	135	4
Lower Heumader Shale	1072 - 1065	28 - 40	5×10^6	---	1.9×10^6	--- (a)	0.35	150	4
Plattsmouth Limestone	1065 - 1053	40 - 52	400×10^6	700×10^6	150×10^6	270×10^6	0.3	165	2
Heebner Shale, Leavenworth Limestone, Snyderville Shale	1053 - 1037	52 - 68	21.5×10^6	150×10^6	8.2×10^6	58×10^6	0.3	140	4
Toronto Limestone	1037 - 1020	68 - 85	700×10^6	700×10^6	270×10^6	270×10^6	0.3	160	2

[a] For Heumader Shale, see Figure 2.5-97b.
Strain range for sandstone and limestone is 0.0001 to 0.001 percent but modulus values are also applicable to SSE strain levels.
Strain range for soil is shown on Figure 2.5-92. Values presented are for a strain range of 0.1 to 1.0 percent.

[b] Values based on tangent modulus from consolidation test.

[c] Values based on resonant column, literature review and previous experience.

[d] See Figure 2.5-97c, 2.9-d, and 2.9-97e.

TABLE 2.5-45 (continued)

Foundation Material	Average Elevation (feet)	Average Depth (feet)	Modulus of Elasticity (psf) Static	Modulus of Elasticity (psf) Dynamic[a]	Modulus of Rigidity (psf) Static	Modulus of Rigidity (psf) Dynamic[a]	Poisson's Ratio	Wet Density (pcf)	Damping[c] (percent)
Unmamed Lawrence Shale	1020 - 998	85 - 107	40×10^6	200×10^6	15×10^6	78×10^6	0.3	160	3
Ireland Shale	998 - 940	107 - 165	50×10^6	240×10^6	20×10^6	90×10^6	0.3	155	3
Ireland Siltstone	940 - 910	165 - 195	50×10^6	240×10^6	20×10^6	90×10^6	0.3	155	3
Robbins Shale	910 - 850	195 - 255	60×10^6	200×10^6	23×10^6	78×10^6	0.3	150	3
Vinland Shale-Siltstone-and Limestone	850 - 705	255 - 300	110×10^6	300×10^6	42×10^6	115×10^6	0.3	150	2
Tanganoxie Shale and Sandstone	705 - 745	300 - 360	95×10^6	270×10^6	35×10^6	100×10^6	0.35	150	3
Weston Shale	745 - 775	360 - 390	80×10^6	245×10^6	23×10^6	90×10^6	0.35	155	3
Granular Structural Fill	Variable	-	1.3×10^6	-[d]	0.5×10^6	-[d]	0.35	150	-[d]

TABLE 2.5-46

SUMMARY OF GEOPHYSICAL PROPERTIES OF SUBSURFACE MATERIALS AT THE PLANT SITE[a]

Depth (feet)	Geologic Unit(s)	Material Description	Compressional Wave Velocity (ft/sec)	Poisson's Ratio	Shear Wave Velocity (ft/sec)	Measured Unit Weight (pcf)	Average Bulk Density (pcf)
0-10	Residual soil and weathered bedrock	Silty clay and weathered shale	2,300	0.463-0.475	500 600	99 113	-
10-36	Heumader Member	Somewhat clayey calcareous shale	6,000	0.467-0.471	1,400-1,500	139	152[b]
36-48	Plattsmouth Member	Dense, fine-grained limestone with shale layers	14,000	0.378	6,200	160 165	166[b]
48-64	Heebner, Leavenworth and Snyderville Members	Interbedded carbonaceous shale, limestone, and clayey calcareous shale	7,000	0.333	3,500[b,d]	-	154[b]
64-82	Toronto Member	Fossiliferous limestone with occasional thin shale layers	11,700	0.305	6,200	147 153	165[b]
82-255	Unnamed Lawrence, Amazonia, Ireland and Robbins Members	Interbedded shale, siltstone and sandstone; a thin coal bed and limestone layer occur in the upper 25 feet; pure shale is present in the basal 60 feet	7,800	0.322	4,000	150-154	160[b]
259-262	Haskell Member	Dense, fine-grained limestone	15,000[b]	0.301[b]	8,000[b,c]	-	166[b]
262-393	Vinland, Tonganoxie and Weston Members	Interbedded siltstone, shale and sandstone; pure shale is present in the basal 30 feet	8,500[b]	0.333[b]	4,250[b,d]	148-154	159[b]
393-402	South Bend and Rock Lake Members	Dense limestone with shale and siltstone	16,500[b]	0.346[b]	8,000[b,c]	-	166[b]

[a]Depths and descriptions based on Boring B-4.

[b]Indicates values obtained from Birdwell Elastic Property Logs, borings B-4, B-5 and B-11.

[c]Shear wave velocity measured by Birdwell.

[d]Shear wave velocity empirically computed by Birdwell.

TABLE 2.5-47

HORIZONTAL COEFFICIENTS OF FRICTION AGAINST MASS CONCRETE FOR STRUCTURAL COMPONENTS

Subgrade Material	Coefficient Of Friction, f
Bedding Material[(a)]	0.55
Crushed Rock[(a)] Structural Fill	0.60
Residual Soil	0.20
Upper Heumader Shale	0.22
Lower Calcareous Heumader Shale	0.30
Upper Plattsmouth Limestone[(b,c)]	0.30
Lower Plattsmouth Limestone[(c)]	0.50
Plattsmouth Limestone[(d,e)]	0.70
Heebner Shale	0.30
Snyderville Shale	0.30

[a] Bedding material and crushed rock structural fill assumed to be compacted to at least 80 percent relative density and to a minimum dry density of at least 95 percent as determined be ASTM D 1557-70, respectively.

[b] Coefficient of friction based on the residual strength parameters of the moderately to highly weathered shale seams present in the upper portions of the Plattsmouth Limestone.

[c] At ESWS pumphouse

[d] At the plantsite

[e] A continuous layer, 0.4 to 0.9 feet in thickness, of clayey shale is present with average elevation 1,057.3 at depths of 6.0 to 7.0 feet below the top of the Plattsmouth Limestone at the Containment Building. A coefficient friction of 0.3 should be used for this layer.

TABLE 2.5-48

DESIGN STATIC AND DYNAMIC PROPERTIES
OF SUBSURFACE MATERIALS AT THE ESWS PUMPHOUSE

Foundation Material	Average Elevation (feet)	Average Depth (feet)	Modulus of Elasticity (psf) Static	Modulus of Elasticity (psf) Dynamic	Modulus of Rigidity (psf) Static	Modulus of Rigidity (psf) Dynamic	Poisson's Ratio	Wet Density (pcf)	Damping (percent)
Overburden Soil	1092-1077	0-15	0.61×10^{6} (a)	2.6×10^{6} (b)	0.21×10^{6} (a)	0.91×10^{6} (b)	0.4	120	4
Heumader Shale	1077-1059	15-33	2.0×10^{6}	---	0.70×10^{6}	---	0.40	140	4
Plattsmouth Limestone	1059-1047	33-45	400×10^{6}	700×10^{6}	150×10^{6}	270×10^{6} (c)	0.30	165	2
Heebner Shale, Leavenworth Limestone, Snyderville Shale	1047-1033	45-59	21.5×10^{6}	150×10^{6} (c)	8.2×10^{6}	58×10^{6} (c)	0.30	140	4.0
Toronto Limestone	1033-1015	59-77	700×10^{6}	700×10^{6} (c)	270×10^{6}	270×10^{6} (c)	0.30	160	2

[a] Modulus of elasticity estimated as 500 times the undrained shear strength and the modulus of rigidity calculated from the assumed Poisson's ratio.

[b] Values estimated from compressional wave velocities measured during the uphole survey of Boring HS-14. For Heumader Shale, see Figure 2.5-97a.

[c] Strain range for limestone and shale is 0.00001 to 0.001 percent.

TABLE 2.5-48a

RESULTS OF DENSITY TEST

MATERIAL NO.	MAXIMUM DRY DENSITY, PCF ASTM-D1557	MAXIMUM/MINIMUM[3] DRY DENSITY, PCF ASTM-D2049	95 PERCENT OF MODIFIED PROCTOR EXPRESSED AS RELATIVE DENSITY %
1[1]	140.6	136.0/101.8	94
2[1]	140.8	135.5/102.4	96
3[2]	147.0	139.2/105.1	101
4[2]	142.6	131.9/105.3	110

[2] Report "Field Density and Laboratory Investigation of the Crushed Stone Fill, Callaway Plant Units 1 and 2". Dames & Moore Report for Union Electric Company dated August 8, 1975.

[1] Test on CCFI Material, Marble Hill Nuclear Power Plant.

[3] Wet Method.

TABLE 2.5-49

SURFACE WAVE DATA IN THE CATEGORY I AREA

Observation Location	Observed Wave	Wave Type Particle Motion	Predominant Frequency (Hz)	Apparent Wave Length (Ft)	Apparent Velocity (Ft/sec)	Observed Limit of Wave Train (cycles)
Plant Site	M_2 Type Rayleigh	Vertical-Radial Prograde	12	214	2570	1
	M_1 Type Rayleigh	Vertical-Radial Retrograde	10-17	190-112	1900	15
	Love	Transverse	8.5-17	294-147	2500	15
Heat Sink	M_2 Type Rayleigh	Vertical-Radial Prograde	17	175	2970	1
	M_1 Type Rayleigh	Vertical-Radial Retrograde	17-20	144-122	2440	15
	Love	Transverse	10-17			10

TABLE 2.5-50

AMBIENT GROUND MOTION MEASUREMENTS

Ambient Station	Frequency (hertz)	Mode[c]	Ground Motion x 10^{-3} T	V	R
Heat Sink	---	D (in)	nil[d]	nil	nil
	---	A (in/sec/sec)	nil	nil	nil
	40 to 52.5[a]	V (in/sec)	.0225	.02	.0125
Heat Sink (with bulldozer moving at distance of approx. 750')	---	D (in)	nil	nil	nil
	---	A (in/sec/sec)	nil	nil	nil
	9.5[b], 66[b]	V (in/sec)	.0375	.0375	.0225
Plant Site	---	D (in)	nil	nil	nil
	---	A (in/sec/sec)	nil	nil	nil
	20 to 75[a], 110[a]	V (in/sec)	.02	.0075	.005

[a]Frequency content variable within specified ranges - no characteristic frequency observed

[b]Frequency content uniform - characteristic frequency observed

[c]D - Displacement
A - Acceleration
V - Velocity

[d]Too small to determine

TABLE 2.5-51

SUMMARY OF GEOPHYSICAL PROPERTIES OF SUBSURFACE MATERIALS AT THE ULTIMATE HEAT SINK[(a)]

Depth (feet)	Geologic Unit(s)	Material Description	Compressional Wave Velocity (ft/sec)	Poisson's Ratio	Shear Wave Velocity (ft/sec)	Measured Unit Weight[6] (pcf)	Average Bulk Density[6] (pcf)
0-7	Residual soil and weathered bedrock	Silty clay and weathered shale	750-1400	0.300-0.455	400	99-113	--
--	Heumader Member[(d)]	Somewhat clayey calcareous shale	4,300[(e)]	0.375[(e)]	1,925[(e)]	139	152
7-20	Plattsmouth Member	Dense, fine-grained limestone with shale layers	12,200	0.340	6,000	160-165	166
20-35.8	Heebner, Leavenworth and Snyderville Members	Interbedded carbonaceous shale, limestone, and clayey calcareous shale	6,150	0.333[(b)]	3,500[(b,c)]	--	154
35.8-50.7	Toronto Member	Fossiliferous limestone with occasional thin shale layers	11,600	0.313	6,000	147-153	165
50.7-110	Unnamed Lawrence, Amazonia, Ireland and Robbins Members	Interbedded shale, siltstone and sandstone; a thin coal bed and limestone layer occur in the upper 25 feet; pure shale is present in the basal 60 feet	7,500	0.305	3,950	150-154	160

[a]Depths and descriptions based on Boring HS-1.

[b]Indicates values obtained from Birdwell Elastic Property Logs, Borings B-4, B-5 and B-11.

[c]Shear wave velocity empirically computed by Birdwell.

[d]Heumader Member not present in Boring HS-1 but does occur in ultimate heat sink area.

[e]Sledge hammer shear test.

[f]Values are from B-4 and B-5.

TABLE 2.5-52

PLANT FOUNDATION DIMENSIONS, ELEVATIONS, AND LOADS

Structure	Approximate Plan Dimension (feet)	Foundation Elevation (feet)	Stratigraphic Unit at Foundation Elevation	Assumed Uniform Foundation Pressure (Static) (psf)
Reactor Building	154 diameter	1088.5		
		Tendon Gallery at 1074	Upper Heumader	7,500
		Core at 1064	Lower Heumader	7,500
Control Building	70 x 154	1068	Lower Heumader	7,900
Auxiliary Building	160 x 217	1068	Lower Heumader	7,900
Fuel Building	91 x 122	1093.5	Upper Heumader	10,600
Diesel Generator Building	65 x 88	1089.5	Upper Heumader	5,300
Hot Machine Shop	68 x 43	1094.5	Upper Heumader	5,600
Radwaste Building	196 x 82	1071.5	Lower Heumader	5,900
Turbine Building	155 x 320	Variable	Upper and Lower Heumader	2,000 to 11,000
Radwaste Tunnel	28 x 180	1071.5	Lower Heumader	7,000
Drum Storage Building	59 x 100	1094.5	Upper Heumader	2,700
Communications Corridor	70 x 38	1071.5	Lower Heumader	4,000
ESW Vertical Loop Chase	28.33 x 16.33	1070	Lower Heumader	4,100

TABLE 2.5-53

DESIGN STATIC AND DYNAMIC BEARING CAPACITIES
OF SUBSURFACE MATERIALS AT THE PLANT SITE

Structure	Foundation Elevation	Ultimate Bearing Capacity (psf)	Allowable Bearing Capacity (psf)		Bearing Pressure (psf)		Computed Safety Factor	
			Static[a]	Dynamic[b]	Static	Dynamic	Static	Dynamic
Reactor Building	1,064-1,088.5	60,000[d]	20,000	30,000	7,500	23,000	8.0	2.6
Control Building	1,068	60,000	20,000	30,000	7,900	13,000	7.6	4.3
Auxiliary Building	1,068	60,000	20,000	30,000	7,900	13,000	7.6	4.3
Fuel Building	1,093.5	60,000[c]	20,000	30,000	10,600	26,900	5.7	2.2
Diesel Generator Building	1,089.5	50,000[c]	17,000	25,000	5,300	18,700	9.4	2.7
Hot Machine Shop	1,099.5	30,000	10,000	15,000	5,600	5,700	5.4	5.3
Radwaste Building	1,071.5	60,000	20,000	30,000	5,900	9,200	10.2	6.5
Turbine Building	Above 1,075 Below 1,075	30,000 60,000	10,000 15,000	15,000 30,000	Variable Variable	Variable Variable	>3 >3	>2 >2
Radwaste Tunnel	1,071.5	60,000	20,000	30,000	4,000	N/A	15	N/A
Drum Storage Building	1,094.5	30,000	10,000	15,000	2,700	3,000	11.1	10
Communications Corridor	1,071.5	60,000	20,000	30,000	4,000	6,000	15	10
ESW Vertical Loop Chase	1,070	25,200	10,100[e]	12,600	3575	4290	7.0	5.9

[a]Based on a minimum factor of safety of 3.0.
[b]Based on a minimum factor of safety of 2.0.
[c]Granular fill and mud mat to 1,086.
[d]Higher portions on lean concrete backfill.
[e]Based on a minimum factor of safety of 2.5.

TABLE 2.5-54

SETTLEMENTS OF POWER BLOCK FOUNDATIONS

	Settlement[a]		
		Computed	
Structure	Allowable[b]	Maximum	Minimum
Reactor Building	1 1/2	0.5	0.3
Auxiliary/Control Building	1	0.3	0.2
Diesel generator Building	1	0.7	0.3
Fuel Building	1 3/4	1.4	0.4
Radwaste Building	1	0.2	0.1
Drum Storage	1	0.4	0.1
Pipe Tunnel	1	0.2	-
Tank Foundations	1		
a. Refuel Water	1	0.9	0.2
b. Condensate	1	0.4	-
c. Demineralization	1	0.2	-
d. Reactor	1	0.4	-
Communications Corridor	1	0.2	0.1
Hot Machine Shop	1	0.4	0.2
Transformer Vaults	1	0.2	-
Transformer Footings	1	0.3	0.1
Condensate Tank Trench	1	0.1	-
Auxiliary Boiler Building	1	0.3	0.2
Emergency Fuel Oil Tank	1/2	0.3	-
Emergency Fuel Oil Vault	1	0.3	-
Turbine Building	1-1 1/2	0.5	0.2
ESW Vertical Loop Chase	1	<0.1	-

[a]See Figure 2.5-106.
[b]Based on input from Bechtel Power Corporation, 1979, Letter BLSE 7534, August 24.

TABLE 2.5-54a (Sheet 1 of 3)

SPECIFICATION A-3852
Amd. 3, 05-10-77

301.5 Bedding for Circulating Water Pipeline, Warming Water Pipeline, Service Water Pipeline, ESWS Pipelines and ESWS Electrical Duct Banks:

a. The bedding shall be shaped to fit the underside of the pipe to provide a continuous firm bearing. Amd. 2

a1. There shall be a minimum of 6 inches of bedding below the pipe inverts where bottom of the trench is soil and a minimum of 12 inches of bedding where the bottom of the trench is rock. Amd. 4

a2. The bedding shall extend to at least the mid height of the pipe for pipelines and to a minimum of 12 inches above the crown elevation of ESWS pipelines. A minimum of 12 inches of bedding material shall be placed along the sides of the pipes and the ESWS ductbanks that are not poured against in-situ materials. Where the ESWS ductbanks can be placed against in-situ material, bedding material is not required. Amd. 4

b. When placing backfill the differential level from one side to the other side of the pipe or ductbank shall not exceed one foot. Amd. 3

c. Bedding Material: Amd. 4

c1. ESWS Pipeline, ESWS Electrical Duct Banks, Circulating Water Pipelines, Warming Water Pipeline and Service Water Pipeline: Amd. 4

c1.1 Bedding material shall be a pea gravel or crushed stone with not less than 95% passing 1/2 inch and not less than 95% to be retained on the No. 4 sieve. The bedding material shall have less than 5 percent friable materials as determined by ASTM C-142 and less than 45 percent loss as determined by ASTM C-131. Amd. 4

TABLE 2.5-54a (Sheet 2 of 3)

Amd. 5

c2. As an alternate to Paragraph c1 the following gradation may be used.

Amd. 4

c2.1 Bedding material shall conform to the applicable requirements of Paragraph 301.5. Bedding material shall have less than 5 percent friable materials as determined by ASTM C-142 and less than 45 percent loss as determined by ASTM C-131; except gradation shall be one of the following:

(1) ALTERNATE NO. 1

Sieve Size	Passing %
3/4"	95-100
3/8"	40-60
#8	0-05

Note: Alternate No. 1 is equally replaced with crushed stone conforming to the requirements of designation SCA-2 of Kansas State Department of Transportation Specifications Section 1102.

(2) ALTERNATE NO. 2

Sieve Size	Passing %
1/2"	95-100
#4	0-20
#8	0-08

(3) ALTERNATE NO. 3 Amd. 4

Sieve Size	Passing %
3/4"	100
3/8"	85-100
#8	40-60
#30	5-30
#100	0-02

(4) ALTERNATE NO. 4 Amd. 4

Sieve Size	Passing %
3/8"	100
#4	95-100
#8	50-85
#16	22-50
#30	8-35
#50	5-30
#100	0-15

TABLE 2.5-54a (Sheet 3 of 3)

(5) ALTERNATE NO. 5 Amd. 5

Sieve Size	Passing %
1"	100
3/4"	90-100
3/8"	20-55
#4	0-10
#8	0-5

(6) ALTERNATE NO. 6 (Sand) Amd. 5

Sieve Size	Passing %
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#50	10-30
#100	2-10

Note:
Alternate No. 6 is equally replaced with fine aggregate conforming to the requirements of designation FA-A of Kansas State Department of Transportation Specifications Section 1104.

d. The bedding material shall be placed in not more than 6 inch layers and vibratory tampered to a relative density of not less than 80% as determined by ASTM D-2049 or ASTM D-4253 and ASTM D-4254.

e. Controlled Low Strength Material (CLSM) meeting the requirements of Specification C-101, Addendums 1 & 2 to Revision 26 (Document No. 25707-00-3PS-DB01-10001 and 25707-000-3PS-DB01-10002 respectively) shall be used as the pipe bedding material when specified on the issued drawings.

The CLSM material shall be installed in accordance with Specification 10466-C-103, Addendum 1 to Revision 21 (Document No. 25707-000-3PS-DB02-10001).

Testing of the CLSM material and/or installation shall be in accordance with Specification 16577-C-191, Addendum 1 to Revision 20 (Document No. 25707-000-3PS-SY01-10001).

Table 2.5-54b

COMPUTED, MEASURED AND ALLOWABLE SETTLEMENTS

STRUCTURE	FOUNDATION PRESSURE (static) (psf)[a]	SETTLEMENT MONUMENT NO.	DATE OF FIRST READING	FIRST READING (ELEVATION)	SETTLEMENT (inches) COMPUTED	MEASURED[c]	ALLOWABLE[a]
Auxiliary Building	7,900				0.2 to 0.3	0.08 to 0.29	1.0
		A-1	1/9/80	2001.9798		0.12[e]	
		A-2	1/9/80	2002.0399		0.18	
		A-3	1/9/80	2001.9955		0.29	
		A-1A	6/82	2001.9590		0.08	
Control Building	7,900				0.2 to 0.3	0.14 to 0.34	1.0
		C-1	2/80	2003.9757		0.14	
		C-1A	7/77	1973.9860		0.34[d]	
Diesel Generator Building	5,300				0.3 to 0.7	0.42 to 0.62	1.0
		D-1	2/1/80	2001.9750		0.42	
		D-2	2/1/80	2002.0150		0.62	
		D-3	2/1/80	2002.0086		0.54	
Fuel Building	10,600				0.4 to 1.4	0.38 to 0.68	1.75
		F-1	2/1/80	2001.9862		0.38[k]	
		F-2	2/1/80	2001.9887		0.67[k]	
		F-3	2/1/80	2002.0721		0.65[k]	
		F-4	2/1/80	2001.9300		0.68[k]	
Radwaste Building	5,900				0.1 to 0.2	0.23 to 0.30	1.0
		R-1	2/6/80	2002.0040		0.25	
		R-2	2/6/80	2002.0176		0.30	
		R-3	2/6/80	2001.9973		0.23	
		R-4	2/6/80	2001.9849		0.25	
Reactor Building	7,500[b]				0.3 to 0.5	0.31 to 0.43	1.5
		R-10 (AZM-50)	8/78	2001.0280		0.41	
		R-20 (AZM-135)	8/78	2001.0130		0.43	
		R-30 (AZM-225)	8/78	2000.9960		0.43	
		R-40 (AZM-315)	8/78	2001.0130		0.31	
Turbine Building	2,000 to 11,000				0.2 to 0.5	0.13 to 0.19	1.0-1.5
		T-1	9/78	2000.0090		0.19	
		T-1A	2/80	1999.9050		0.13	
		T-2	9/78	1982.9900		0.18	
		T-2A	2/80	1999.9918		0.14	
		T-3	2/80	1999.8997		0.17	
		T-3A	2/80	2000.4822		0.16	
		T-4	9/78	2000.0040		0.06[f]	
		T-4A	2/80	2000.4848		0.10[i]	
		T-4B	10/80	2000.0014		0.14[j]	
		T-5A	2/80	1999.8015		0.19	
ESWS Pumphouse	6,600				0.1 to 0.25	0.0 to 0.26	1.0
		PH-1	2/80	1958.0440		0.04[g]	
		PH-2	2/80	1958.0004		0.02[g]	
		PH-3	2/80	1958.0547		0.02[g]	
		PH-4	2/80	1958.0169		0.04[g]	
		E-1	1/81	2002.023		0.26[h]	
		E-2	5/81	2002.049		0.14[h]	
		E-2A	1/84	2002.034		0.0	
		E-3	1/81	2002.093		0.26[h]	
		E-4	5/81	2002.054		0.11[h]	
		E-4A	1/84	2001.963		0.0	

[a] Provided in Bechtel letter BLSE-7534, (8-24-79).

[b] Provided in Bechtel letter BLSE-7686, (10-11-79).

[c] Measured settlement as of November, 1983.

[d] Measured settlement as of July 1980; no readings thereafter.

[e] Measured settlement as of December, 1981, replaced by A-1A.

[f] Measured settlement as of September, 1980; new monument T-4B was established.

[g] Measured settlement as of April, 1980; monuments inaccessible thereafter.

[h] Measured settlement as of January, 1984.

[i] Measured settlement as of July 1982, monument inaccessible thereafter.

[j] Measured settlement as of May, 1982, monument destroyed.

[k] Measured settlement as of April, 1984.

TABLE 2.5-55
SOIL PARAMETERS FOR STABILITY ANALYSIS
OF ESWS PUMPHOUSE CHANNEL AND UHS SLOPES

Soil	Density (pcf)	Total Stress ϕ_{cu} (degree)	Total Stress C_{cu} (psf)	Effective ϕ' (degree)	Effective C' (psf)
Soil	124	10	585	20	400
Shale	150	35	5,000	35	5,000

WOLF CREEK

Table 2.5-55a

SUMMARY OF CONSOLIDATED UNDRAINED TRIAXIAL
TEST DATA ON UHS EMBANKMENT MATERIAL

		①		②		③		④		⑤		⑥	
TEST NUMBER		1		2		3		4		5		6	
BORING		CUHS-1		CUHS-1		CUHS-2		CUHS-2		CUHS-3		CUHS-3	
SAMPLE		2		7		3		6		3		4	
ELEV (FEET)		1966		1954		1983		1956		1963		1960	
INITIAL	w, %	13.9		16.3		18.3		16.4		19.9		23.4	
	γ_d, PCF	121.5		112.7		107.8		113.7		106.1		101.7	
	e_0	0.39		0.49		0.56		0.48		0.59		0.66	
	S	0.96		0.98		0.96		0.94		0.96		1.0	
FINAL	w, %	17.0		21.1		23.2		19.4		23.7		27.9	
	γ_d, PCF	120.1		111.7		106.2		114.8		105.6		100.2	
	e_f	0.40		0.50		0.58		0.46		0.60		0.68	
	S												
BACK PRESSURE (PSI)		48		46		56		64		55		66	
STRAIN RATE (INCHES / MINUTE)		0.002		0.002		0.002		0.002		0.002		0.002	
STRESS CONDITION		PEAK $\sigma_1-\sigma_3$	MAX. $\bar{\sigma}_1/\bar{\sigma}_3$	PEAK $\sigma_1-\sigma_3$	MAX. $\bar{\sigma}_1/\bar{\sigma}_3$	PEAK $\sigma_1-\sigma_3$	MAX. $\bar{\sigma}_1/\bar{\sigma}_3$	PEAK $\sigma_1-\sigma_3$	MAX. $\bar{\sigma}_1/\bar{\sigma}_3$	PEAK $\sigma_1-\sigma_3$	MAX. $\bar{\sigma}_1/\bar{\sigma}_3$	PEAK $\sigma_1-\sigma_3$	MAX. $\bar{\sigma}_1/\bar{\sigma}_3$
TOTAL STRESS	ϵ, %	11.6	1.59	15.4	5.3	14.3	5.2	15.7	3.6	6.6	2.6	10.7	2.2
	TIME TO FAIL (MIN)	328	45	462	160	433	158	465	108	198	78	323	65
	σ_3, PSF	576	576	1872	1872	1152	1152	1152	1152	1872	1872	576	576
	$\sigma_1-\sigma_3$	3332	1410	3152	2507	2162	1857	4862	3381	2625	2333	2261	1769
	σ_1, PSF	3908	1986	5024	4379	3314	3009	6014	4533	4496	4205	2837	2345
	$\frac{1}{2}(\sigma_1-\sigma_3)$	1666	705	1576	1254	1081	929	2431	1691	1313	1167	1131	885
	$\frac{1}{2}(\sigma_1+\sigma_3)$	2242	1281	3448	3126	2233	2081	2593	2843	3184	3039	1707	1461
	u, PSF	533	562	-101	821	-58	317	677	1138	547	936	418	475
	A, $u/(\sigma_1-\sigma_3)$	0.16	0.40	-0.03	0.33	-0.03	0.17	0.14	0.34	0.21	0.40	0.18	0.27
EFFECTIVE STRESS	ϵ, %	11.6	1.59	15.4	5.3	14.3	5.2	15.7	3.6	6.6	2.6	10.7	2.2
	TIME TO FAIL (MIN)	328	45	462	160	433	158	465	108	198	78	323	65
	$\bar{\sigma}_3$, PSF	43	14	1973	1051	1210	835	475	14	1325	936	158	101
	$\bar{\sigma}_1-\bar{\sigma}_3$	3332	1410	3152	2507	2162	1857	4862	3381	2625	2333	2261	1769
	$\bar{\sigma}_1$, PSF	3375	1424	5125	3558	3372	2692	5337	3395	3949	3269	2419	1870
	$\frac{1}{2}(\bar{\sigma}_1-\bar{\sigma}_3)$	1666	705	1576	1254	1081	929	2431	1691	1313	1167	1131	885
	$\frac{1}{2}(\bar{\sigma}_1+\bar{\sigma}_3)$	1709	719	3549	2305	2291	1764	2906	1705	2637	2103	1289	986
	u, PSF	533	562	-101	821	-58	317	677	1138	547	936	418	475
	A, $u/(\bar{\sigma}_1-\bar{\sigma}_3)$	0.16	0.40	-0.03	0.33	-0.03	0.17	0.14	0.34	0.21	0.40	0.18	0.27
	$\bar{\sigma}_1/\bar{\sigma}_3$	78.5	102	2.6	3.4	2.78	3.22	11.2	24.3	3.0	3.5	15.3	18.5
LL													
PL													
PI													
SOIL CLASS													

TABLE 2.5-56

RESULTS OF SLOPE STABILITY ANALYSIS FOR UHS EXCAVATED SLOPES USING WEDGE ANALYSIS

Condition	Computed Minimum Factor of Safety	Required Minimum Factor of Safety
End of Construction	7.8	1.4
Steady State	5.3	1.5
Steady State plus SSE (0.12 g)	3.5	1.2

TABLE 2.5-57

Safety Factors of Slope Stability Analysis for
ESWS Intake Channel Excavated Slopes

Condition	Effective Stress Parameters	Total Stress Parameters	Required Minimum Factor of Safety
5:1 Slopes			
Submerged - Lake level @ el 1087	5.91		1.5
Submerged + 0.12g SSE	2.16		1.2
Rapid Drawdown - el 1087 to 1070	2.82		1.2
End of Construction (Short-term)		2.86	1.5
End of Construction (Long-term)	3.37	3.14	1.5
End of Construction +0.12g SSE (Long-term)	1.86	1.74	1.2
3:1 Slopes			
Submerged - Lake level above el 1070	7.13		1.5
Submerged +0.12g SSE	3.37	3.88	1.2
End of Construction (Short-term)		5.69	1.5
End of Construction (Long-term)	5.02	5.97	1.5

TABLE 2.5-58

COMPRESSIONAL AND SHEAR WAVE VELOCITIES, ULTIMATE HEAT SINK

Material	Elevation[(a)] (feet)	UHS Dam		ESWS Pumphouse	
		Vp(fps)[(b)]	Vs(fps)[(c)]	Vp(fps)[(d)]	Vs(fps)[(e,f)]
In-Situ Soil	1,072 - 1,077	1,450 ± 975	375 ± 250	1,425	685
Heumader Shale Member					
Upper				2,625	1,075
Lower	1,060 - 1,072			2,625	1,260
Plattsmouth Limestone Member	1,047 - 1,060	13,050 ± 1,500	6,375 ± 725	14,000	6,915
Heebner Shale - Leavenworth Limestone and Snyderville Shale Members	1,031 - 1,047	5,525 ± 1,250	2,775 ± 625	6,150	3,275
Toronto Limestone Member	1,013 - 1,031	12,800 ± 1,000	6,675 ± 650	10,600	5,675
Unnamed Lawrence - Amazonia Limestone Members	984 - 1,013	6,800 ± 800	3,575 ± 425	6,800	3,675

[a] Elevations based on Borings HS-14 and HS-15.

[b] Compressional wave velocities measured at alignment of UHS dam. Mean and ± one standard deviation values are listed.

[c] Shear wave velocities at alignment of UHS dam based on an evaluation of measured shear wave and compressional wave velocities. Mean and ± one standard deviation values are listed.

[d] Compressional wave velocities measured by the uphole technique at Boring HS-14.

[e] Shear wave velocities estimated from Vp measurements at HS-14 and shear wave data from similar materials.

[f] The standard deviations listed for Vp and Vs at the UHS dam alignment can be used to estimate the variations that are associated with the velocity values listed for the ESWS pumphouse.

TABLE 2.5-59

SURFACE WAVE DATA FOR THE ULTIMATE HEAT SINK

Observed Wave	Wave Type Particle Motion	Predominant Frequency (Hz)	Apparent Wave Length (ft)	Apparent Velocity (ft/sec)	Observed Limit Of Wave Train (cycles)
M2 Type Rayleigh	Vertical-Radial, Prograde	17	175	2,970	1
M1 Type Rayleigh	Vertical-Radial, Retrograde	17-20	144-122	2,440	15
Love	Transverse	10-17	-	-	10

TABLE 2.5-60

AMBIENT GROUND MOTION MEASUREMENTS IN THE ULTIMATE HEAT SINK

Ambient Station	Frequency (Hertz)	Mode[(a)]	Ground Motion x 10-3		
			T	V	R
Heat Sink	-	D (in)	nil[(c)]	nil	nil
	-	A (in/sec/sec)	nil	nil	nil
	40 to 52.5[(b)]	V (in/sec)	.0225	.02	.0125
Heat Sink (with bulldozer moving at distance of approx. 750')	-	D (in)	nil	nil	nil
	-	A (in/sec/sec)	nil	nil	nil
	9.5, 66[(d)]	V (in/sec)	.0375	.0375	.0225

[a]D- Displacement
A - Acceleration
V - Velocity

[b]Frequency content variable within specified ranges - no characteristic frequency observed.

[c]Nil - too small to be measured.

[d]Frequency content uniform - characteristic frequency observed.

WOLF CREEK

Table 2.5-60a

VERTICAL MOVEMENT MONUMENT DATA
UHS DAM

Monument Number	Location (feet)		Date of Survey and Elevation										
	Station	Offset	05/20/80	05/27/80	06/03/80	06/10/80	06/17/80	06/24/80	07/01/80	07/08/80	07/15/80	07/22/80	07/29/80
1	(-) 2+00	0	1978.031	1978.023	1978.022	1978.021	1978.038	1978.036	1978.039	1978.046	1978.030	1978.030	1978.038
2	0+00	0	1978.276	1978.269	1978.264	1978.266	1978.282	1978.279	1978.282	1978.290	1978.274	1978.275	1978.279
3	2+00	0	1978.369	1978.364	1978.360	1978.363	1978.370	1978.376	1978.378	1978.387	1978.374	1978.380	1978.377
4	4+00	0	1978.753	1978.740	1978.733	1978.732	1978.736	1978.739	1978.740	1978.744	1978.733	1978.742	1978.733
5	5+50	0	1978.663	1978.653	1978.648	1978.650	1978.656	1978.656	1978.661	1978.666	1978.654	1978.664	1978.656
6	7+00	0	1978.565	1978.555	1978.554	1978.555	1978.559	1978.563	1978.568	1978.573	1978.559	1978.573	1978.563
7	8+50	0	1978.414	1978.404	1978.401	1978.406	1978.410	1978.414	1978.414	1978.416	1978.408	1978.424	1978.410
8	10+00	0	1978.289	1978.280	1978.276	1978.283	1978.287	1978.291	1978.296	1978.296	1978.288	1978.304	1978.291
9	12+00	0	1978.093	1978.084	1978.084	1978.089	1978.094	1978.098	1978.100	1978.101	1978.094	1978.113	1978.095

Note : Elevations refer to SNUPPS reference datum.

Table 2.5-60a (continued)

Monument Number	Location (feet) Station	Offset	Date of Survey and Elevation 08/05/80	08/12/80	08/19/80	08/26/80	09/02/80	09/09/80	09/16/80	09/23/80	09/30/80	11/04/80	12/01/80
1	(-) 2+00	0	1978.034	1978.040	1978.035	1978.037	1978.036	1978.046	1978.032	1978.035	1978.030	1978.031	1978.026
2	0+00	0	1978.276	1978.283	1978.273	1978.280	1978.277	1978.287	1978.275	1978.277	1978.272	1978.275	1978.272
3	2+00	0	1978.373	1978.375	1978.367	1978.377	1978.375	1978.380	1978.379	1978.373	1978.372	1978.375	1978.379
4	4+00	0	1978.729	1978.730	1978.720	1978.728	1978.724	1978.726	1978.731	1978.721	1978.719	1978.720	1978.722
5	5+50	0	1978.651	1978.652	1978.642	1978.652	1978.648	1978.649	1978.653	1978.643	1978.642	1978.643	1978.644
6	7+00	0	1978.557	1978.560	1978.550	1978.558	1978.556	1978.556	1978.560	1978.551	1978.549	1978.550	1978.553
7	8+50	0	1978.406	1978.407	1978.397	1978.406	1978.404	1978.403	1978.406	1978.397	1978.394	1978.396	1978.397
8	10+00	0	1978.288	1978.286	1978.280	1978.291	1978.287	1978.288	1978.288	1978.281	1978.278	1978.284	1978.289
9	12+00	0	1978.090	1978.089	1978.084	1978.096	1978.091	1978.093	1978.092	1978.083	1978.081	1978.084	1978.085

Table 2.5-60a (continued)

Monument Number	Location (feet) Station	Offset	Date of Survey and Elevation 01/05/81
1	(-) 2+00	0	1978.019
2	0+00	0	1978.264
3	2+00	0	1978.379
4	4+00	0	1978.709
5	5+50	0	1978.632
6	7+00	0	1978.542
7	8+50	0	1978.387
8	10+00	0	1978.278
9	12+00	0	1978.073

Table 2.5-60b

VERTICAL MOVEMENT MONUMENT DATA
UHS DAM

Monument Number	Location (feet) Station	Offset	Date of Survey and Cumulative and Movement 05/27/80	06/03/80	06/10/80	06/17/80	06/24/80	07/01/80	07/07/80	07/15/80	07/22/80	07/29/80	08/05/80
1	(-) 2+00	0	0.10	0.11	0.12	-0.08	-0.06	-0.10	-0.18	0.01	0.01	-0.08	-0.04
2	0+00	0	0.08	0.14	0.12	-0.07	-0.04	-0.07	-0.17	0.02	0.01	-0.04	0.00
3	2+00	0	0.06	0.11	0.07	-0.01	-0.08	-0.11	-0.22	-0.06	-0.13	-0.10	-0.05
4	4+00	0	0.16	0.24	0.25	0.20	0.17	0.16	0.11	0.24	0.13	0.24	0.29
5	5+50	0	0.12	0.18	0.16	0.08	0.08	0.02	0.04	0.11	-0.01	0.08	0.14
6	7+00	0	0.12	0.13	0.12	0.07	0.02	-0.04	-0.10	0.07	-0.10	0.02	0.10
7	8+50	0	0.12	0.16	0.10	0.05	0.00	0.00	-0.02	0.07	-0.12	0.05	0.10
8	10+00	0	0.11	0.16	0.07	0.02	-0.02	-0.08	-0.08	0.01	-0.18	-0.02	0.01
9	12+00	0	0.11	0.11	0.05	-0.01	-0.06	-0.08	-0.10	-0.01	-0.24	-0.02	0.04

Notes: 1. All movements are in inches.
2. Positive number indicates settlement.

Table 2.5-60b (continued)

Monument Number	Location (feet)		Date of Survey and Cumulative Movement										
	Station	Offset	08/12/80	08/19/80	08/26/80	09/02/80	09/09/80	09/16/80	09/23/80	09/30/80	11/04/80	12/01/80	01/05/81
1	(-) 2+00	0	-0.11	-0.05	-0.07	-0.06	-0.18	-0.01	-0.05	0.01	0.00	0.06	0.14
2	0+00	0	-0.08	0.04	-0.05	0.01	-0.13	0.01	-0.01	0.05	0.01	0.05	0.14
3	2+00	0	-0.07	0.02	-0.10	-0.07	-0.13	-0.12	-0.05	-0.04	-0.07	-0.12	-0.12
4	4+00	0	0.28	0.40	0.30	0.35	0.32	0.26	0.38	0.41	0.40	0.37	0.53
5	5+50	0	0.13	0.25	0.13	0.18	0.17	0.12	0.24	0.25	0.24	0.23	0.37
6	7+00	0	0.06	0.18	0.08	0.11	0.11	0.06	0.17	0.19	0.18	0.14	0.28
7	8+50	0	0.08	0.20	0.10	0.12	0.13	0.10	0.20	0.24	0.22	0.20	0.32
8	10+00	0	0.04	0.11	-0.02	0.02	0.01	0.01	1.10	0.13	0.06	0.00	0.13
9	12+00	0	0.05	0.11	-0.04	0.02	0.00	0.01	0.12	0.14	0.11	0.10	0.24

WOLF CREEK

Table 2.5-60c

HORIZONTAL MOVEMENT MONUMENT DATA
UHS DAM

Monument Number	Location (feet) Station	Offset	Date of Survey and Coordinates 5/23/80 North	East	6/25/80 North	East	07/23/80 North	East	08/21/80 North	East	09/24/80 North	East
1	(-) 2+00	0	98071.529	102244.256	98071.461	102244.139	98071.488	102244.226	98071.541	102244.106	98071.617	102244.011
2	0+00	0	97916.880	102370.959	97916.857	102370.923	97916.859	102370.892	97916.920	102370.821	97916.975	102370.700
3	2+00	0	97762.179	102497.783	97762.165	102497.714	97762.147	102497.762	97762.226	102497.689	97762.259	102497.564
4	4+00	0	97607.647	102624.344	97607.657	102624.361	97607.654	102624.372	97607.712	102624.279	97607.786	102624.192
5	5+50	0	97491.336	102719.270	97491.337	102719.282	97491.314	102719.276	97491.387	102719.188	97491.426	102719.123
6	7+00	0	97375.299	102814.312	97375.269	102814.293	97375.246	102814.345	97375.330	102814.233	97375.366	102814.123
7	8+50	0	97259.144	102909.218	97259.135	102909.257	97259.146	102909.296	97259.200	102909.149	97259.246	102909.063
8	10+00	0	97143.284	103004.258	97143.275	103004.245	97143.259	103004.270	97143.362	103004.213	97143.393	103004.082
9	12+00	0	97022.872	103158.715	97022.851	103158.725	97022.771	103158.652	97022.843	103158.647	97022.993	103158.567

Notes: 1. Coordinates refer to SNUPPS reference grid.
2. See Figure 241.24-4-1 for location of the movement monument.

Table 2.5-60c (continued)

Monument Number	Location (feet)		Date of Survey and Coordinates			
			11/06/80		02/16/81	
	Station	Offset	North	East	North	East
1	(-) 2+00	0	98071.593	102244.267	98071.541	102244.188
2	0+00	0	97916.919	102370.906	97916.934	102370.861
3	2+00	0	97762.230	102497.783	97762.218	102497.745
4	4+00	0	97607.713	102624.324	97607.687	102624.313
5	5+50	0	97491.402	102719.254	97491.357	102719.227
6	7+00	0	97375.346	102814.315	97375.310	102814.237
7	8+50	0	97259.206	102909.233	97259.194	102909.198
8	10+00	0	97143.374	103004.231	97143.362	103004.267
9	12+00	0	97022.952	103158.714	97023.002	103158.732

WOLF CREEK

Table 2.5-60d

HORIZONTAL MOVEMENT UHS DAM

Monument Number	Location (feet) Station	Offset	06/25/80 South	06/25/80 West	07/23/80 South	07/23/80 West	08/21/80 South	08/21/80 West	09/24/80 South	09/24/80 West	11/06/80 South	11/06/80 West	02/16/81 South	02/16/81 West
1	(-) 2+00	0	0.82	1.40	0.49	0.36	-0.14	1.80	-1.06	2.94	-0.77	-0.13	-0.14	0.82
2	0+00	0	0.28	0.43	0.25	0.80	-0.48	1.66	-1.14	3.11	-0.47	0.64	-0.65	1.18
3	2+00	0	0.17	0.83	0.38	0.25	-0.56	1.13	-0.96	2.63	-0.61	0.00	-0.47	0.46
4	4+00	0	-0.12	-0.20	-0.08	-0.34	-0.78	0.78	-1.67	1.82	-0.79	0.24	-0.48	0.37
5	5+50	0	-0.01	-0.14	0.26	-0.07	-0.61	0.98	-1.08	1.76	-0.79	0.19	-0.25	0.52
6	7+00	0	0.36	0.23	0.64	-0.40	-0.37	0.95	-0.80	2.27	-0.56	-0.04	-0.13	0.90
7	8+50	0	0.11	-0.47	-0.02	-0.94	-0.67	0.83	-1.22	1.86	-0.74	-0.18	-0.60	0.24
8	10+00	0	0.11	0.16	0.30	-0.14	-0.94	0.54	-1.31	2.11	-1.08	0.32	-0.94	-0.11
9	12+00	0	0.25	-0.12	1.21	0.76	0.35	0.82	-1.45	1.78	-0.96	0.01	-1.56	-0.20

(Date of Survey and Cumulative Movement)

Notes: 1. + indicates movement towards south or west.
- indicates movement towards north or east.
2. All movements are in inches.

TABLE 2.5-61

WELL AND PIEZOMETER PLUGGING

Location	Type	Number	Coordinates[a]		Plugging Volume		Remarks
Main Dam, Spillways, and Saddle Dams	well	D-61b	N83,200	E99,900	-		Not located
	well	D-61	N83,400	E99,800	-		Removed by excavation
	well	D-63	N83,300	E99,250	2.5	yd^3	Concrete
	piezometer	LK-8	N83,385.5	E100,359.8	2.3	qts	Grout
Baffle Dikes	well	XC-1	N100,910	E96,350	-		Removed by excavation
	well	XC-2	N100,890	E96,300	12.0	yd^3	Concrete
	well	XD-3	N95,700	E101,600	6.0	yd^3	Concrete
	well	XD-4	N94,720	E101,780	46.0	yd^3	Concrete
Ultimate Heat Sink	piezometer	HS-1 (2)[b]	N97,921.4	E102,373.2	3.4	qts	Grout
					1.84	qts	Grout
	piezometer	HS-3 (1)[b]	N97,534.7	E102,690	0.165	qt	Grout
	piezometer	HS-5 (2)[b]	N97,147.8	E103,006.8	2.48	qts	Grout
					0.92	qt	Grout

(a) SNUPPS coordinates.

(b) Number in parentheses denotes number of piezometers at location.

TABLE 2.5-62

IN-PLACE DENSITY TEST SUMMARY FOR MAIN DAM AND SADDLE DAMS COHESIVE EMBANKMENT FILL

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
24	85+00	100 N	1,969.0	LW-5	25.0	93.6	33
31-S	84+00	90 S	1,968.0	LW-5	25.5	94.9	36
32	84+50	100 S	1,968.0	LW-5	26.7	92.1	36
33	85+00	110 N	1,969.0	LW-5	25.0	90.4	37
36	84+00	90 S	1 968.0	LW-5	24.7	93.1	38
37	85+00	110 N	1,969.0	LW-5	27.4	89.6	39
38	84+00	90 S	1,968.0	LW-5	20.7	99.2	
39	85+00	110 N	1,969.0	LW-5	21.8	97.7	
182	31+15	3 E	1,969.0	LW-5	18.0	95.4	
183	28+40	0	1,975.0	LW-5	21.5	94.8	184
184	28+40	0	1,975.0	LW-5	20.6	95.1	
185	20+50	0	1,976.0	LW-5	24.0	88.6	200
186	32+14	1 W	1,973.0	LW-13	23.0	98.3	
187	28+95	2 E	1,976.0	LW-7	25.1	102.1	
200	20+50	0	1,976.0	LW-7	25.7	102.0	
201	19+30	2 W	1,977.0	LW-8	23.7	97.7	
202	34+69	0	1,977.0	LW-8	23.6	97.2	

(a) The "S" following the test number indicates that a sand cone correlation test was run with the nuclear test indicated.

(b) No prefix indicates a Main Dam station; Roman numeral (I, II, III, IV, V) prefix indicates a Saddle Dam station; A or B prefix indicates a Baffle Dike A or B station.

(c) SNUPPS datum.

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
203-S	34+00	1 W	1,980.0	LW-11	28.2	98.3	
209	82+40	100 N	1,969.0	LW-2	25.5	92.3	213
210	82+40	100 N	1,969.0	LW-2	22.2	91.7	213
211	82+40	100 N	1,969.0	LW-2	22.2	92.2	213
212	102+08	4 N	1,970.0	LW-5	27.1	87.6	217
213	82+40	100 N	1,969.0	LW-2	18.5	96.3	
214	102+08	4 N	1,970.0	LW-5	26.2	89.3	217
215	81+60	10 S	1,969.5	LW-13	22.2	96.9	
216	84+00	30 S	1,969.5	LW-13	24.3	95.1	
217	102+08	4 N	1,970.0	LW-13	23.2	96.1	
218	82+00	50 N	1,969.5	LW-13	25.1	93.7	219
219	82+00	50 N	1,969.5	LW-13	24.8	96.2	
220	78+00	30 S	1,958.0	LW-13	25.1	96.0	243
221	81+00	60.5 S	1,970.0	LW-13	24.5	96.5	
222	101+25	3 S	1,970.5	LW-13	26.2	94.4	224
223-S	80+60	57 S	1,962.0	LW-13	23.0	100.5	
224	101+25	3 S	1,970.5	LW-13	24.8	95.5	
225	83+90	84 S	1,970.0	LW-13	22.7	98.5	
226	80+77	25 S	1,967.5	LW-13	21.6	98.7	
227	85+10	70 N	1,973.0	LW-13	24.9	96.6	
228	96+00[d]	3 N	1,984.0	LW-2	21.1	98.1	

(d) In keyway.

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
229	102+00[d]	3 S	1,989.0	LW-2	19.1	99.1	
230	87+00[d]	3 N	1,977.0	LW-2	21.2	97.0	
231	93+05	4 N	1,980.0	LW-2	18.5	98.0	
232-S	97+40	32 S	1,987.0	LW-1	21.8	95.2	
233	103+05	0	1,991.0	LW-1	21.8	96.7	
234	85+42	106 S	1,973.0	LW-2	20.6	96.5	
235	87+65	5 S	1,980.0	LW-1	23.0	95.8	
236	81+42	88 S	1,966.0	LW-4	17.9	97.4	
237	91+06	4 S	1,989.0	LW-4	19.1	95.6	
238-S	85+20	14 N	1,972.0	LW-8	24.7	95.9	
239	88+08	40 S	1,982.0	LW-15	23.1	97.5	
240	83+60	99 N	1,972.0	LW-4	18.2	97.1	
241	92+25	6 S	1,991.0	LW-4	17.9	97.5	
242	84+28	77 N	1,965.0	LW-3	19.1	96.4	
243	78+00	30 S	1,958.0	LW-2	20.8	95.5	
244	79+05	55 S	1,956.0	LW-4	18.7	95.5	
245	82+20	27 N	1,969.0	LW-4	17.1	97.9	
246	90+20	20 S	1,992.0	LW-4	17.2	98.7	
247	85+40	60 N	1,975.0	LW-2	20.0	97.2	
248	82+50	0	1,968.0	LW-4	15.5	101.3	
249	83+20	5 S	1,970.0	LW-4	17.2	97.8	
250	81+00	50 N	1,967.0	LW-4	17.5	97.4	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
251	91+00	15 N	1,994.0	LW-4	16.3	100.0	
252	80+45	6 N	1,964.0	LW-18	24.5	95.5	
253	83+27	40 N	1,977.0	LW-1	23.8	95.1	
254	85+05	96 N	1,981.0	LW-1	24.6	93.8	277
255	101+24	97 N	1,992.0	LW-2	19.3	97.6	
256	110+70	3 S	1,994.0	LW-2	20.6	97.6	
257	85+05	96 N	1,981.0	LW-1	24.5	92.2	277
258	85+30	10 N	1,980.0	LW-12	27.4	96.0	
259	89+15	33 S	1,984.0	LW-18	21.1	96.1	
260	90+10	5 N	1,991.0	LW-12	22.6	100.0	
263	98+00	10 N	1,989.0	LW-15	24.1	95.1	
264	87+00	30 S	1,983.0	LW-15	23.5	95.8	
265	87+90	15 S	1,984.5	LW-15	28.5	92.1	270
266	84+30	7 S	1,973.0	LW-16	23.3	94.7	267
267	84+30	7 S	1,973.0	LW-16	25.8	96.0	
268	81+40	83 N	1,970.0	LW-16	27.8	92.9	269
269	81+40	83 N	1,970.0	LW-17	24.7	95.8	
270	87+70	15 S	1,984.5	LW-15	23.4	97.2	
271	99+48	3 N	1,992.5	LW-17	20.0	95.3	
275	91+40	41 N	1,996.0	LW-2	20.2	97.5	
276	84+00	83 N	1,981.0	LW-2	21.3	95.7	
277	85+05	96 N	1,981.0	LW-1	22.2	96.0	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
278-S	95+95	6 S	1,987.5	LW-1	21.8	97.4	
279	100+98	8 S	1,994.5	LW-2	20.2	96.7	
280	84+00	5 N	1,975.0	LW-3	19.4	93.5	284
281	80+00	20 S	1,965.0	LW-3	19.1	95.5	
282	84+00	5 N	1,975.0	LW-3	20.1	94.3	284
283	58+00	0	1,991.0	LW-3	17.4	99.2	
284	84+00	5 N	1,975.0	LW-3	18.9	97.3	
285	5+15	70 E	1,962.0	LW-18	24.0	96.3	
286	2+40	1 E	1,966.0	LW-12	27.9	96.7	
287-S	6+10	94 W	1,961.0	LW-17	25.6	95.1	
288	7+20	49 E	1,961.0	LW-17	26.1	94.7	289
289	7+20	49 N	1,961.0	LW-17	19.0	103.4	
290	6+30	30 W	1,961.0	LW-17	25.2	93.6	292
291	0+65	5 E	1,983.0	LW-11	25.1	99.2	
292	6+30	30 W	1,961.0	LW-17	23.9	97.3	
293	5+80	35 E	1,961.5	LW-10	20.0	99.5	
294	7+25	65 W	1,961.5	LW-10	23.9	95.3	
295	6+10	75 W	1,962.0	LW-10	21.3	98.8	
296	6+20	60 E	1,962.0	LW-10	20.7	98.6	
297	5+25	70 E	1,962.5	LW-10	22.6	95.5	
298-S	5+90	90 W	1,962.5	LW-10	22.2	93.8	300
299	1+20	0	1,980.5	LW-10	23.8	94.6	301

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
300	5+90	90 W	1,962.5	LW-10	19.6	96.8	
301	1+20	0	1,980.5	LW-10	21.2	95.3	
302	5+65	60 E	1,965.0	LW-18	23.5	97.2	
303	34+00	30 W	1,979.0	LW-2	24.3	91.8	319
304	39+75	0	1,963.0	LW-17	22.2	97.8	
305-S	85+45	20 N	1,967.8	LW-17	28.0	90.3	315
306	81+00	40 N	1,964.0	LW-17	16.3	101.9	
307	7+30	50 E	1,965.0	LW-10	19.9	97.6	
308	5+20	90 W	1,965.0	LW-10	23.9	94.1	318
309	2+90	6 W	1,977.0	LW-10	21.2	97.4	
310	34+00	30 W	1,979.0	LW-2	22.7	94.2	319
315	85+45	20 N	1,967.8	LW-2	18.8	98.4	
316	34+70	35 E	1,979.0	LW-2	22.4	93.2	320
317-S	34+70	35 E	1,979.0	LW-2	22.3	94.8	320
318	5+20	90 W	1,965.0	LW-10	20.5	97.2	
319	34+00	30 W	1,979.0	LW-2	19.4	96.1	
320	34+70	35 E	1,979.0	LW-2	20.6	96.0	
321	28+10	0	1,979.0	LW-2	19.1	97.2	
322	39+00	0	1,973.5	LW-1	26.5	88.6	324
323	43+50	0	1,961.0	LW-17	21.7	95.6	
324	39+00	0	1,973.5	LW-1	23.4	95.2	
325	V 6+00	120 E	1,967.0	LW-2	20.7	95.2	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
326-S	V 6+80	140 W	1,968.0	LW-2	18.8	97.9	
327	V 6+00	75 W	1,968.0	LW-2	24.9	91.3	331
328	V 1+00	0	1,987.0	LW-2	23.9	92.5	338
329-S	V 41+00	4 N	1,963.0	LW-1	24.9	90.6	333
330	V 6+00	75 W	1,968.0	LW-2	21.2	94.2	331
331-S	V 6+00	75 W	1,968.0	LW-2	19.6	98.0	
332	V 1+00	0	1,987.0	LW-2	22.8	94.1	338
333	V 41+00	4 N	1,963.0	LW-1	20.4	99.4	
334-S	V 1+00	0	1,987.0	LW-2	26.8	87.9	338
335	V 6+00	130 E	1,969.0	LW-18	23.1	95.5	
336	V 5+00	115 W	1,970.5	LW-18	30.0	86.4	352
337	V 5+50	0	1,970.0	LW-18	23.6	96.3	
338	V 1+00	0	1,987.0	LW-2	21.9	95.8	
339-S	V 3+00	6 S	1,989.0	LW-2	23.7	90.2	347
340	5+00	115 W	1,970.5	LW-18	26.3	91.7	352
341	5+90	20 W	1,971.5	LW-18	23.3	97.0	
342	2+40	10 W	1,982.0	LW-18	26.1	92.4	353
343	42+00	6 N	1,958.0	LW-1	23.0	95.4	
344	47+00	0	1,943.0	LW-1	24.7	92.2	371
345	6+20	50 E	1,971.0	LW-18	23.2	97.1	
346	V 3+00	6 S	1,989.0	LW-2	21.6	93.7	347
347	V 3+00	6 S	1,989.0	LW-2	20.4	95.6	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
348	V 1+00	20 S	1,991.0	LW-19	23.4	96.8	
352	5+00	115 W	1,970.5	LW-15	22.6	96.2	
353	2+40	10 W	1,982.0	LW-18	19.4	98.5	
354	23+00	7 E	1,987.5	LW-15	22.6	98.6	
355	29+00	0	1,981.0	LW-19	21.0	100.2	
356	33+00	80 W	1,990.5	LW-1	18.7	98.8	
357	6+60	100 E	1,971.0	LW-19	25.6	95.1	
358	6+00	0	1,971.0	LW-19	25.5	92.0	362
359	6+90	75 W	1,969.0	LW-19	24.3	95.4	
360	47+00	0	1,943.0	LW-19	24.7	94.0	371
361	30+10	50 E	1,978.5	LW-19	17.5	98.6	
362	6+00	0	1,971.0	LW-19	23.3	97.4	
363	3+00	3 E	1,980.5	LW-18	21.0	99.6	
364	100+00	5 S	1,993.5	LW-2	20.7	97.6	
365	17+85	2 E	1,947.0	LW-19	27.2	92.0	394
366	47+00	0	1,948.0	LW-19	26.8	93.4	371
367	41+00	60 S	1,971.0	LW-2	23.2	94.0	373
368	6+00	100 E	1,974.0	LW-2	21.0	96.4	
369	17+85	2 E	1,947.0	LW-19	27.4	90.2	394
370	47+00	0	1,943.0	LW-19	26.6	93.7	371
371	47+00	0	1,943.0	LW-19	23.9	95.8	
372	5+00	0	1,975.0	LW-2	23.5	93.4	375

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
373	41+00	60 S	1,971.0	LW-2	17.0	98.2	
374	39+00	75 S	1,974.5	LW-2	20.0	96.2	
375	8+00	0	1,975.0	LW-2	22.0	95.9	
376	7+00	110 W	1,969.0	LW-2	18.9	100.0	
377	3+00	0	1,982.0	LW-2	18.4	98.5	
378	4+80	125 E	1,978.5	LW-2	21.7	96.7	
379	7+10	35 W	1,970.0	LW-2	18.2	99.9	
380	27+00	0	1,980.5	LW-2	18.4	96.3	
381	33+00	10 W	1,990.0	LW-2	16.3	99.5	
382	42+50	6 N	1,959.5	LW-8	22.9	99.9	
383	37+90	0	1,967.0	LW-8	21.9	98.7	
384	45+60	80 S	1,958.0	LW-2	20.1	98.5	
392	V 2+50	20 N	1,990.0	LW-4	16.1	99.2	
393	39+30	75 S	1,974.5	LW-2	18.9	97.4	
394-S	17+85	2 E	1,947.0	LW-19	14.7	107.3	
395-S	33+00	15 W	1,992.0	LW-2	20.4	96.2	
396-S	28+00	5 E	1,983.5	LW-2	17.8	95.4	
397	17+60	3 W	1,952.0	LW-19	21.7	97.8	
398	72+90	95 W	1,968.0	LW-7	29.5	97.5	
399	90+00	85 W	1,964.5	LW-8	23.2	96.5	
400	17+65	4 W	1,958.0	LW-3	16.4	95.3	
401	47+10	95 S	1,950.0	LW-2	21.4	96.9	

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
402	40+00	35 S	1,974.0	LW-2	21.4	96.5	
403	38+00	80 S	1,977.0	LW-2	18.7	97.2	
404	33+00	0	1,994.0	LW-2	20.1	97.7	
405	29+00	10 W	1,988.0	LW-2	18.6	99.8	
406	80+50	10 N	1,968.0	LW-2	20.1	95.7	
407	86+60	20 S	1,986.0	LW-2	21.3	95.0	
408	99+00	0	1,994.0	LW-2	21.0	95.2	
409	16+40	2 E	1,947.0	LW-2	19.7	97.3	
410	32+00	5 W	1,983.0	LW-3	20.0	98.6	
411	29+00	5 W	1,982.5	LW-2	21.6	92.0	418
412	17+00	12 E	1,950.0	LW-19	27.3	88.5	413
413	17+00	0	1,950.0	LW-19	24.9	95.8	
418	29+00	5 W	1,982.5	LW-2	17.5	95.4	
419	80+05	80 N	1,965.0	LW-2	21.0	97.0	
420	83+80	5 S	1,977.0	LW-2	20.8	95.7	
421	40+40	6 N	1,962.0	LW-19	23.1	97.8	
422	103+95	4 N	1,997.0	LW-1	21.3	96.3	
423	34+00	10 W	1,987.0	LW-18	23.9	95.3	
424	26+86	7 E	1,988.0	LW-2	20.3	95.7	
425	46+20	6 N	1,947.0	LW-2	18.0	98.0	
426	24+00	0	1,991.0	LW-19	23.3	96.9	
429	98+95	8 N	1,997.0	LW-2	18.3	98.1	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
430	90+10	4 N	1,997.0	LW-4	16.3	100.3	
431	85+90	0	1,983.0	LW-2	18.9	97.1	
432	82+12	14 S	1,976.0	LW-2	17.3	96.2	
433	15+80	3 E	1,955.0	LW-3	19.7	96.3	
434	37+85	60 S	1,978.0	LW-2	18.3	98.7	
435	41+00	27 S	1,969.5	LW-2	19.5	97.4	
436	46+70	75 S	1,951.0	LW-1	22.4	96.8	
437	38+10	3 N	1,955.0	LW-1	18.1	95.2	
438-S	26+00	4 W	1,991.0	LW-1	17.3	96.9	
439-S	29+85	7 E	1,982.5	LW-2	18.9	95.8	
440	42+90	3 S	1,955.5	LW-4	12.1	97.0	
441	38+30	4 S	1,967.0	LW-2	19.4	96.2	
442	95+90	14 N	1,995.0	LW-3	18.8	96.2	
443	83+87	39 N	1,981.0	LW-1	21.1	96.4	
444	87+95	4 N	1,994.5	LW-3	20.2	95.5	
445	15+12	6 E	1,950.0	LW-4	15.1	96.0	
446-S	33+90	30 E	1,986.0	LW-2	19.6	97.8	
447-S	32+50	40 E	1,993.5	LW-2	19.1	96.9	
448-S	102+60	10 S	2,000.5	LW-3	18.4	97.5	
449-S	41+70	4 N	1,956.0	LW-3	18.3	97.0	
453	83+50	15 N	1,977.0	LW-3	15.5	100.5	
454	88+90	0	1,996.0	LW-3	18.2	98.4	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
455	27+00	5 E	1,987.0	LW-3	19.0	98.2	
456	32+00	10 W	1,986.0	LW-3	19.5	96.5	
457	39+00	5 S	1,965.5	LW-3	18.1	97.3	
458	44+00	4 N	1,951.0	LW-2	20.7	96.2	
459	6+00	105 E	1,974.0	LW-3	16.2	95.7	
460	5+00	5 E	1,975.0	LW-3	20.7	95.2	
461	40+40	5 N	1,964.0	LW-3	19.5	97.2	
462	42+60	6 S	1,954.5	LW-3	18.9	97.6	
463-S	91+85	10 S	1,998.5	LW-3	16.9	101.2	
464-S	82+22	30 N	1,978.0	LW-3	23.0	92.5	465
465	82+22	30 N	1,978.0	LW-3	19.0	96.8	
466	6+00	95 N	1,971.0	LW-2	19.7	96.2	
467-S	32+90	4 W	1,996.0	LW-3	18.6	98.2	
468-S	26+95	15 E	1,989.0	LW-3	17.7	100.0	
472	89+65	6 S	1,998.0	LW-3	18.8	98.1	
473	37+66	6 S	1,981.0	LW-3	19.5	97.3	
474	47+40	7 S	1,942.5	LW-3	16.3	100.3	
475	30+30	20 E	1,987.0	LW-3	22.7	90.9	481
476	22+15	6 E	1,990.5	LW-3	20.1	94.6	478
477	6+30	90 E	1,974.0	LW-3	16.7	100.3	
478	22+15	6 E	1,990.5	LW-3	18.6	97.0	
479-S	30+30	20 E	1,987.0	LW-3	24.4	89.8	481

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
480-S	82+20	10 S	1,976.0	LW-3	18.7	97.2	
481	30+30	20 E	1,987.0	LW-3	19.0	97.4	
482	4+75	75 E	1,979.0	LW-1	17.0	97.2	
483	4+55	69 W	1,975.0	LW-2	20.1	95.8	
484	0+60	4 E	1,991.0	LW-3	17.6	99.4	
485	40+70	3 N	1,965.0	LW-19	24.5	97.0	
486	44+15	2 S	1,953.5	LW-3	18.5	95.4	
487	84+95	2 S	1,992.0	LW-3	17.6	99.8	
488-S	91+00	9 N	2,000.5	LW-3	23.8	91.4	493
489	95+91	6 N	1,996.0	LW-3	17.9	100.4	
490	22+40	4 E	1,990.0	LW-3	17.4	98.9	
491	29+95	4 W	1,986.0	LW-3	18.8	98.4	
492	6+65	120 E	1,973.5	LW-3	20.0	95.4	
493-S	91+00	9 N	2,000.5	LW-3	17.3	98.5	
494	79+90	4 N	1,969.0	LW-2	21.1	96.1	
495	V 1+00	10 E	1,994.0	LW-2	19.7	102.2	
496	39+70	4 N	1,970.0	LW-3	19.8	95.7	
497	2+25	5 E	1,984.0	LW-3	18.6	100.4	
498	8+25	0	1,947.0	LW-19	24.4	92.5	
499-S	85+80	10 S	1,991.0	LW-3	18.3	98.0	
500-S	82+60	25 S	1,977.5	LW-3	15.3	98.3	
501	8+30	10 E	1,950.0	LW-3	18.2	98.4	

TABLE 2.5-62 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
502-S	32+40	5 E	1,988.0	LW-3	15.3	102.7	
503-S	25+00	5 W	1,994.0	LW-3	20.2	94.3	508
504	8+15	0	1,955.0	LW-3	16.7	98.1	
505	23+00	5 W	1,994.0	LW-3	20.3	94.9	508
506	13+00	6 E	1,947.5	LW-3	16.8	101.8	
507	6+70	100 W	1,971.0	LW-3	18.6	98.7	
508	23+00	5 W	1,994.0	LW-3	19.8	97.4	
509	85+05	24 S	1,987.0	LW-2	20.5	95.8	
510	15+65	6 W	1,952.0	LW-4	16.3	100.4	
511	9+50	5 W	1,950.0	LW-3	18.4	97.0	
517	46+00	3 N	1,947.0	LW-4	13.3	104.5	
518	13+90	4 W	1,952.5	LW-4	16.8	101.5	
519	16+00	80 W	1,962.5	LW-3	18.9	98.8	
520	13+60	100 W	1,961.0	LW-4	17.0	101.2	
521	10+20	115 W	1,962.0	LW-4	18.4	97.0	
522	43+30	2 N	1,959.0	LW-4	17.7	98.8	
523	21+58	15 W	1,988.0	LW-4	17.2	99.0	
524-S	33+82	30 W	1,997.5	LW-3	18.7	97.2	
525	36+40	60 N	1,978.5	LW-3	20.0	96.3	
526	43+00	80 N	1,962.5	LW-2	21.5	96.2	
527	16+40	6 E	1,952.5	LW-4	14.0	101.8	
528	45+45	0	1,954.0	LW-3	18.1	98.3	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
529	12+10	4 W	1,951.0	LW-2	21.4	96.1	
530	46+10	3 N	1,950.0	LW-4	16.4	101.2	
535	17+00	2 E	1,968.5	LW-2	21.3	97.5	
536	5+05	40 W	1,975.0	LW-2	20.0	95.9	
537	1+95	5 W	1,986.5	LW-3	19.1	97.4	
538	10+80	6 E	1,954.0	LW-4	16.9	100.6	
539	10+15	124 W	1,960.5	LW-4	18.5	98.6	
540	12+90	108 W	1,960.0	LW-4	16.6	100.7	
541	16+00	90 W	1,964.5	LW-4	18.2	98.8	
542	43+10	55 N	1,964.0	LW-2	19.0	95.8	
543	24+20	6 W	1,998.0	LW-3	19.2	98.4	
544	30+80	8 E	1,991.0	LW-4	17.2	100.4	
545	14+85	6 W	1,958.5	LW-4	16.5	101.7	
546	83+10	0	1,983.5	LW-4	14.8	100.7	
549	15+95	4 E	1,961.0	LW-1	21.8	96.8	
550	10+25	70 E	1,960.0	LW-3	18.1	98.2	
551	11+95	121 E	1,956.0	LW-3	18.7	91.0	
552	45+65	3 S	1,957.5	LW-2	20.3	96.2	
553	9+80	5 E	1,957.0	LW-4	15.3	103.3	
554	84+10	15 N	1,985.0	LW-3	19.2	97.4	
555	9+95	75 W	1,960.5	LW-3	18.5	97.9	
556	15+00	95 W	1,964.0	LW-2	22.2	94.0	557

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
557	15+00	95 W	1,964.0	LW-4	15.1	99.4	
558-S	13+10	0	1,958.5	LW-19	24.9	95.6	
559	44+60	60 N	1,960.0	LW-2	19.5	96.7	
560	38+30	4 S	1,975.0	LW-2	19.4	97.7	
563	81+10	18 N	1,977.5	LW-2	20.2	95.2	
564	26+35	0	1,995.0	LW-4	17.7	99.0	
565	30+18	3 E	1,990.5	LW-4	16.8	99.7	
566	44+05	4 N	1,959.0	LW-2	20.9	95.1	
567	14+90	105 E	1,964.0	LW-3	18.2	99.4	
568	10+15	75 E	1,961.5	LW-4	17.1	100.0	
569	8+50	98 W	1,963.0	LW-4	15.1	96.3	
570	12+80	85 W	1,961.0	LW-2	20.6	94.7	572
571	15+85	4 W	1,964.5	LW-19	21.0	101.3	
572	12+80	85 W	1,961.0	LW-2	18.0	101.8	
573	84+85	4 S	1,987.5	LW-4	16.2	99.4	
574	32+23	5 E	1,990.0	LW-3	22.2	93.9	627
575	25+98	0	1,995.0	LW-4	17.5	100.0	
576	11+12	97 E	1,963.0	LW-3	20.5	97.0	
577	16+05	101 E	1,967.5	LW-3	19.8	96.7	
578-S	12+25	5 W	1,961.5	LW-2	25.6	88.2	584
579	42+90	10 N	1,968.0	LW-3	17.9	96.3	
580	37+60	3 S	1,980.5	LW-3	19.4	95.7	

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
581-S	9+35	90 E	1,964.5	LW-3	19.6	97.9	
582	12+60	60 E	1,963.5	LW-3	16.3	96.8	
583-S	5+85	50 E	1,973.5	LW-2	19.6	96.4	
584	12+25	5 W	1,961.5	LW-2	21.2	96.8	
585	16+65	20 W	1,966.0	LW-3	17.8	96.6	
586	11+15	100 W	1,960.0	LW-3	17.7	97.8	
587	8+00	110 W	1,966.0	LW-2	19.3	95.7	
588	40+00	0	1,971.0	LW-2	21.0	95.2	
589	43+85	20 S	1,968.5	LW-5	20.3	97.6	
590	16+10	100 E	1,966.0	LW-17	25.4	96.8	
591	7+05	90 E	1,972.0	LW-17	20.9	99.8	
592	10+00	20 E	1,963.5	LW-15	23.6	99.8	
593	15+00	15 W	1,965.5	LW-2	19.4	98.2	
594	8+50	50 W	1,967.5	LW-5	18.6	98.3	
595	14+10	110 W	1,966.0	LW-5	20.0	98.7	
596	5+95	135 W	1,972.5	LW-17	21.9	98.9	
597	18+30	30 E	1,967.0	LW-2	20.3	95.1	
598	15+33	80 E	1,966.0	LW-2	19.1	98.2	
599	12+00	115 E	1,963.5	LW-4	17.6	98.5	
600	5+05	111 E	1,976.5	LW-17	22.6	97.0	
601	10+25	115 W	1,963.5	LW-18	21.4	99.2	
602	9+95	120 W	1,963.0	LW-18	21.4	99.9	

TABLE 2.5-62 (continued)

Test Number[(a)]	Location Station[(b)]	Location Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
603	6+60	100 W	1,970.5	LW-18	22.5	97.6	
604	7+30	60 W	1,970.0	LW-18	20.3	97.6	
605	4+30	125 E	1,981.0	LW-3	18.2	99.9	
606	9+20	50 E	1,967.0	LW-4	16.5	102.6	
607	13+00	130 E	1,962.5	LW-2	21.3	93.9	608
608	13+00	130 E	1,962.5	LW-2	19.7	97.0	
609	18+20	90 E	1,971.5	LW-3	20.1	96.7	
610	7+95	40 W	1,968.5	LW-3	20.0	96.3	
611	14+90	100 W	1,965.5	LW-3	20.0	95.9	
612	18+50	80 W	1,968.5	LW-3	19.4	97.8	
613	16+50	110 E	1,970.0	LW-3	18.6	95.4	
614	10+80	20 E	1,964.5	LW-3	20.8	95.8	
615	6+95	115 E	1,972.5	LW-15	24.3	98.7	
616	4+85	96 W	1,979.0	LW-2	21.9	95.0	
617	6+75	125 W	1,973.5	LW-3	18.9	97.6	
618	11+90	101 W	1,962.0	LW-3	18.1	97.4	
619	9+95	112 W	1,964.5	LW-2	20.3	96.1	
620	37+55	6 S	1,979.5	LW-2	18.1	97.8	
621	42+90	24 S	1,962.0	LW-19	24.9	98.5	
622	16+30	100 E	1,969.0	LW-3	19.1	96.4	
623	14+45	85 E	1,967.5	LW-4	17.7	99.0	
624	9+85	25 E	1,968.5	LW-1	22.0	96.2	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
625	4+75	120 E	1,982.5	LW-1	21.5	96.9	
626	18+30	120 W	1,972.0	LW-2	19.8	94.8	628
627	32+23	5 E	1,990.0	LW-3	14.9	105.1	
628	18+30	120 W	1,972.0	LW-2	19.8	97.6	
629	7+00	90 W	1,972.0	LW-4	17.6	100.1	
630	9+00	20 W	1,968.0	LW-4	18.5	97.2	
631	16+90	100 E	1,969.5	LW-3	19.4	96.5	
632	13+50	20 E	1,966.0	LW-3	17.6	98.4	
633	5+30	40 E	1,980.0	LW-17	22.0	98.8	
634-S	8+00	120 E	1,972.0	LW-1	21.2	97.0	
635	9+50	30 E	1,968.0	LW-4	17.4	99.3	
636-S	8+80	100 W	1,967.5	LW-2	21.1	97.4	
637-S	5+10	50 W	1,966.5	LW-2	19.8	93.1	644
638-S	43+00	10 S	1,972.0	LW-3	19.9	92.2	648
639	1+40	40 W	1,994.5	LW-2	24.9	91.2	647
640	17+95	60 W	1,965.5	LW-3	19.9	96.2	
641	14+00	135 W	1,963.0	LW-3	19.7	96.5	
642	14+60	111 E	1,970.0	LW-3	16.9	97.0	
643	18+70	90 E	1,972.0	LW-3	16.0	99.0	
644	5+10	50 W	1,976.5	LW-3	17.0	100.9	
645	17+40	100 W	1,978.5	LW-3	18.7	99.0	
646	15+98	65 E	1,970.0	LW-3	19.9	95.2	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
647-S	1+40	40 W	1,994.5	LW-3	19.9	96.2	
648-S	43+00	10 S	1,972.0	LW-3	18.7	98.3	
649	12+70	100 E	1,964.0	LW-3	18.1	96.5	
650	8+80	20 W	1,970.0	LW-3	19.2	97.1	
651	V 2+65	24 W	1,991.0	LW-1	22.8	96.2	
652	IV 17+80	1 E	1,975.0	LW-3	18.3	97.8	
653	18+10	70 W	1,972.5	LW-3	18.7	98.5	
654	9+00	65 E	1,971.0	LW-14	19.7	95.9	
655	15+80	85 E	1,972.5	LW-3	20.1	96.2	
656	5+98	0	1,977.5	LW-14	21.7	93.7	657
657	5+98	0	1,977.5	LW-18	22.8	97.0	
658-S	14+60	50 W	1,965.0	LW-3	18.3	98.8	
659	11+35	70 E	1,967.0	LW-17	24.5	97.9	
660	5+85	0	1,978.0	LW-17	22.4	100.1	
661	17+30	15 E	1,974.0	LW-3	21.1	95.2	
662	36+85	2 S	1,983.0	LW-4	14.7	104.2	
663	42+12	10 S	1,968.0	LW-1	22.4	97.0	
664	17+00	90 E	1,971.0	LW-4	16.9	99.7	
665	11+00	10 E	1,967.5	LW-19	24.3	97.3	
666	6+05	30 E	1,978.0	LW-4	17.3	97.2	
667	17+10	70 W	1,971.0	LW-2	20.6	96.1	
668	14+20	40 W	1,966.0	LW-3	19.0	99.2	

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
669-S	75+20	225 S	1,908.5	LW-3	19.3	97.3	
670-S	75+50	160 S	1,907.0	LW-3	19.9	96.7	
671	73+40	250 S	1,908.0	LW-3	21.3	94.6	672
672	73+40	250 S	1,908.0	LW-3	19.2	97.5	
673	74+00	200 S	1,908.5	LW-19	23.5	97.7	
674	74+90	40 S	1,907.0	LW-2	20.1	97.4	
675	75+00	205 S	1,913.0	LW-3	19.4	98.3	
679	74+90	275 S	1,911.5	LW-3	19.9	95.3	
680	8+00	50 W	1,975.0	LW-3	20.1	97.8	
681-S	75+00	50 S	1,908.0	LW-3	21.7	94.6	
682	18+10	105 E	1,975.5	LW-17	24.5	97.8	
683	9+70	50 E	1,972.5	LW-5	22.1	98.5	
684	75+00	50 S	1,913.0	LW-3	20.9	96.4	
685	72+50	290 S	1,910.5	LW-3	20.2	97.6	
686	73+20	110 S	1,911.0	LW-3	20.2	96.7	
687	16+60	60 E	1,974.0	LW-5	21.9	96.9	
688	17+10	20 W	1,974.0	LW-2	19.8	97.9	
689	18+05	110 W	1,979.0	LW-18	21.7	99.1	
690	75+20	210 S	1,911.5	LW-18	22.6	98.7	
691	73+10	70 S	1,913.0	LW-4	18.4	100.8	
692	2+40	10 E	1,991.0	LW-3	19.8	96.6	
693	5+15	15 W	1,982.0	LW-3	19.2	97.3	

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
694	76+00	275 S	1,913.0	LW-4	18.2	99.8	
695	13+25	30 E	1,969.0	LW-18	22.2	98.9	
696	7+40	20 W	1,978.0	LW-3	20.0	96.2	
697	74+00	160 S	1,908.5	LW-4	18.0	99.4	
698	73+60	30 S	1,908.0	LW-4	17.1	100.3	
699	17+70	80 W	1,974.5	LW-2	21.1	96.7	
700	17+10	55 E	1,971.0	LW-18	21.5	99.9	
701	74+50	200 S	1,909.5	LW-3	19.1	98.3	
702	73+10	100 S	1,911.0	LW-4	17.5	100.9	
703-S	75+50	60 S	1,911.0	LW-4	18.7	97.2	
704	73+00	280 S	1,911.5	LW-4	19.2	99.9	
705	75+60	175 S	1,911.0	LW-4	19.5	98.3	
706	73+00	50 S	1,911.0	LW-4	17.7	101.8	
710	74+00	200 S	1,913.0	LW-3	19.8	96.9	
711	75+00	100 S	1,913.0	LW-4	18.9	98.8	
712	11+80	39 E	1,968.5	LW-3	19.2	98.4	
713	9+10	10 E	1,973.5	LW-3	18.6	99.4	
714	5+85	15 W	1,979.5	LW-3	18.3	98.9	
715	17+95	50 W	1,979.5	LW-3	18.1	97.4	
716	76+25	50 S	1,926.5	LW-3	19.3	100.1	
717	73+50	140 S	1,913.0	LW-4	18.3	99.4	
718	17+10	70 E	1,977.0	LW-18	21.5	98.3	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
719	72+80	240 S	1,913.0	LW-4	17.8	98.2	
720	73+30	150 S	1,913.0	LW-4	17.7	100.0	
721	74+85	90 S	1,911.0	LW-4	17.4	102.0	
722	72+90	195 S	1,914.0	LW-3	21.2	95.4	
724-S	12+90	35 W	1,965.0	LW-18	21.4	100.5	
725-S	5+98	5 E	1,982.0	LW-3	20.1	97.3	
726-S	74+10	100 S	1,911.0	LW-14	18.2	102.8	
727	76+40	260 S	1,928.0	LW-4	18.5	99.8	
728	71+15	200 S	1,913.0	LW-4	16.9	102.7	
729	17+50	96 E	1,975.5	LW-3	20.7	97.2	
730	75+10	110 S	1,914.5	LW-4	18.2	101.4	
731	4+30	15 W	1,986.0	LW-4	17.9	99.7	
732	72+15	270 S	1,912.0	LW-4	19.8	96.9	
733	11+05	30 E	1,970.5	LW-4	19.4	98.0	
734	74+25	130 S	1,914.0	LW-4	18.0	101.1	
735	76+00	190 N	1,905.0	LW-2	20.8	97.3	
736	74+45	28 N	1,906.5	LW-2	19.2	99.2	
737	75+00	250 N	1,905.0	LW-24	18.4	95.0	
738	43+00	10 N	1,966.0	LW-4	18.3	99.1	
739	39+00	10 S	1,977.0	LW-18	22.4	99.6	
740	74+50	100 N	1,908.0	LW-24	19.7	94.3	743
741	5+60	10 E	1,982.5	LW-24	16.2	100.4	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
742	9+05	20 W	1,975.0	LW-3	21.3	96.2	
743	74+50	100 N	1,908.0	LW-24	18.1	97.5	
744	18+50	30 W	1,980.5	LW-4	21.5	94.4	750
745	76+25	280 S	1,930.0	LW-24	18.0	97.5	
746	75+10	75 N	1,910.5	LW-4	19.2	97.7	
747	73+70	200 N	1,911.0	LW-4	20.2	97.2	
748	72+15	170 S	1,913.0	LW-4	21.0	97.2	
749	75+20	90 S	1,917.5	LW-4	19.2	99.4	
750	18+50	30 W	1,980.5	LW-4	20.9	95.7	
751	15+75	0	1,971.5	LW-4	19.1	98.0	
752-S	75+80	100 N	1,912.0	LW-4	19.6	98.8	
753-S	74+40	225 N	1,910.0	LW-4	19.6	95.9	
754-S	72+50	150 S	1,914.5	LW-3	20.5	99.1	
755	74+60	225 S	1,924.0	LW-24	18.8	95.2	
756-S	11+60	10 W	1,971.5	LW-18	23.0	99.5	
757-S	7+10	4 E	1,981.0	LW-24	20.0	96.1	
758-	75+80	40 S	1,917.0	LW-24	16.6	100.8	
759	73+60	100 N	1,912.0	LW-3	20.2	97.7	
760	75+70	250 N	1,912.5	LW-14	18.8	98.4	
761	75+10	25 N	1,914.0	LW-14	19.8	97.9	
762	19+95	15 W	1,986.0	LW-4	20.3	95.3	
763	17+00	0	1,974.0	LW-24	19.3	94.7	767

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
764	73+40	200 N	1,910.0	LW-24	20.8	93.7	770
765	3+85	5 W	1,990.5	LW-3	19.9	97.8	
766	7+10	10 E	1,981.0	LW-3	21.4	96.2	
767	17+00	0	1,974.0	LW-24	20.2	96.4	
768	75+20	100 N	1,914.5	LW-18	22.6	98.6	
769	73+40	200 N	1,910.0	LW-24	20.1	94.4	770
770	73+40	200 N	1,910.0	LW-24	19.6	95.4	
771	71+20	290 S	1,914.0	LW-4	19.5	97.1	
772	73+80	150 S	1,916.0	LW-24	18.1	99.5	
773	75+90	220 S	1,928.0	LW-24	15.0	102.1	
774	45+30	20 S	1,958.5	LW-3	19.4	97.9	
775	36+65	10 N	1,984.0	LW-4	17.3	99.5	
776	75+50	275 N	1,914.0	LW-24	21.2	94.2	779
777	75+20	95 N	1,913.0	LW-4	21.5	95.1	
778	19+00	15 W	1,983.0	LW-4	19.0	98.3	
779	75+50	275 N	1,914.0	LW-4	19.0	97.2	
780	74+50	10 N	1,913.0	LW-4	19.0	99.7	
781	14+90	0	1,970.5	LW-24	13.5	100.5	
782	76+50	160 N	1,918.0	LW-24	16.7	97.8	
783	71+10	230 S	1,914.5	LW-4	19.7	97.1	
784	72+40	150 S	1,916.0	LW-4	18.8	95.5	
785	75+40	200 S	1,918.0	LW-4	21.6	95.7	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
786	76+00	70 S	1,921.5	LW-4	17.2	97.4	
787	10+90	25 E	1,974.5	LW-24	17.2	96.5	
788	4+50	5 E	1,986.5	LW-4	17.9	98.3	
789	76+05	15 N	1,918.0	LW-5	19.5	97.1	
790	74+40	130 N	1,912.5	LW-24	17.0	99.9	
791	74+85	270 N	1,913.5	LW-24	15.4	102.0	
792	15+30	15 W	1,973.0	LW-24	18.1	99.2	
793	18+90	10 E	1,980.5	LW-24	16.0	101.8	
794	76+00	60 S	1,924.5	LW-24	16.8	99.2	
795	11+40	20 E	1,974.0	LW-24	16.0	100.3	
796	5+80	0	1,984.0	LW-24	18.9	94.9	797
797	5+80	0	1,984.0	LW-24	18.6	96.4	
798	76+70	130 N	1,917.5	LW-24	21.8	91.8	804
799	18+30	10 W	1,984.0	LW-4	17.7	100.8	
800	16+40	18 W	1,974.5	LW-24	19.4	95.4	
801	74+60	255 S	1,922.0	LW-5	20.4	97.5	
802	72+80	225 S	1,920.0	LW-24	17.6	99.0	
803-S	75+00	40 S	1,921.5	LW-3	21.3	96.6	
804-S	76+70	130 N	1,917.5	LW-24	20.1	96.8	
805-S	76+90	250 N	1,925.0	LW-14	18.3	97.9	
806-S	74+10	280 N	1,917.0	LW-31	14.0	96.3	
807-S	72+30	190 N	1,913.0	LW-15	24.4	100.6	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
808	73+30	250 S	1,919.5	LW-24	20.4	93.8	825
809	5+60	25 W	1,975.5	LW-24	17.4	98.2	
810	16+40	0	1,976.0	LW-24	19.0	96.2	
811	76+70	265 S	1,934.5	LW-15	24.3	100.1	
812	18+90	25 W	1,983.5	LW-24	19.9	93.7	820
813	76+50	40 S	1,920.5	LW-15	23.5	98.1	
814	76+85	40 N	1,922.0	LW-15	25.6	95.1	
815	74+65	100 N	1,916.5	LW-15	27.3	95.5	826
816	73+80	275 N	1,917.0	LW-15	23.0	99.4	
817	76+25	265 N	1,919.5	LW-15	29.1	91.6	821
818	18+90	25 W	1,983.5	LW-24	18.9	94.8	820
819	12+85	5 W	1,968.0	LW-24	18.4	96.4	
820	18+90	25 W	1,983.5	LW-24	15.4	101.8	
821	76+25	265 N	1,919.5	LW-15	25.7	96.7	
822	73+30	250 S	1,919.5	LW-24	19.7	94.8	825
823	72+10	60 S	1,916.5	LW-24	17.9	97.8	
824	IV 23+30	4 W	1,987.0	LW-4	20.5	96.3	
825	73+30	250 S	1,916.5	LW-24	17.4	98.3	
826	74+65	100 N	1,916.5	LW-24	20.8	95.1	
827	76+83	220 N	1,930.0	LW-24	16.7	99.7	
828	75+40	270 N	1,925.0	LW-31	15.0	99.1	
829	76+40	90 N	1,930.0	LW-26	17.0	100.6	

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
830	77+50	200 S	1,951.5	LW-15	20.5	100.8	
831	73+85	75 N	1,912.5	LW-26	18.5	96.3	
832	76+15	150 N	1,917.5	LW-26	18.1	95.8	
833	77+40	270 N	1,933.0	LW-18	19.4	96.7	
834	IV 17+30	3 W	1,975.0	LW-31	13.9	99.8	
835	IV 11+75	60 W	1,963.0	LW-24	20.4	93.1	
836	IV 9+30	100 E	1,968.0	LW-24	17.3	95.6	
837	IV 12+75	70 E	1,967.5	LW-24	18.1	97.0	
838	72+00	100 N	1,917.5	LW-26	17.4	99.7	
839	76+00	200 N	1,923.5	LW-14	18.2	99.8	
840	76+20	50 N	1,925.0	LW-15	23.1	98.7	
841	72+15	230 S	1,916.0	LW-24	19.1	96.3	
842	75+80	260 S	1,932.5	LW-14	17.2	95.4	
843	75+90	20 S	1,927.5	LW-15	21.9	98.5	
844	73+20	0	1,917.5	LW-15	26.2	95.7	
845	74+00	150 N	1,917.5	LW-15	19.9	102.3	
846	76+95	285 N	1,924.0	LW-18	19.8	100.3	
847	67+70	20 S	1,917.5	LW-15	21.0	101.6	
848	73+00	10 S	1,917.0	LW-15	23.7	98.5	
849	76+50	200 N	1,923.5	LW-5	21.2	98.7	
850	73+90	220 N	1,917.0	LW-5	19.0	100.6	
851	73+00	260 N	1,918.5	LW-14	19.5	99.2	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
852	68+60	275 S	1,908.0	LW-15	21.7	101.0	
853	69+20	200 N	1,908.5	LW-15	21.7	101.2	
854	67+30	190 S	1,907.0	LW-18	20.8	100.7	
855	66+10	80 S	1,907.5	LW-14	16.4	99.9	
856	67+70	130 S	1,907.0	LW-14	20.5	97.0	
857	68+90	0	1,911.5	LW-14	16.8	97.3	
858	74+70	75 S	1,924.5	LW-14	19.2	98.8	
859	72+30	25 S	1,919.5	LW-14	21.6	94.9	860
860	72+30	25 S	1,919.5	LW-14	21.4	95.2	
861	67+80	20 S	1,914.5	LW-14	21.5	94.2	862
862	67+80	20 S	1,914.5	LW-14	20.4	96.3	
863	77+00	50 N	1,922.5	LW-26	22.4	91.5	866
864	44+05	15 N	1,964.5	LW-25	22.7	97.6	
865	39+50	0	1,976.0	LW-25	13.9	101.5	881
866	77+00	50 N	1,922.5	LW-14	19.0	95.9	
867	72+40	230 N	1,919.5	LW-14	17.6	95.8	
868	67+00	260 N	1,910.5	LW-18	20.7	100.3	
869-S	76+00	75 N	1,921.5	LW-18	23.4	97.6	
870-S	72+30	60 N	1,917.5	LW-14	21.0	97.1	
871-S	69+90	120 N	1,915.0	LW-15	21.6	100.0	
872	68+10	200 N	1,913.5	LW-15	21.5	101.3	
873	65+50	175 N	1,912.5	LW-18	21.8	100.3	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
874	66+10	225 N	1,913.0	LW-15	22.1	100.6	
875-S	65+70	260 S	1,907.5	LW-33	22.5	97.4	
876-S	68+60	200 S	1,910.0	LW-33	20.3	97.5	
877-S	73+30	275 S	1,921.0	LW-33	18.5	100.4	
878	65+20	10 N	1,908.0	LW-14	17.2	97.0	
879	67+90	10 S	1,910.0	LW-33	21.6	96.7	
880	75+00	25 S	1,925.5	LW-33	20.9	99.2	
881	39+50	0	1,976.0	LW-31	15.5	100.0	
882	65+60	275 N	1,911.0	LW-33	14.8	99.7	
883	68+80	280 N	1,912.0	LW-18	22.6	99.9	
884	73+90	250 N	1,915.5	LW-22	16.9	97.5	
885	66+00	75 N	1,913.0	LW-18	21.1	99.1	
886	68+95	55 N	1,912.0	LW-33	19.6	97.0	
887	71+90	50 N	1,918.0	LW-18	22.0	100.2	
888-S	76+25	65 S	1,929.5	LW-22	14.3	98.5	897
889-S	73+20	80 S	1,923.0	LW-22	18.0	95.8	
890-S	70+20	20 S	1,918.0	LW-15	25.8	96.3	
891-S	66+70	250 S	1,913.0	LW-15	20.4	95.7	
892-S	70+30	280 S	1,925.0	LW-15	20.2	98.2	
893-S	72+60	275 S	1,919.5	LW-26	18.8	95.9	
894	77+00	275 N	1,931.0	LW-18	24.8	97.1	
895	73+60	255 N	1,924.0	LW-22	18.5	98.4	

Test Number[a]	Location Station[b]	Location Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
896	68+00	280 N	1,921.0	LW-22	21.9	97.8	
897	76+25	65 S	1,929.5	LW-22	15.8	102.2	
898	65+50	200 S	1,909.0	LW-33	21.4	97.9	
899	70+00	250 S	1,913.0	LW-33	19.8	100.0	
900	76+00	25 N	1,926.0	LW-26	19.3	95.0	
901	74+00	75 N	1,923.0	LW-33	23.1	96.1	
902	71+80	100 N	1,920.0	LW-26	19.0	96.3	
903	69+40	40 N	1,920.0	LW-22	17.7	96.5	
904	76+10	30 S	1,929.0	LW-26	20.7	92.7	910
905	72+80	50 S	1,925.0	LW-33	20.5	97.4	
906	66+50	50 S	1,923.0	LW-22	19.4	96.8	
907	76+10	30 S	1,929.0	LW-26	19.4	94.2	910
908	73+55	190 N	1,921.0	LW-15	21.2	100.5	
909	69+90	190 N	1,919.5	LW-15	22.1	98.4	
910	76+10	30 S	1,929.0	LW-26	17.8	97.3	
911	67+10	60 N	1,909.5	LW-15	25.1	90.8	912
912	67+10	60 N	1,909.5	LW-15	20.7	95.9	
913	69+83	0	1,916.5	LW-18	20.2	102.2	
914	74+40	90 N	1,923.5	LW-15	23.1	95.1	
915	71+15	245 N	1,914.5	LW-18	21.7	98.8	
916	65+15	280 N	1,904.0	LW-33	19.9	97.9	
917	76+45	200 S	1,934.5	LW-15	23.0	96.6	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
918	74+30	230 S	1,929.5	LW-15	19.6	98.7	
919	72+85	100 S	1,925.0	LW-18	20.3	98.2	
920	70+95	210 S	1,921.5	LW-18	20.6	97.3	
921	68+95	285 S	1,918.5	LW-18	20.2	96.2	
922	66+85	60 S	1,915.0	LW-18	19.0	98.0	
923	26+97	4 E	1,994.5	LW-33	17.6	100.3	
924	13+75	10 W	1,971.0	LW-33	20.9	96.0	
925	5+15	0	1,986.5	LW-33	21.6	97.3	
926	17+60	10 E	1,982.0	LW-33	17.8	100.3	
927	74+80	230 N	1,920.0	LW-15	19.8	97.5	
928	71+00	200 N	1,918.0	LW-15	20.9	99.5	
929	68+10	250 N	1,913.0	LW-15	21.6	100.1	
930	65+80	275 N	1,911.0	LW-15	23.4	99.0	
931	66+00	100 N	1,914.0	LW-15	22.9	96.7	
932-S	72+50	25 N	1,919.5	LW-15	20.1	98.3	
933-S	40+65	100 N	1,969.0	LW-14	20.4	95.9	
934	66+50	50 S	1,908.5	LW-15	22.4	98.5	
935	68+50	100 S	1,912.5	LW-14	16.7	96.8	
936	73+00	150 S	1,919.0	LW-15	21.7	101.7	
937	76+00	190 S	1,931.5	LW-15	21.3	97.8	
938	72+00	250 S	1,922.0	LW-14	20.2	95.9	
939	70+20	260 S	1,916.0	LW-15	22.2	99.1	

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
940	67+90	280 S	1,910.0	LW-15	21.9	100.6	
941-S	68+25	0	1,909.5	LW-15	18.0	101.3	
942-S	25+90	10 E	1,997.0	LW-15	20.2	101.4	
943-S	29+95	15 W	1,991.0	LW-15	18.3	100.9	
944-S	37+50	75 N	1,983.0	LW-14	17.0	96.1	
945	65+75	280 N	1,914.0	LW-15	20.2	97.6	
946	70+50	230 N	1,917.0	LW-15	20.7	100.7	
947	74+50	210 N	1,920.0	LW-15	19.9	100.0	
948	75+90	30 S	1,926.5	LW-15	21.6	97.6	
949	72+00	0	1,917.5	LW-15	23.8	95.2	
950	68+20	15 S	1,917.0	LW-15	21.1	98.1	
951	76+00	60 S	1,931.5	LW-15	20.9	101.4	
952	72+90	100 S	1,926.5	LW-15	22.2	99.5	
953	69+95	120 S	1,921.5	LW-15	22.0	99.9	
954	66+10	150 S	1,917.5	LW-33	20.2	97.4	
955	16+15	5 W	1,976.5	LW-2	19.7	98.6	
956	12+70	15 W	1,971.5	LW-15	17.7	99.8	
957	7+15	0	1,982.5	LW-2	20.3	96.9	
958	75+00	250 S	1,932.5	LW-15	21.9	96.9	
959	71+80	275 S	1,925.5	LW-15	23.9	97.2	
960	68+40	260 S	1,917.5	LW-15	21.2	98.1	
961	32+75	5 W	2,001.5	LW-15	13.8	101.6	974

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
962	43+00	115 N	1,966.5	LW-15	19.2	97.8	
963	38+00	120 N	1,968.5	LW-15	19.4	98.5	
964	75+85	275 N	1,929.5	LW-15	20.4	100.2	
965	72+50	260 N	1,924.5	LW-15	20.7	96.8	
966	68+60	280 N	1,920.5	LW-34	21.6	99.9	
967	66+00	90 N	1,919.5	LW-34	18.9	99.8	
968	70+05	60 N	1,923.5	LW-33	20.1	97.5	
969	74+60	15 N	1,925.5	LW-15	23.5	95.9	
971-S	76+65	185 N	1,929.0	LW-33	21.7	96.6	
972-S	72+15	280 N	1,924.0	LW-33	19.2	95.7	
973-S	68+45	160 N	1,921.0	LW-33	22.3	95.0	
974-S	32+75	5 W	2,001.5	LW-15	18.1	96.1	
975-S	18+35	22 W	1,984.0	LW-34	22.5	97.9	
976-S	11+80	15 E	1,975.0	LW-34	21.3	100.1	
977	5+40	0	1,987.5	LW-34	17.8	98.6	
978	67+50	35 N	1,916.0	LW-33	20.7	97.6	
979	70+30	20 N	1,918.5	LW-33	18.0	96.8	
980	76+40	5 N	1,927.5	LW-33	20.3	96.1	
981	75+00	10 S	1,927.5	LW-33	20.1	98.1	
982	70+50	25 S	1,920.0	LW-15	21.7	99.2	
983	67+30	200 S	1,915.0	LW-15	22.5	99.5	
984	69+15	140 S	1,918.0	LW-14	24.1	91.8	993

TABLE 2.5-62 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
985	67+50	280 N	1,919.0	LW-15	19.6	98.9	
986	69+60	275 N	1,919.0	LW-15	19.4	95.1	
987	73+50	260 N	1,922.5	LW-33	19.3	96.2	
988	68+00	75 N	1,917.0	LW-33	21.4	97.8	
989	72+50	110 N	1,919.0	LW-15	23.0	95.0	
990	76+25	75 N	1,928.0	LW-15	21.5	94.5	991
991	76+25	75 N	1,928.0	LW-33	20.9	97.4	
993	69+15	140 S	1,918.0	LW-33	20.3	98.1	
994	71+90	260 S	1,918.5	LW-15	21.7	100.0	
995	74+80	200 S	1,929.5	LW-34	21.4	100.0	
996	67+80	250 N	1,918.5	LW-34	23.6	97.3	
997	70+75	275 N	1,919.5	LW-15	23.0	98.4	
998	76+25	255 N	1,929.5	LW-33	17.6	98.9	
999	75+85	75 N	1,927.5	LW-34	20.1	95.4	
1000	72+95	100 N	1,922.0	LW-34	20.5	98.9	
1001	68+75	60 N	1,916.5	LW-34	20.9	98.8	
1002	67+95	10 S	1,918.0	LW-15	25.8	96.2	
1003	74+40	0	1,923.0	LW-15	25.7	93.2	1009
1004	66+50	265 N	1,916.0	LW-15	27.8	93.3	1008
1005	69+00	230 N	1,920.5	LW-15	23.5	96.4	
1006	72+97	265 N	1,924.5	LW-34	18.8	95.9	
1008	66+50	265 N	1,916.0	LW-15	23.5	95.7	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1009	74+40	0	1,923.0	LW-15	20.9	100.3	
1010	75+80	100 N	1,929.5	LW-15	23.1	98.9	
1011	72+40	120 N	1,925.5	LW-15	23.3	94.1	1012
1012	72+40	120 N	1,925.5	LW-15	23.6	98.1	
1013	68+10	90 N	1,920.5	LW-15	22.2	100.1	
1014	67+20	75 S	1,917.0	LW-36	17.7	97.6	
1015	70+05	125 S	1,921.0	LW-24	16.1	99.4	
1016	74+80	150 S	1,932.0	LW-24	18.3	95.5	
1017	74+60	225 S	1,920.0	LW-24	17.9	96.7	
1018	72+60	240 S	1,920.0	LW-34	20.1	96.3	
1019	68+40	280 S	1,924.0	LW-24	17.4	95.7	
1020	67+10	275 N	1,919.5	LW-33	21.0	97.1	
1021	70+80	230 N	1,921.5	LW-15	22.4	99.9	
1022	75+50	290 N	1,931.0	LW-33	20.3	96.0	
1023	75+98	5 N	1,935.5	LW-33	20.1	96.2	
1024	72+10	35 N	1,923.5	LW-34	23.8	96.8	
1025	68+50	25 N	1,920.0	LW-34	27.7	95.1	
1026	25+65	5 E	1,998.5	LW-14	19.8	97.8	
1027	68+95	225 S	1,917.0	LW-34	20.7	99.8	
1028	71+00	275 S	1,922.5	LW-33	21.3	97.6	
1029	75+00	290 S	1,933.0	LW-33	21.4	96.5	
1030	76+30	275 N	1,932.0	LW-15	23.1	96.3	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1031	73+00	260 N	1,927.0	LW-15	24.3	97.4	
1032	69+60	260 N	1,923.5	LW-34	24.3	96.0	
1033	76+85	35 N	1,930.0	LW-15	21.0	98.1	
1034	73+70	90 N	1,925.0	LW-22	19.4	94.6	1039
1035	69+10	90 N	1,924.0	LW-15	21.8	99.7	
1036	67+80	60 S	1,920.0	LW-38	16.9	95.6	
1037	70+35	40 S	1,924.5	LW-34	22.6	100.0	
1038	74+75	50 S	1,926.0	LW-34	30.7	100.9	
1039	73+70	90 N	1,925.0	LW-33	21.5	98.1	
1040	16+10	10 E	1,965.5	LW-36	14.6	95.2	
1041	11+00	5 W	1,952.0	LW-34	24.4	97.3	
1042	4+85	10 W	1,991.5	LW-15	20.8	97.9	
1043	67+75	280 S	1,919.0	LW-22	18.5	99.0	
1044	70+00	210 S	1,921.0	LW-33	19.6	99.1	
1045	72+95	270 S	1,929.0	LW-33	18.6	101.3	
1046	75+80	210 N	1,929.5	LW-33	19.5	97.8	
1047	72+00	280 N	1,924.0	LW-15	22.0	94.3	1048
1048	72+00	280 N	1,924.0	LW-15	23.8	99.5	
1049	67+05	200 N	1,919.5	LW-33	17.1	97.7	
1050	76+05	40 N	1,934.0	LW-33	21.6	96.7	
1051	73+30	110 N	1,930.5	LW-33	20.1	97.4	
1052	68+85	70 N	1,922.0	LW-34	20.3	96.7	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1053	67+60	5 S	1,918.0	LW-33	21.0	97.9	
1054	69+95	20 S	1,921.0	LW-36	17.8	98.8	
1055	72+60	0	1,927.5	LW-33	21.4	97.6	
1056	74+95	298 N	1,928.0	LW-33	18.5	98.4	
1057	70+40	215 N	1,925.5	LW-33	18.0	99.4	
1058	67+00	245 N	1,919.0	LW-33	20.2	97.9	
1059-S	68+25	40 S	1,918.0	LW-37	19.3	97.7	
1060-S	70+40	70 S	1,922.5	LW-15	22.1	100.0	
1061-S	74+10	55 S	1,928.5	LW-34	21.6	100.2	
1062-S	75+50	75 N	1,930.5	LW-15	19.1	98.7	
1063-S	72+25	100 N	1,927.0	LW-33	20.0	96.6	
1064-S	69+10	100 N	1,922.5	LW-37	19.1	99.6	
1065	76+20	290 S	1,938.0	LW-33	18.8	100.1	
1066	72+80	260 S	1,927.5	LW-33	20.4	98.6	
1067	68+50	275 S	1,922.5	LW-33	20.3	98.8	
1068	76+10	290 N	1,931.5	LW-15	23.7	96.0	
1069	73+70	270 N	1,929.0	LW-3	21.0	95.1	
1070	68+65	250 N	1,925.0	LW-15	20.7	99.3	
1071	75+50	100 S	1,932.0	LW-14	19.2	96.7	
1072	70+90	90 S	1,925.5	LW-14	19.6	97.1	
1073	75+00	75 N	1,931.5	LW-15	25.9	91.7	1074
1074	75+00	75 N	1,931.5	LW-15	21.5	95.3	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1075	72+40	60 N	1,928.0	LW-15	25.9	95.7	
1076	70+20	90 N	1,924.5	LW-15	22.6	98.1	
1078	75+08	305 S	1,935.0	LW-4	16.5	98.9	
1079	73+00	210 S	1,928.5	LW-4	20.4	95.1	
1080	69+10	295 S	1,918.5	LW-33	21.9	95.7	
1081	67+35	140 S	1,914.5	LW-33	22.0	96.9	
1082	70+05	50 S	1,916.0	LW-34	24.4	89.4	1083
1083	70+05	50 S	1,916.0	LW-34	22.8	99.1	
1084	77+30	10 S	1,939.0	LW-34	19.7	96.6	
1085	66+00	270 N	1,913.0	LW-4	17.8	98.3	
1086	68+70	280 N	1,915.0	LW-4	13.3	99.4	
1087	76+15	230 N	1,935.0	LW-18	19.0	96.7	
1088	76+40	110 N	1,996.0	LW-33	21.4	97.4	
1089-S	72+60	75 N	1,929.5	LW-33	19.7	87.8	
1090-S	68+50	50 N	1,923.0	LW-33	20.5	95.6	
1091-S	67+75	60 S	1,919.5	LW-34	17.2	97.0	
1092-S	69+25	125 S	1,923.0	LW-34	21.5	93.7	1095
1093-S	72+00	75 S	1,925.5	LW-34	22.8	95.1	
1094-S	74+80	25 S	1,931.0	LW-34	21.4	100.1	
1095	69+25	125 S	1,923.0	LW-34	22.5	96.5	
1096	75+20	260 S	1,937.0	LW-18	23.5	94.6	1097
1097	75+20	260 S	1,937.0	LW-18	22.6	98.7	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1098	75+55	215 N	1,933.0	LW-37	18.0	97.4	
1099	71+30	250 N	1,928.0	LW-37	20.9	97.0	
1100	69+00	230 N	1,922.5	LW-37	19.1	97.5	
1101	67+05	200 S	1,917.0	LW-37	17.6	100.1	
1102	67+30	75 S	1,918.0	LW-3	17.9	100.0	
1103	71+30	100 S	1,927.5	LW-3	18.6	99.4	
1104	75+85	250 S	1,938.5	LW-18	18.1	99.4	
1105	73+20	220 S	1,930.0	LW-37	21.2	95.1	
1106	69+20	255 S	1,922.0	LW-32	16.4	96.0	
1107	69+10	25 N	1,920.5	LW-37	18.5	99.1	
1108	69+85	40 N	1,925.0	LW-3	18.4	99.4	
1109	75+30	10 N	1,937.0	LW-37	16.1	97.1	
1110	72+75	75 S	1,928.5	LW-37	20.8	96.6	
1111	69+20	0	1,923.0	LW-37	19.9	97.0	
1113	66+05	290 N	1,918.0	LW-18	17.4	97.1	
1114	68+45	275 N	1,922.0	LW-37	17.1	100.0	
1115	73+35	240 N	1,932.5	LW-18	22.4	96.7	
1116	76+90	180 N	1,935.5	LW-4	17.9	99.2	
1117	73+00	150 N	1,930.5	LW-18	20.4	97.1	
1118	67+80	160 N	1,923.0	LW-4	17.4	99.9	
1119	76+85	50 N	1,938.0	LW-18	20.6	99.4	
1120	73+45	25 S	1,928.5	LW-4	13.6	97.4	1121

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1121	73+45	25 S	1,928.5	LW-18	20.7	97.2	
1122	69+50	60 S	1,923.5	LW-32	16.2	95.0	
1123	77+20	260 N	1,939.0	LW-34	23.8	96.1	
1124	73+60	270 N	1,932.5	LW-34	21.6	95.8	
1125	69+15	210 N	1,924.0	LW-34	21.3	98.5	
1126	67+50	90 N	1,921.0	LW-38	15.9	97.0	
1127	70+75	75 N	1,927.0	LW-18	21.9	97.4	
1128	75+10	70 N	1,933.0	LW-36	18.3	99.6	
1129	76+25	60 S	1,938.5	LW-36	18.1	96.1	
1130	73+80	100 S	1,931.0	LW-37	21.2	97.5	
1131	69+55	80 S	1,923.0	LW-36	18.1	99.0	
1132	75+75	200 S	1,938.0	LW-36	14.8	96.1	
1133	71+25	290 S	1,927.0	LW-22	16.9	98.5	
1134	69+00	255 S	1,922.0	LW-37	18.4	99.6	
1135	77+35	275 N	1,939.5	LW-3	19.5	98.2	
1136	73+75	280 N	1,933.0	LW-34	21.5	91.7	1139
1137	71+15	265 N	1,930.5	LW-34	20.0	100.1	
1138	67+50	225 N	1,920.5	LW-33	16.9	99.7	
1139	73+75	280 N	1,933.0	LW-3	19.6	98.0	
1140	66+80	30 N	1,918.5	LW-33	20.1	98.6	
1141	70+00	100 N	1,929.5	LW-33	21.2	97.0	
1142	74+60	75 N	1,933.5	LW-33	21.5	96.3	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1143	76+25	60 S	1,939.5	LW-18	21.0	97.8	
1144	71+90	120 S	1,928.5	LW-33	18.5	100.4	
1145	68+60	100 S	1,923.5	LW-18	25.0	93.0	1149
1146	68+75	225 S	1,923.5	LW-33	21.8	95.6	
1147	71+15	285 S	1,927.5	LW-3	18.2	99.5	
1148	74+60	200 S	1,937.5	LW-3	18.0	97.4	
1149	68+60	100 S	1,923.5	LW-33	21.6	97.9	
1150	77+60	240 N	1,941.0	LW-32	17.8	96.1	
1151	72+80	285 N	1,931.0	LW-3	18.7	96.4	
1152	70+25	200 N	1,928.0	LW-18	22.1	99.5	
1153	77+00	75 N	1,941.0	LW-18	21.2	100.6	
1154	71+70	100 N	1,930.0	LW-18	21.9	98.2	
1155	70+30	85 N	1,930.5	LW-18	19.9	99.4	
1156	76+80	60 S	1,939.0	LW-36	17.7	98.2	
1157	72+95	85 S	1,931.0	LW-33	22.2	96.4	
1158	69+45	65 S	1,925.5	LW-33	19.3	98.2	
1159	67+40	225 S	1,918.5	LW-4	17.5	100.7	
1160	70+40	245 S	1,925.0	LW-33	21.8	96.9	
1161	72+98	268 S	1,932.5	LW-4	17.2	100.6	
1162	70+30	250 N	1,930.5	LW-4	19.5	96.0	
1163	73+10	150 N	1,933.0	LW-37	21.8	96.1	
1164	76+15	200 N	1,939.0	LW-4	19.1	96.0	

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1165	75+95	0	1,937.0	LW-37	19.9	96.0	
1166	71+90	10 N	1,930.0	LW-37	15.0	94.9	1167
1167	71+90	10 N	1,930.0	LW-37	20.5	95.9	
1168	71+25	100 S	1,929.0	LW-18	21.7	97.2	
1169	76+80	120 S	1,942.0	LW-4	16.0	96.0	
1170-S	70+60	285 S	1,927.5	LW-33	21.8	97.4	
1171-S	72+90	210 S	1,932.0	LW-33	21.0	96.8	
1172-S	76+50	245 S	1,941.5	LW-33	22.2	95.5	
1173-S	77+00	230 N	1,941.0	LW-37	20.0	97.0	
1174-S	72+85	240 N	1,933.5	LW-37	20.2	96.2	
1175-S	68+10	270 N	1,924.0	LW-32	14.6	98.1	
1176	76+30	150 S	1,943.0	LW-4	18.5	99.6	
1177	73+00	250 S	1,933.5	LW-34	24.3	95.4	
1178	69+45	275 S	1,925.5	LW-34	22.5	97.7	
1179	78+30	200 N	1,948.0	LW-34	22.7	95.0	
1180	75+50	215 N	1,939.5	LW-1	22.6	96.7	
1181	69+30	230 N	1,930.0	LW-18	21.3	98.5	
1182	77+90	60 N	1,945.0	LW-4	19.8	96.1	
1183	75+70	0	1,938.0	LW-37	21.2	95.4	
1184	72+05	150 N	1,933.0	LW-34	22.1	95.7	
1185	67+75	80 N	1,923.5	LW-18	20.8	97.6	
1186	77+35	100 S	1,942.5	LW-34	20.0	96.0	

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1187	74+85	140 S	1,937.0	LW-23	21.2	97.0	
1188	73+25	160 S	1,931.5	LW-4	23.1	90.3	1192
1189	66+90	85 S	1,919.0	LW-33	19.7	100.0	
1190	65+60	295 S	1,919.5	LW-33	21.1	96.2	
1191	70+15	274 S	1,927.5	LW-4	18.8	97.2	
1192	73+25	160 S	1,931.5	LW-4	17.6	99.7	
1193	77+80	230 N	1,945.0	LW-37	19.4	98.5	
1194	74+35	250 N	1,935.5	LW-37	20.4	97.5	
1195	67+90	295 N	1,927.0	LW-37	19.2	98.1	
1196	66+10	130 N	1,918.5	LW-37	20.7	97.0	
1197	75+05	100 N	1,932.0	LW-4	15.1	100.5	
1198	67+00	20 N	1,924.0	LW-37	19.4	97.1	
1199	73+40	0	1,933.0	LW-37	19.7	97.7	
1203	72+70	190 S	1,934.5	LW-37	18.7	100.4	
1204	70+30	90 SN	1,929.5	LW-24	17.3	98.7	
1205	68+80	135 S	1,924.5	LW-24	19.5	94.9	1231
1206	66+00	245 S	1,912.5	LW-37	20.4	97.1	
1207	77+10	200 N	1,944.0	LW-34	22.9	92.9	1208
1208	77+10	200 N	1,944.0	LW-33	17.2	98.3	
1209	72+95	280 N	1,936.5	LW-24	17.8	97.3	
1210	69+90	245 N	1,932.5	LW-24	18.2	97.7	
1211	78+00	200 S	1,945.5	LW-30	21.6	95.2	

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1212	66+90	50 N	1,924.5	LW-15	22.5	98.5	
1213	69+40	75 N	1,928.0	LW-33	17.7	96.6	
1214	71+80	120 N	1,934.0	LW-15	21.1	96.9	
1215	74+25	150 W	1,937.0	LW-37	20.1	99.1	
1216	77+00	60 N	1,940.0	LW-32	15.5	99.5	
1217	58+70	230 N	1,897.5	LW-15	20.8	95.1	
1218	57+50	260 N	1,898.5	LW-22	18.0	97.4	
1219	58+50	180 N	1,897.0	LW-15	20.9	96.7	
1220	59+00	195 N	1,897.0	LW-15	22.9	96.6	
1221	60+00	120 N	1,896.0	LW-34	21.0	97.1	
1222	53+30	285 N	1,898.0	LW-37	20.1	97.4	
1223	60+50	175 N	1,902.0	LW-34	20.7	100.1	
1224	58+00	150 N	1,900.5	LW-33	21.0	98.5	
1225	55+90	100 N	1,900.5	LW-34	26.4	95.6	1226
1226	55+90	100 N	1,900.5	LW-33	20.9	98.8	
1227	61+90	50 S	1,898.8	LW-34	27.2	97.5	
1228	59+20	65 S	1,899.0	LW-33	19.0	95.6	
1229	64+50	40 S	1,917.0	LW-4	17.7	98.5	
1230	67+10	100 S	1,920.5	LW-33	20.9	96.1	
1231	68+80	135 S	1,924.5	LW-4	19.9	95.9	
1232	72+50	240 S	1,934.5	LW-4	15.5	99.4	
1233	69+80	200 S	1,928.5	LW-4	16.8	98.3	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1234	66+10	235 S	1,915.5	LW-4	16.0	99.5	
1235	56+15	280 N	1,905.0	LW-34	23.2	98.8	
1236	59+50	150 N	1,902.0	LW-34	22.3	98.0	
1237	58+00	70 N	1,900.0	LW-34	18.1	97.0	
1239	61+80	75 S	1,900.5	LW-18	17.3	95.0	
1240	59+00	120 S	1,897.5	LW-18	19.1	100.6	
1241	56+00	200 N	1,902.0	LW-18	20.7	97.1	
1242	59+80	150 N	1,904.0	LW-18	19.5	98.4	
1243-S	67+60	50 N	1,921.0	LW-4	16.0	98.5	
1244-S	72+20	80 N	1,933.0	LW-1	15.6	95.9	1245
1245	72+20	80 N	1,933.0	LW-1	17.7	100.4	
1246	77+00	100 N	1,944.0	LW-32	14.5	96.2	
1247	59+00	100 N	1,925.5	LW-6	16.0	96.7	
1248	61+00	80 N	1,925.5	LW-4	14.3	98.6	
1249	62+30	60 N	1,920.5	LW-10	17.6	95.7	
1250	65+00	60 S	1,922.0	LW-24	17.3	99.7	
1251	67+00	65 S	1,921.5	LW-24	16.4	100.6	
1252-S	60+90	200 N	1,905.0	LW-35	13.5	93.1	1253
1253-S	60+90	200 N	1,905.0	LW-35	16.6	98.8	
1254-S	61+00	100 N	1,905.0	LW-15	16.8	97.1	
1255-S	61+00	100 N	1,905.0	LW-15	15.5	100.4	1257
1256-S	59+50	75 N	1,902.5	LW-15	13.6	98.9	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1257	61+00	100 N	1,905.0	LW-15	21.5	102.8	
1258	59+50	75 N	1,902.5	LW-15	25.8	95.9	
1259	62+00	200 N	1,909.5	LW-15	18.2	102.8	
1260	57+00	150 N	1,897.5	LW-15	19.8	97.7	
1261	59+00	200 N	1,904.5	LW-15	20.5	98.3	
1262	59+80	100 S	1,896.0	LW-15	19.2	101.6	
1263	58+25	100 S	1,896.0	LW-15	24.9	98.6	
1264	59+50	150 S	1,897.0	LW-15	19.5	99.5	
1265	60+25	100 S	1,897.0	LW-10	17.7	95.1	
1266	56+75	100 N	1,898.0	LW-15	19.1	99.5	
1267	58+00	150 N	1,905.5	LW-10	18.5	100.7	
1268	62+00	50 N	1,909.5	LW-15	26.7	95.3	
1269	60+25	285 N	1,900.5	LW-15	23.0	97.8	
1270	58+50	240 N	1,904.5	LW-40	21.5	98.4	
1271	58+75	150 N	1,903.5	LW-37	20.2	99.4	
1272	65+35	265 N	1,920.5	LW-15	22.2	96.8	
1273	67+80	285 N	1,926.5	LW-15	22.0	98.0	
1274	68+00	125 N	1,925.5	LW-3	17.0	96.6	
1275	69+00	60 N	1,928.5	LW-41	18.5	96.6	
1276	71+70	25 S	1,930.5	LW-15	22.1	96.0	
1277	73+25	100 N	1,935.0	LW-15	23.8	95.8	
1278	75+80	50 N	1,938.5	LW-15	23.5	94.7	1980

Test Number[a]	Location Station[b]	Location Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1279	76+10	25 N	1,943.0	LW-15	19.6	95.9	
1280	75+30	50 N	1,938.5	LW-15	22.8	99.2	
1281	59+00	75 S	1,906.0	LW-33	16.8	100.0	
1282	59+00	100 S	1,909.0	LW-15	22.1	95.9	
1283	61+50	125 S	1,903.0	LW-15	21.0	99.5	
1284	58+00	290 S	1,903.5	LW-40	11.2	101.2	
1285	58+00	290 S	1,903.5	LW-40	17.7	97.4	
1286	65+35	265 N	1,907.5	LW-40	22.5	99.5	
1287	59+80	200 N	1,907.5	LW-40	23.0	96.9	
1288	58+60	100 N	1,902.0	LW-40	27.0	84.0	1289
1289	58+60	100 N	1,902.0	LW-40	22.3	97.1	
1290	66+00	270 S	1,921.0	LW-15	17.5	94.8	
1291	60+30	280 N	1,913.0	LW-40	21.7	96.0	
1292	64+40	275 S	1,914.0	LW-40	16.5	101.9	
1293	66+05	275 S	1,921.0	LW-40	24.3	92.0	
1294	65+05	255 S	1,919.5	LW-44	19.1	99.1	
1295	67+95	56 S	1,922.5	LW-44	21.7	95.2	
1296	68+90	25 S	1,922.5	LW-44	20.9	98.8	
1297	70+00	15 S	1,923.5	LW-44	18.8	101.1	
1298	66+10	255 S	1,921.0	LW-40	17.4	100.6	
1299	73+10	175 N	1,936.5	LW-42	15.9	102.0	
1300	76+10	100 N	1,943.0	LW-45	23.1	74.2	1301

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1301	76+10	100 N	1,943.0	LW-44	18.8	83.7	1308
1302	57+30	280 N	1,907.0	LW-40	22.4	94.3	1303
1303	57+30	280 N	1,907.0	LW-40	19.4	96.6	
1304	59+25	285 N	1,906.0	LW-12	24.6	92.7	1305
1305	59+25	285 N	1,906.0	LW-12	24.3	95.2	
1306	57+90	145 N	1,907.5	LW-44	19.8	100.6	
1307	62+95	100 N	1,909.0	LW-12	24.3	98.4	
1308	76+10	100 N	1,943.0	LW-13	19.9	95.5	
1309	54+20	155 S	1,914.5	LW-39	24.1	85.1	1310
1310-S	54+20	155 S	1,914.5	LW-39	20.1	97.0	
1311	53+90	290 S	1,908.5	LW-17	18.9	95.2	
1312-S	57+30	215 N	1,907.0	LW-39	21.5	96.0	
1313-S	60+95	200 N	1,907.0	LW-20	20.8	93.8	1314
1314	60+95	200 N	1,907.0	LW-20	21.0	96.9	
1315	60+05	0	1,902.0	LW-48	22.4	95.0	
1316	62+95	20 N	1,909.0	LW-40	18.4	96.6	
1317	63+20	80 S	1,909.0	LW-23	18.5	95.3	
1318	66+90	25 S	1,922.0	LW-49	22.6	96.6	
1319	70+05	40 S	1,932.5	LW-44	23.2	95.2	
1320	76+30	65 S	1,944.5	LW-44	21.7	98.6	
1321	59+15	300 N	1,907.0	LW-23	22.6	96.3	
1322	63+10	275 N	1,910.5	LW-23	16.7	97.0	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1323	69+05	200 N	1,931.0	LW-23	17.1	102.5	
1324	73+85	170 N	1,939.5	LW-23	19.3	97.1	
1325	58+00	320 S	1,904.0	LW-44	20.0	95.8	
1326	60+10	295 S	1,905.0	LW-44	24.6	93.8	1334
1327	63+40	270 S	1,909.0	LW-44	26.3	94.7	1335
1328	66+75	220 S	1,922.0	LW-23	22.3	96.8	
1329	66+05	115 S	1,920.5	LW-12	23.7	95.5	
1330	63+90	90 S	1,904.0	LW-23	20.4	96.9	
1331	61+10	40 S	1,902.0	LW-23	18.3	99.9	
1332	57+10	75 S	1,902.0	LW-23	15.9	100.0	
1333	60+10	295 S	1,905.0	LW-44	25.1	90.1	1334
1334	60+10	295 S	1,905.0	LW-23	20.5	98.1	
1335	63+40	270 S	1,909.0	LW-23	20.3	97.8	
1336	63+95	280 N	1,916.5	LW-45	20.8	95.1	
1337	59+90	240 N	1,907.0	LW-44	20.7	96.3	
1338	58+85	0	1,906.0	LW-42	16.1	97.6	
1339	62+00	20 S	1,908.0	LW-23	19.4	97.0	
1340	64+00	70 N	1,914.5	LW-23	18.9	97.4	
1341	55+70	290 S	1,904.5	LW-42	17.7	99.0	
1342	61+95	255 S	1,908.0	LW-44	21.9	97.5	
1343-S	64+70	285 S	1,909.5	LW-43	15.0	95.4	
1344-S	67+60	250 S	1,926.0	LW-44	30.3	89.9	1345

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1345	67+60	250 S	1,926.0	LW-42	16.0	95.3	
1346	60+35	245 N	1,909.0	LW-23	18.5	97.9	
1347	57+85	280 N	1,910.5	LW-48	20.5	95.5	
1348	60+60	200 N	1,909.5	LW-20	22.0	97.1	
1349	57+70	0	1,907.0	LW-23	16.6	102.4	
1350	63+00	10 N	1,912.5	LW-44	25.6	94.8	1351
1351	63+00	10 N	1,912.5	LW-44	21.5	101.0	
1352	56+00	200 S	1,907.5	LW-44	20.8	95.9	
1353	54+00	160 S	1,908.0	LW-15	27.5	94.0	1354
1354	54+00	160 S	1,908.0	LW-15	25.2	96.2	
1355	57+80	180 S	1,907.5	LW-44	23.7	95.1	
1356	60+30	300 S	1,908.0	LW-23	15.2	101.2	
1357	62+85	150 S	1,908.0	LW-15	20.0	98.6	
1358	65+70	170 S	1,916.0	LW-45	16.4	98.6	
1359	70+85	195 N	1,935.5	LW-23	16.1	101.5	
1360	73+80	185 N	1,939.5	LW-23	21.5	92.1	1361
1361	73+80	185 N	1,939.5	LW-23	19.2	96.9	
1362	58+40	300 N	1,909.0	LW-21	23.3	97.4	
1363	63+30	275 N	1,913.5	LW-21	23.5	96.5	
1364	61+85	220 N	1,911.0	LW-21	25.4	95.0	1368
1365	58+90	100 S	1,905.0	LW-23	19.2	100.7	
1366	61+30	160 S	1,907.0	LW-21	20.9	98.8	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1367	63+70	5 S	1,909.5	LW-23	17.6	99.1	
1368	61+85	220 N	1,911.0	LW-21	23.9	96.3	
1369	56+30	300 S	1,912.5	LW-21	19.2	95.0	
1370	62+75	280 S	1,906.5	LW-23	18.3	97.9	
1371	59+15	315 S	1,902.0	LW-21	22.8	96.1	
1372	58+50	15 N	1,907.0	LW-21	21.7	97.3	
1373	61+90	5 N	1,910.0	LW-21	25.0	94.8	1377
1374	61+90	5 N	1,910.0	LW-21	24.9	95.2	1377
1375	63+20	30 S	1,909.0	LW-40	18.3	95.7	
1376	59+85	20 S	1,908.5	LW-21	16.4	95.9	
1377	61+90	5 N	1,910.0	LW-21	23.9	95.7	
1378	64+90	295 S	1,912.5	LW-23	16.3	99.3	
1379	62+50	300 S	1,906.5	LW-23	17.3	96.1	
1380	59+85	285 S	1,902.5	LW-23	16.2	94.1	1383
1383	59+85	285 S	1,902.5	LW-45	16.8	97.5	
1384	59+00	275 N	1,911.5	LW-42	17.5	96.1	
1385	61+70	85 N	1,912.5	LW-21	22.9	97.4	
1386	58+85	80 S	1,906.0	LW-40	16.3	98.9	
1387	61+20	135 S	1,911.0	LW-21	18.0	101.1	
1388	64+20	40 S	1,913.0	LW-40	17.5	98.6	
1389	64+85	270 N	1,921.5	LW-40	21.0	99.3	
1390	58+60	290 S	1,905.0	LW-48	22.6	96.6	

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1391	63+35	300 S	1,911.0	LW-42	18.0	99.0	
1392	69+70	130 N	1,935.0	LW-42	17.5	98.6	
1393	74+40	102 N	1,940.5	LW-44	20.9	96.2	
1394	58+95	5 S	1,906.0	LW-47	20.4	96.7	
1395	60+00	70 S	1,908.5	LW-45	16.8	98.9	
1396	63+70	50 S	1,912.0	LW-48	19.9	93.9	1397
1397	63+70	50 S	1,912.0	LW-48	19.7	97.9	
1398	65+75	15 N	1,923.0	LW-41	19.0	95.7	
1399	70+90	20 S	1,935.5	LW-34	30.2	89.5	1614
1400	74+20	5 S	1,940.0	LW-42	14.3	95.3	
1401	78+15	30 S	1,948.0	LW-42	17.7	97.3	
1402	63+50	280 S	1,914.0	LW-41	17.5	95.5	
1403	59+95	295 S	1,909.0	LW-48	18.2	98.0	
1405	59+85	260 N	1,910.0	LW-49	19.0	98.3	
1406	58+60	100 N	1,905.0	LW-49	17.3	100.2	
1407-S	62+00	100 S	1,913.0	LW-49	19.0	98.8	
1408-S	59+50	125 S	1,903.0	LW-49	17.8	96.2	
1409-S	63+50	225 S	1,914.5	LW-49	16.4	95.7	
1410-S	69+85	100 S	1,935.5	LW-48	22.7	99.4	
1411-S	58+40	260 S	1,905.5	LW-23	16.5	91.1	1413
1412-S	58+40	260 S	1,905.5	LW-23	18.3	100.7	
1413	58+40	260 S	1,905.5	LW-23	20.9	98.1	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1414	64+50	150 S	1,914.0	LW-48	17.6	100.1	
1415	61+50	140 S	1,912.0	LW-48	17.3	96.0	
1416	58+50	75 S	1,906.0	LW-48	18.7	96.1	
1417	60+40	150 S	1,910.0	LW-48	21.9	98.4	
1418	62+00	130 S	1,913.5	LW-44	19.8	98.5	
1419	64+00	160 S	1,914.0	LW-48	19.0	95.6	
1420	64+50	125 N	1,922.5	LW-49	17.8	99.0	
1421	58+75	275 N	1,907.0	LW-49	15.7	96.3	
1422	64+40	0	1,923.0	LW-48	20.0	97.7	
1423	60+50	50 N	1,910.5	LW-48	21.6	100.9	
1424	72+20	75 N	1,938.5	LW-41	14.9	97.3	
1425	76+40	75 N	1,945.5	LW-44	23.3	98.1	
1426	59+00	275 S	1,907.5	LW-50	19.5	102.1	
1427	62+80	260 S	1,915.0	LW-50	18.0	97.6	
1428	66+00	260 S	1,924.5	LW-48	21.9	99.2	
1429	59+40	290 N	1,911.0	LW-50	19.1	100.8	
1430	61+50	290 N	1,912.0	LW-46	22.9	95.4	
1431	61+50	290 N	1,912.0	LW-46	24.3	95.8	
1432	61+50	270 N	1,912.0	LW-47	27.7	89.4	1438
1433	63+70	270 N	1,914.5	LW-50	23.3	98.0	
1434	63+80	100 S	1,915.0	LW-45	17.4	99.6	
1435	62+50	140 S	1,914.0	LW-50	20.9	100.0	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1436	61+30	180 S	1,914.0	LW-49	16.5	99.1	
1437	63+70	160 S	1,915.5	LW-45	19.0	98.5	
1438-S	61+50	270 N	1,912.0	LW-47	19.4	98.3	
1439-S	61+50	260 N	1,912.0	LW-47	22.8	94.5	1452
1440-S	60+50	260 N	1,911.5	LW-47	22.5	94.9	1453
1441	60+50	125 N	1,911.5	LW-47	20.1	99.2	
1442	58+70	100 N	1,908.0	LW-49	22.7	98.0	1462
1443	55+70	100 S	1,910.0	LW-45	18.7	100.0	
1444	56+60	230 S	1,910.5	LW-45	18.3	98.1	
1445	61+00	80 S	1,914.5	LW-50	18.5	98.2	
1446	59+80	70 S	1,907.0	LW-45	16.0	100.0	
1447	58+70	110 S	1,907.0	LW-45	20.5	95.8	
1448	78+00	100 N	1,937.0	LW-49	22.4	96.0	
1449	77+10	80 N	1,937.0	LW-42	12.4	98.0	
1450	75+50	80 N	1,945.5	LW-42	14.9	97.5	
1451	69+50	80 N	1,936.0	LW-50	20.3	99.5	
1452	61+50	260 N	1,912.0	LW-47	20.7	96.6	
1453	60+50	260 N	1,911.5	LW-47	18.4	99.2	
1454	60+10	280 S	1,911.0	LW-49	15.2	97.0	
1455	61+90	280 S	1,915.0	LW-47	16.4	99.7	
1456	62+90	290 S	1,915.5	LW-45	17.4	100.4	
1457	64+50	280 S	1,916.0	LW-39	15.9	97.5	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1458	71+50	60 S	1,938.5	LW-47	15.2	99.7	
1459	75+50	80 S	1,945.5	LW-50	16.8	98.5	
1460	72+50	60 S	1,939.5	LW-45	12.1	99.6	
1461	77+50	80 S	1,952.5	LW-45	13.7	96.9	
1462	58+70	100 N	1,908.0	LW-48	22.2	100.6	
1463	61+00	225 N	1,915.5	LW-49	18.8	98.5	
1464	63+25	175 N	1,916.0	LW-50	22.3	99.2	
1465	65+00	275 N	1,913.0	LW-49	21.7	98.5	
1466	62+50	100 N	1,913.0	LW-48	22.6	96.7	
1467	59+90	0	1,907.5	LW-48	22.4	97.6	
1468	64+25	50 N	1,916.5	LW-48	20.8	96.5	
1469	58+00	100 S	1,907.5	LW-47	20.1	99.4	
1470	61+00	75 S	1,915.0	LW-45	17.4	99.8	
1471	64+50	50 S	1,916.5	LW-45	17.3	97.5	
1472	64+40	50 S	1,916.5	LW-45	17.7	96.8	
1473	71+75	50 N	1,939.0	LW-49	19.2	99.0	
1474	74+75	0	1,946.0	LW-49	17.9	99.2	
1475	77+50	75 N	1,953.0	LW-45	17.4	97.1	
1476	61+60	250 S	1,915.5	LW-48	24.3	98.1	
1477	62+10	260 S	1,916.0	LW-50	18.2	97.0	
1478	65+25	250 S	1,917.0	LW-47	18.7	97.0	
1479	63+75	225 S	1,916.0	LW-47	14.9	96.6	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1480	71+00	50 S	1,938.5	LW-48	25.0	95.2	
1481	74+50	70 S	1,946.0	LW-48	21.8	100.1	
1482	78+00	90 S	1,953.5	LW-47	19.1	98.6	
1484	60+75	150 S	1,915.5	LW-49	18.9	99.3	
1485	57+50	220 S	1,908.0	LW-48	26.4	96.5	
1486	58+75	185 S	1,909.0	LW-48	20.8	98.1	
1487	59+50	175 S	1,908.0	LW-50	19.8	101.3	
1488	64+00	250 S	1,916.5	LW-43	13.9	96.3	
1489	62+25	0	1,913.5	LW-48	23.6	96.7	
1490	62+50	100 S	1,918.0	LW-47	13.3	100.0	
1491	65+25	30 N	1,918.0	LW-48	25.1	97.5	
1492	58+00	270 N	1,917.0	LW-50	20.1	99.9	
1493	60+00	250 N	1,918.0	LW-40	21.9	99.8	
1494	62+00	175 N	1,919.0	LW-50	21.8	97.3	
1495	63+50	150 N	1,920.0	LW-50	19.6	95.9	
1496	64+00	160 N	1,921.0	LW-48	21.8	98.9	
1497	76+00	25 N	1,947.0	LW-50	19.8	96.5	
1498	74+10	50 N	1,944.0	LW-50	17.6	99.9	
1499	71+50	75 N	1,940.0	LW-47	15.9	96.6	
1500	77+75	75 S	1,948.5	LW-50	21.7	99.7	
1501	E 99,734, N 83,635[e]		1,932.0	LW-45	18.6	98.0	
1508	58+25	300 N	1,915.0	LW-49	19.2	100.1	

[e] USGS coordinates.

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1509	60+20	250 N	1,917.0	LW-43	16.3	99.9	
1510	63+00	290 N	1,917.5	LW-49	19.6	98.8	
1511	65+30	240 N	1,919.0	LW-49	18.8	100.4	
1512	65+00	200 S	1,922.0	LW-45	14.0	99.5	
1513	63+20	250 S	1,915.0	LW-44	19.6	99.9	
1514	61+00	210 S	1,913.5	LW-49	15.2	98.8	
1515	60+80	205 S	1,913.5	LW-41	14.5	99.5	
1516	77+50	50 N	1,947.5	LW-47	15.8	99.8	
1517	75+00	0	1,946.5	LW-41	15.8	100.0	
1518	73+25	50 S	1,945.0	LW-48	22.1	99.9	
1519	72+00	75 N	1,941.0	LW-49	19.4	98.0	
1520	69+85	75 S	1,939.0	LW-49	19.4	98.8	
1521	64+75	0	1,922.0	LW-48	23.2	99.4	
1522	61+00	0	1,918.5	LW-50	20.9	99.2	
1523	58+75	50 S	1,916.5	LW-49	17.3	99.0	
1524	56+50	100 S	1,912.5	LW-47	17.8	99.4	
1525	61+50	280 S	1,920.0	LW-45	19.2	97.5	
1526	63+25	275 S	1,915.0	LW-45	19.1	96.8	
1529	74+75	75 N	1,946.0	LW-50	21.3	100.0	
1530	70+20	65 N	1,942.0	LW-50	21.3	99.6	
1531	67+00	150 N	1,933.0	LW-48	25.4	95.2	
1532	63+80	250 N	1,920.0	LW-49	20.9	98.8	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1533	58+50	200 N	1,909.0	LW-48	23.7	95.5	
1534	62+00	180 N	1,920.0	LW-49	19.7	98.0	
1535	57+00	260 S	1,907.0	LW-48	21.3	99.5	
1536	60+00	270 S	1,911.0	LW-50	18.2	98.8	
1537	62+00	270 S	1,915.5	LW-48	22.1	98.4	
1538	64+70	270 S	1,922.0	LW-48	22.0	98.3	
1544	59+00	0	1,914.0	LW-47	18.7	99.4	
1545	62+00	0	1,917.0	LW-47	18.2	98.6	
1546	63+50	0	1,918.5	LW-49	19.7	97.6	
1547	68+00	0	1,925.0	LW-43	16.3	97.7	
1548	70+00	0	1,940.5	LW-50	22.6	98.4	
1549	75+00	0	1,943.0	LW-49	22.1	98.0	
1550	56+50	300 S	1,910.5	LW-43	15.4	96.5	
1551	58+70	280 S	1,916.0	LW-45	19.1	98.7	
1552	60+50	270 S	1,918.0	LW-45	14.3	96.7	
1553	62+70	250 S	1,919.0	LW-50	16.9	98.0	
1554	77+00	80 N	1,954.0	LW-47	23.5	96.3	
1555	72+00	80 N	1,944.5	LW-47	21.3	95.1	
1556	69+00	100 N	1,941.0	LW-47	14.9	99.8	
1557	67+30	110 N	1,933.0	LW-47	20.5	98.8	
1558	64+00	160 N	1,921.0	LW-45	18.1	100.1	
1559	61+00	260 N	1,919.5	LW-47	19.8	97.3	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1560	58+50	280 N	1,918.0	LW-45	19.6	99.0	
1561	57+50	70 S	1,917.5	LW-47	17.2	100.0	
1562	61+00	70 S	1,916.5	LW-43	14.4	99.3	
1563	62+40	90 S	1,919.5	LW-45	16.1	99.0	
1564	64+00	90 S	1,921.0	LW-45	16.7	98.8	
1570	70+00	50 S	1,945.0	LW-49	21.8	97.8	
1571	73+00	100 S	1,947.0	LW-47	15.3	99.0	
1572	76+00	100 S	1,952.0	LW-49	21.2	99.3	
1573	65+00	200 S	1,924.0	LW-45	18.9	98.9	
1574	63+00	250 S	1,922.0	LW-40	19.4	99.3	
1575	60+00	270 S	1,919.0	LW-46	18.4	98.6	
1576	59+00	280 S	1,918.5	LW-46	18.3	99.7	
1577	56+70	250 S	1,915.5	LW-49	21.0	98.2	
1578	N 83,195, E 99,569(e)		1,932.0	LW-45	11.6	98.4	1579
1579	N 83,195, E 99,569(e)		1,932.0	LW-45	18.3	98.4	
1580	N 83,210, E 99,590(e)		1,933.0	LW-45	16.7	95.3	
1581	N 83,190, E 99,570(e)		1,933.0	LW-45	16.1	96.8	
1582	15+00	40 E	1,977.0	LW-54	19.1	104.5	
1583	16+70	30 W	1,972.0	LW-54	18.8	105.8	
1584	75+50	20 W	1,980.5	LW-54	16.4	107.6	
1585	80+00	20 E	1,980.5	LW-54	24.2	97.1	
1586-S	49+80	30 E	1,971.5	LW-54	18.8	101.7	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1587-S	48+80	40 E	1,968.5	LW-54	19.2	99.1	
1588-S	46+60	30 E	1,969.5	LW-54	19.6	104.8	
1589-S	45+10	25 E	1,967.5	LW-54	19.9	102.5	
1590-S	44+40	20 E	1,970.5	LW-54	22.9	100.8	
1591	66+75	75 N	1,929.5	LW-48	21.6	94.9	1620
1592	68+60	100 N	1,940.0	LW-50	15.6	98.0	
1593	71+00	0	1,945.0	LW-50	20.9	99.3	
1594	74+00	50 S	1,948.5	LW-50	20.2	96.4	
1595	77+00	100 N	1,954.0	LW-48	20.1	96.5	
1596	78+50	75 S	1,958.0	LW-49	19.6	97.5	
1597	64+50	220 N	1,924.0	LW-50	18.8	97.2	
1598	59+50	275 N	1,918.0	LW-49	16.6	99.2	
1599	57+00	220 N	1,908.0	LW-49	16.7	99.7	
1600	56+75	235 N	1,908.0	LW-48	18.5	96.4	
1601	57+75	100 S	1,915.5	LW-45	15.1	99.7	
1602	59+50	100 S	1,918.0	LW-45	16.7	98.6	
1603	62+50	150 S	1,919.5	LW-45	15.3	98.3	
1604	64+75	125 S	1,923.5	LW-49	19.2	97.2	
1605	54+75	325 N	1,905.0	LW-45	14.6	100.2	
1606	53+50	300 N	1,904.0	LW-48	18.8	98.8	
1607	54+75	275 N	1,912.0	LW-49	16.6	97.7	
1608	53+30	280 N	1,910.0	LW-45	18.4	97.0	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1609	61+00	250 S	1,917.5	LW-47	13.3	96.8	
1610	63+00	225 S	1,920.5	LW-49	18.5	97.8	
1611	63+50	225 S	1,920.5	LW-50	13.1	97.1	1675
1612	57+50	200 S	1,915.5	LW-50	19.3	98.2	
1613	59+50	175 S	1,918.0	LW-49	18.2	99.9	
1614	70+90	20 S	1,935.5	LW-34	21.6	96.4	
1620	66+75	75 N	1,929.5	LW-48	19.3	107.3	
1621	59+00	250 N	1,924.5	LW-45	16.1	95.5	
1622	58+30	220 N	1,918.5	LW-50	19.3	98.6	
1623	58+50	80 N	1,920.0	LW-45	17.3	100.4	
1624	60+50	50 N	1,922.0	LW-48	19.7	100.2	
1625	64+00	0	1,927.0	LW-45	16.8	96.4	
1626	66+50	30 N	1,933.5	LW-49	19.7	99.7	
1627	70+00	0	1,941.5	LW-43	18.0	98.0	
1628	72+00	40 S	1,945.0	LW-49	21.1	99.3	
1629	73+00	50 S	1,947.0	LW-43	15.0	101.2	
1630	75+00	0	1,949.5	LW-49	19.5	97.8	
1631	78+50	80 S	1,961.0	LW-43	14.7	97.9	
1632	73+00	100 S	1,947.0	LW-45	16.8	97.6	
1633	68+00	80 S	1,934.0	LW-47	19.2	87.9	
1634	68+00	80 S	1,934.0	LW-47	18.0	94.1	1676
1635	69+00	100 S	1,935.5	LW-47	21.3	97.2	
1641	60+00	150 N	1,919.5	LW-45	17.6	98.5	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1642	61+00	90 S	1,921.0	LW-50	17.2	98.1	
1643	62+75	75 N	1,925.0	LW-48	21.6	101.5	
1644	61+50	225 S	1,922.5	LW-50	18.8	102.0	
1645	62+00	220 S	1,923.5	LW-45	17.8	99.8	
1646-S	60+50	250 S	1,920.5	LW-50	20.4	101.3	
1647-S	59+00	270 S	1,920.0	LW-48	19.0	99.8	
1648-S	58+70	190 S	1,920.0	LW-47	16.7	98.8	
1649-S	56+00	240 S	1,913.5	LW-46	17.8	99.7	
1650	55+70	240 S	1,912.0	LW-45	16.7	98.6	
1651	55+00	100 N	1,920.0	LW-45	13.7	97.4	1671
1652	59+00	150 N	1,918.0	LW-46	22.2	99.4	
1653-S	63+00	250 N	1,922.0	LW-47	15.7	100.3	
1654-S	61+80	260 N	1,923.0	LW-43	13.3	100.3	
1655-S	59+00	200 N	1,918.0	LW-49	16.0	98.5	
1656-S	57+00	50 S	1,916.5	LW-50	29.7	91.7	1672
1657	57+00	55 S	1,916.5	LW-50	25.3	95.4	
1658	56+00	50 S	1,915.5	LW-50	25.6	95.9	
1659	59+00	50 S	1,917.5	LW-50	21.9	100.4	
1660	61+00	60 S	1,921.0	LW-50	21.4	101.2	
1661	62+00	40 N	1,923.5	LW-45	17.6	98.5	
1662	62+50	100 N	1,924.5	LW-45	18.5	98.5	
1663	54+50	100 S	1,910.0	LW-45	18.1	98.0	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1664	55+50	80 S	1,911.0	LW-50	20.4	100.4	
1671-S	55+00	100 N	1,920.0	LW-49	19.8	101.6	
1672-S	57+00	50 S	1,916.5	LW-49	18.6	97.8	
1673-S	57+00	55 S	1,916.5	LW-49	25.8	92.3	1677
1674-S	56+00	50 S	1,915.5	LW-49	14.9	97.7	
1675	63+50	225 S	1,920.5	LW-50	20.6	99.4	
1676	68+00	80 S	1,934.0	LW-47	21.1	98.1	
1677	57+00	55 S	1,916.5	LW-49	18.0	100.3	
1678-S	66+00	60 S	1,930.5	LW-45	21.5	96.4	
1679-S	67+00	60 S	1,932.0	LW-45	21.2	96.6	1681
1680-S	69+50	60 S	1,936.0	LW-50	22.3	101.0	
1681	67+00	50 S	1,932.0	LW-45	19.9	99.5	
1682	67+00	55 S	1,932.0	LW-45	19.8	98.5	
1683	63+50	100 N	1,923.5	LW-50	22.1	100.8	
1684	61+50	80 N	1,923.0	LW-43	15.1	98.9	
1685	59+50	80 N	1,917.0	LW-45	17.3	97.7	
1686	57+00	90 N	1,917.5	LW-45	17.8	98.1	
1687	54+00	100 N	1,911.0	LW-47	15.9	96.4	
1688	53+50	100 N	1,910.0	LW-43	15.1	97.3	
1689	54+00	180 S	1,910.5	LW-45	18.6	100.5	
1690	55+00	160 S	1,911.5	LW-45	18.1	100.9	
1691	58+00	190 S	1,919.0	LW-45	19.0	99.2	

TABLE 2.5-62 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1692	60+00	280 S	1,920.5	LW-47	15.8	97.9	
1696	62+75	80 N	1,926.5	LW-49	20.2	99.0	
1697	61+00	60 N	1,923.0	LW-49	21.0	99.4	
1698	60+00	150 N	1,920.5	LW-47	18.6	99.8	
1699	59+00	200 N	1,919.0	LW-49	19.4	98.8	
1700	57+00	50 N	1,918.0	LW-47	18.1	99.8	
1701	55+50	100 N	1,921.5	LW-49	20.6	97.8	
1702	54+50	100 N	1,921.5	LW-45	20.9	99.5	
1703	63+00	200 N	1,923.0	LW-47	19.5	99.8	
1704	62+00	40 N	1,924.5	LW-47	18.0	99.5	
1705	59+00	50 N	1,919.0	LW-47	19.2	98.9	
1706	56+00	250 S	1,916.5	LW-45	21.6	97.3	
1707	59+00	280 S	1,919.0	LW-45	19.5	98.4	
1708	62+60	230 N	1,923.0	LW-47	14.7	96.6	
1709	58+85	200 N	1,918.0	LW-47	16.6	97.0	
1710	60+85	185 N	1,923.0	LW-46	19.3	95.5	
1711	54+10	135 N	1,916.0	LW-44	23.4	100.8	
1712	57+30	60 N	1,920.0	LW-47	17.7	97.3	
1713	60+25	200 S	1,921.0	LW-46	15.6	95.8	
1714	58+40	270 S	1,920.5	LW-41	14.6	96.5	
1715	56+30	240 S	1,920.0	LW-46	19.0	95.7	
1719	59+00	280 N	1,925.5	LW-45	14.4	97.6	

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1720	54+00	290 N	1,915.0	LW-44	20.9	96.7	
1721	55+00	220 N	1,916.0	LW-49	16.8	95.9	
1722	59+10	190 N	1,922.0	LW-49	18.1	97.3	
1723	60+70	190 N	1,920.5	LW-50	17.5	97.3	
1724	63+00	290 N	1,920.0	LW-44	20.2	98.5	
1725	54+00	270 S	1,919.0	LW-44	20.5	97.5	
1726	63+50	80 S	1,927.0	LW-47	18.3	95.5	
1727	67+00	30 S	1,933.5	LW-44	23.1	94.7	1728
1728	67+00	30 S	1,933.5	LW-44	20.0	97.9	
1729	71+00	20 S	1,942.0	LW-44	20.5	95.4	
1730	75+00	40 S	1,948.0	LW-44	20.0	97.2	
1731	60+00	50 S	1,920.0	LW-44	20.3	98.6	
1732	57+50	50 S	1,920.0	LW-38	13.9	98.4	
1737	73+00	0	1,945.0	LW-49	19.5	99.9	
1738	68+00	25 N	1,934.0	LW-50	22.6	99.4	
1739	61+00	175 N	1,921.0	LW-47	17.0	100.0	
1740	54+00	100 N	1,915.0	LW-50	23.5	96.3	
1741	75+00	25 N	1,948.5	LW-48	23.2	97.0	
1742	73+25	25 S	1,945.0	LW-48	25.4	98.4	
1743	71+50	75 S	1,943.0	LW-50	22.3	99.2	
1744	70+00	100 S	1,941.0	LW-50	24.8	98.5	
1745	69+50	50 N	1,936.5	LW-48	23.4	100.4	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1746	68+00	0	1,934.5	LW-49	21.6	99.7	
1747	65+00	50 S	1,929.0	LW-50	22.6	100.2	
1748	63+00	100 S	1,921.0	LW-45	15.8	99.5	
1749	61+00	100 N	1,921.5	LW-50	22.0	100.7	
1750	60+00	100 S	1,920.5	LW-48	22.9	99.6	
1751	58+00	0	1,921.0	LW-49	21.4	98.3	
1752	59+00	125 S	1,919.5	LW-45	18.1	98.8	
1753	61+00	125 S	1,921.5	LW-47	17.0	100.0	
1754	58+75	100 N	1,922.0	LW-47	19.4	99.5	
1755	56+25	100 S	1,919.0	LW-50	20.9	100.4	
1756	54+50	150 N	1,920.0	LW-50	22.7	98.9	
1757	53+50	100 S	1,915.0	LW-49	20.4	98.8	
1763-S	59+00	175 S	1,926.0	LW-49	17.8	99.0	
1764-S	56+00	200 S	1,922.0	LW-40	22.8	99.8	
1765-S	53+50	275 S	1,923.0	LW-45	17.1	98.9	
1766	55+00	100 S	1,924.5	LW-48	21.8	96.5	
1767	62+00	100 S	1,927.0	LW-40	21.7	100.8	
1768	66+00	125 S	1,935.0	LW-49	17.8	98.1	
1769	70+00	120 S	1,939.0	LW-49	16.7	98.3	
1770	75+00	100 S	1,951.5	LW-49	18.5	98.8	
1771	77+00	120 S	1,965.0	LW-49	18.0	97.6	
1772	62+25	150 N	1,926.0	LW-49	17.2	98.7	

TABLE 2.5-62 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1773	63+00	150 N	1,926.5	LW-49	17.6	99.9	
1774	68+00	125 N	1,940.0	LW-45	18.1	100.9	
1775	69+50	125 N	1,942.5	LW-45	19.6	99.2	
1776	74+00	125 N	1,953.0	LW-45	16.9	101.0	
1777	75+25	125 N	1,954.5	LW-45	16.5	99.5	
1778	76+50	100 N	1,956.5	LW-45	18.2	99.8	
1782-S	57+00	250 S	1,929.5	LW-50	24.0	100.2	
1783-S	55+00	275 S	1,927.0	LW-50	22.4	101.2	
1784-S	53+75	215 S	1,925.5	LW-50	22.6	100.2	
1785-S	64+55	25 S	1,935.0	LW-48	17.7	99.4	
1786-S	66+50	35 S	1,937.0	LW-49	15.7	99.9	
1787-S	69+00	50 S	1,939.0	LW-40	18.7	93.6	1788
1788	69+00	50 S	1,939.0	LW-40	21.3	101.1	
1789	69+00	52 S	1,939.0	LW-40	21.8	100.7	
1790	65+00	75 S	1,936.0	LW-40	21.2	98.4	
1791	63+00	0	1,933.5	LW-40	22.6	98.9	
1792-S	60+50	75 N	1,931.5	LW-48	22.8	98.9	
1793-S	58+75	50 N	1,930.5	LW-48	19.1	99.2	
1794-S	56+00	0	1,928.0	LW-48	22.5	99.9	
1798-S	59+50	250 N	1,925.0	LW-43	14.7	99.8	
1799-S	61+50	250 N	1,928.0	LW-50	18.6	99.5	
1800-S	57+00	280 N	1,920.0	LW-50	20.3	99.7	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1801	59+00	100 S	1,935.0	LW-49	21.3	98.0	
1802	61+00	100 S	1,938.0	LW-50	20.6	99.4	
1803	61+00	0	1,938.0	LW-49	19.6	99.4	
1804	63+00	100 S	1,941.0	LW-49	19.6	99.4	
1805	64+50	50 S	1,942.5	LW-49	20.7	97.4	
1806	66+50	0	1,945.0	LW-49	20.2	96.6	
1807	68+75	65 S	1,948.0	LW-48	20.0	99.6	
1808	70+50	75 S	1,950.0	LW-48	22.0	98.3	
1809	71+25	75 S	1,951.0	LW-49	17.3	97.4	
1810	73+00	75 S	1,952.5	LW-48	20.4	100.1	
1811	74+00	0	1,953.5	LW-49	20.1	99.4	
1812	75+00	25 S	1,954.5	LW-50	22.7	98.9	
1813	76+00	50 S	1,956.0	LW-47	21.3	99.5	
1814	77+00	75 S	1,957.0	LW-49	20.2	99.7	
1815	78+00	0	1,958.0	LW-49	19.0	99.2	
1821-S	71+25	80 N	1,948.0	LW-50	22.2	89.2	1823
1822-S	71+50	80 N	1,948.0	LW-50	18.1	97.2	1823
1823-S	71+60	60 N	1,948.0	LW-50	19.8	97.1	
1824-S	78+00	85 S	1,949.0	LW-50	19.5	95.3	
1825	61+75	0	1,929.0	LW-49	13.6	95.0	1833
1826	62+00	0	1,929.0	LW-49	14.1	94.0	1835
1827	65+00	50 S	1,934.0	LW-44	17.1	94.9	1828

TABLE 2.5-62 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1828	65+00	50 S	1,934.0	LW-44	19.1	97.2	
1829	65+10	55 S	1,934.0	LW-44	18.7	97.3	
1830	65+05	45 S	1,934.0	LW-44	19.0	96.6	
1831	65+10	45 S	1,934.0	LW-44	18.7	97.9	
1832	65+00	55 S	1,934.0	LW-44	20.2	96.2	
1833	61+75	0	1,929.0	LW-49	18.3	96.6	
1834	61+75	0	1,929.0	LW-49	19.7	95.2	
1835	62+00	50 S	1,929.0	LW-49	16.3	96.3	
1836	62+00	50 S	1,929.0	LW-49	19.6	95.7	
1837-S	75+00	50 S	1,947.0	LW-50	21.2	98.0	
1838-S	76+00	75 S	1,948.0	LW-50	19.2	97.6	
1849	55+00	40 S	1,923.0	LW-47	16.4	100.2	
1850	59+00	50 S	1,931.5	LW-50	17.0	95.7	
1851	61+25	35 S	1,933.0	LW-50	19.5	99.6	
1852	65+00	50 S	1,936.0	LW-47	15.9	95.5	
1853	69+00	60 S	1,944.0	LW-49	17.3	99.0	
1854	72+50	75 S	1,947.0	LW-50	17.7	95.2	
1855	59+00	125 N	1,931.5	LW-50	17.3	96.7	
1856	62+00	100 N	1,933.5	LW-50	19.7	96.7	
1857	65+00	100 N	1,936.0	LW-50	16.5	97.3	
1858	68+00	100 N	1,944.0	LW-45	15.8	99.5	
1859	72+00	110 N	1,951.0	LW-49	19.5	96.0	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1860	75+00	100 N	1,955.0	LW-45	18.2	95.8	
1869	55+00	120 S	1,923.5	LW-50	21.9	98.0	
1870	58+00	100 S	1,930.0	LW-49	19.5	98.3	
1871	62+00	100 S	1,935.5	LW-50	21.2	97.8	
1872	63+50	55 S	1,935.0	LW-50	21.3	98.0	
1873	65+00	125 S	1,936.5	LW-49	21.9	95.5	
1874	67+00	70 S	1,938.5	LW-50	21.7	98.2	
1875	69+00	75 S	1,944.5	LW-50	19.6	99.2	
1876	71+00	25 S	1,946.0	LW-49	19.1	96.9	
1877	74+75	100 N	1,955.5	LW-49	20.7	97.5	
1878	62+50	100 N	1,933.5	LW-49	19.8	96.1	
1879	65+50	80 N	1,937.5	LW-49	20.0	96.4	
1880	58+50	100 N	1,931.0	LW-49	19.2	97.8	
1892	54+00	0	1,922.0	LW-42	18.2	97.5	
1893	57+00	75 S	1,930.0	LW-40	21.5	99.1	
1894	59+00	100 S	1,931.5	LW-42	17.7	97.9	
1895	61+00	120 S	1,932.5	LW-22	16.4	97.3	
1896	64+00	100 S	1,935.5	LW-50	20.6	97.2	
1897	67+00	0	1,939.0	LW-44	21.2	96.6	
1898	69+00	50 S	1,945.0	LW-42	17.9	97.1	
1899	71+00	100 S	1,947.0	LW-44	21.8	99.5	
1900	57+00	100 S	1,928.0	LW-44	21.3	99.4	

TABLE 2.5-62 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1901	62+50	100 N	1,934.0	LW-44	20.3	99.8	
1902	65+50	100 N	1,938.0	LW-42	16.2	96.8	
1903	71+00	25 N	1,947.0	LW-43	17.2	95.8	
1912	55+00	100 N	1,910.0	LW-50	18.5	97.7	
1913	57+00	25 N	1,920.0	LW-49	19.6	98.8	
1914	58+50	0	1,931.0	LW-49	17.8	99.7	
1915	60+75	25 S	1,932.0	LW-47	17.5	99.5	
1916	62+50	75 S	1,932.0	LW-49	18.3	99.3	
1917	65+00	75 N	1,937.5	LW-49	18.9	98.8	
1918	67+50	100 N	1,943.0	LW-48	21.9	99.8	
1919	69+00	50 N	1,948.0	LW-50	20.8	95.3	
1920	59+75	100 S	1,929.0	LW-45	16.0	97.1	
1921	62+00	100 S	1,932.0	LW-45	16.9	96.4	
1922	65+00	100 S	1,937.0	LW-40	22.8	100.7	
1923	68+00	75 S	1,942.0	LW-50	22.7	100.0	
1924	70+00	0	1,952.0	LW-39	25.0	95.5	
1925	72+00	100 N	1,955.0	LW-39	25.9	95.9	
1926	73+00	0	1,956.0	LW-39	25.8	97.6	
1927	75+00	100 S	1,959.0	LW-39	23.8	99.9	
1928	76+00	50 S	1,963.0	LW-39	24.0	98.5	
1929	77+00	50 S	1,968.0	LW-39	23.0	98.7	
1930	78+00	0	1,973.0	LW-39	24.1	98.0	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1931	79+00	100 N	1,977.0	LW-39	26.8	95.5	1932
1932	79+00	90 N	1,977.0	LW-39	21.6	100.3	
1933	79+00	95 N	1,977.0	LW-39	24.3	97.8	
1934	76+50	50 N	1,964.0	LW-39	23.1	97.8	
1935	71+50	0	1,955.0	LW-48	24.2	99.6	
1936	69+00	0	1,946.0	LW-50	19.8	100.9	
1949	69+00	25 S	1,946.5	LW-48	23.4	96.2	
1950	71+50	50 S	1,954.5	LW-48	22.1	99.9	
1951	73+75	25 N	1,957.0	LW-39	22.5	98.3	
1952	74+25	25 S	1,958.0	LW-48	19.1	98.6	
1953	75+75	50 S	1,963.5	LW-48	19.8	97.9	
1954	77+00	50 N	1,969.5	LW-45	18.7	98.3	
1955	78+00	0	1,974.0	LW-45	17.9	98.7	
1956	79+00	40 N	1,978.0	LW-45	17.4	100.5	
1957	56+00	75 S	1,915.0	LW-39	18.3	96.8	
1958	57+00	50 S	1,920.5	LW-49	19.3	99.3	
1959	57+50	75 S	1,923.0	LW-49	18.8	99.8	
1960	59+50	0	1,932.0	LW-50	19.9	100.1	
1961	61+50	75 N	1,932.5	LW-48	19.8	97.6	
1962	64+00	75 S	1,936.0	LW-50	17.7	95.3	
1963	66+00	0	1,939.0	LW-50	18.1	96.8	
1964	68+00	50 S	1,943.0	LW-48	22.0	96.3	

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1974	69+25	40 N	1,952.0	LW-45	18.0	98.0	
1975	72+50	20 N	1,955.5	LW-45	14.9	95.4	
1976	75+60	15 S	1,964.5	LW-45	18.4	99.1	
1977	78+50	20 S	1,972.5	LW-43	15.9	99.1	
1978	58+50	50 N	1,929.0	LW-45	18.8	98.2	
1979	61+00	25 N	1,933.0	LW-45	17.1	98.3	
1980	63+50	75 N	1,937.5	LW-49	17.0	99.3	
1981	66+25	50 N	1,942.0	LW-43	15.4	99.6	
1982	64+50	0	1,939.0	LW-49	19.8	98.6	
1983	62+00	20 S	1,934.0	LW-49	17.9	100.1	
1984	57+50	20 N	1,929.0	LW-49	19.7	99.4	
1985	54+50	60 N	1,923.0	LW-49	19.2	99.2	
1986	56+50	50 S	1,924.0	LW-47	16.2	99.3	
1987	59+75	60 S	1,931.5	LW-47	17.9	99.9	
1988	72+00	60 S	1,955.0	LW-45	19.4	98.2	
1989	73+50	0	1,957.5	LW-41	15.8	98.6	
1990	75+50	50 S	1,965.5	LW-45	16.1	97.3	
1991	78+25	0	1,975.0	LW-45	18.5	99.3	
2001	58+40	50 S	1,930.0	LW-42	16.3	96.9	
2002	60+00	25 S	1,931.5	LW-41	13.6	96.8	
2003	63+00	0	1,936.5	LW-40	17.2	96.3	
2004	66+00	10 S	1,942.0	LW-48	18.4	95.6	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2005	59+00	75 N	1,930.5	LW-40	18.8	99.1	
2006	62+00	100 N	1,934.5	LW-40	21.0	97.6	
2007	65+20	110 N	1,941.0	LW-40	22.7	96.0	
2008	68+00	115 N	1,948.0	LW-41	16.8	96.1	
2009	70+70	30 S	1,955.5	LW-32	12.9	100.5	
2010	74+90	25 S	1,964.0	LW-29	19.1	99.2	
2011	77+00	90 N	1,968.0	LW-32	15.1	99.0	
2012	73+00	100 N	1,957.0	LW-32	15.9	98.7	
2013	60+00	60 S	1,932.0	LW-42	17.9	98.1	
2014	64+20	0	1,939.0	LW-48	20.5	96.3	
2015	67+00	25 S	1,943.5	LW-48	20.5	95.7	
2026	56+00	0	1,923.5	LW-43	16.0	98.1	
2027	59+00	100 S	1,931.0	LW-43	16.1	98.2	
2028	62+00	75 S	1,934.5	LW-47	18.0	100.1	
2029	66+00	50 S	1,943.0	LW-43	16.3	97.3	
2030	69+00	25 S	1,952.5	LW-50	20.8	100.2	
2031	71+00	0	1,954.0	LW-47	19.6	99.4	
2032	74+00	25 S	1,959.5	LW-47	19.4	99.9	
2033	76+50	50 S	1,967.0	LW-49	19.9	99.3	
2034	78+25	50 S	1,976.5	LW-45	16.4	98.5	
2035	54+50	75 N	1,923.5	LW-49	19.7	98.0	

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2036-S	57+00	75 N	1,927.5	LW-48	19.9	96.7	
2037-S	57+00	60 N	1,927.5	LW-47	17.6	99.6	
2038-S	63+25	75 N	1,938.0	LW-49	19.9	98.2	
2039-S	67+00	75 N	1,943.5	LW-49	20.2	101.5	
2040	69+75	60 N	1,953.5	LW-45	19.8	99.1	
2041	71+50	70 N	1,956.5	LW-49	17.5	99.1	
2042	74+00	75 N	1,959.5	LW-49	18.4	98.7	
2043	77+50	25 N	1,970.5	LW-45	17.1	99.1	
2044	78+50	50 N	1,977.5	LW-45	17.7	98.5	
2045	77+60	50 S	1,971.5	LW-45	17.5	98.5	
2060-S	57+00	75 S	1,928.0	LW-44	18.0	97.9	
2061-S	61+50	75 S	1,934.0	LW-45	18.3	98.5	
2062-S	65+00	75 S	1,940.5	LW-45	17.8	96.3	
2063-S	70+50	0	1,955.0	LW-45	19.4	95.5	
2064	72+00	0	1,958.0	LW-50	18.8	96.8	
2065	74+50	15 N	1,961.0	LW-44	16.8	96.8	
2066	76+00	20 N	1,966.0	LW-45	18.3	98.7	
2067	78+00	20 N	1,974.0	LW-45	18.1	99.6	
2068	55+00	60 N	1,922.5	LW-49	18.9	97.6	
2069	57+10	40 N	1,928.5	LW-49	18.6	97.8	
2070	59+50	50 N	1,932.0	LW-49	18.7	98.6	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2071	61+80	20 N	1,934.5	LW-49	18.5	98.6	
2072	64+25	40 S	1,940.0	LW-48	19.1	96.0	
2073	66+50	25 S	1,943.0	LW-47	19.9	97.4	
2074	68+90	70 S	1,949.0	LW-47	19.4	98.0	
2075	71+75	50 S	1,958.0	LW-48	19.2	99.9	
2076	74+25	20 N	1,960.5	LW-33	19.1	95.7	
2077	76+00	25 N	1,965.0	LW-33	19.7	98.4	
2078	54+00	50 N	1,921.5	LW-33	20.4	97.9	
2079	56+50	50 N	1,921.5	LW-49	16.9	97.0	
2080	59+00	80 N	1,931.5	LW-49	16.0	98.6	
2081	62+50	75 N	1,938.0	LW-49	16.4	97.8	
2082	65+50	60 N	1,943.0	LW-45	17.8	99.0	
2083	69+00	0	1,954.0	LW-45	17.8	99.9	
2084	72+25	30 N	1,958.5	LW-49	19.6	97.8	
2087	50+00	75 N	1,929.5	LW-40	18.4	97.8	
2088	49+85	75 S	1,928.0	LW-44	19.3	98.5	
2089	49+25	50 N	1,936.0	LW-44	17.7	95.6	
2090	53+50	0	1,920.0	LW-49	18.7	97.2	
2091	56+75	100 N	1,928.5	LW-50	20.9	97.8	
2092	58+25	50 N	1,930.5	LW-50	20.0	98.7	
2093	60+50	25 N	1,933.0	LW-50	19.0	99.0	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2094	62+40	50 N	1,938.5	LW-49	15.1	96.9	
2095-S	68+50	70 N	1,953.5	LW-49	17.7	98.1	
2096-S	64+75	75 N	1,941.0	LW-48	18.5	98.7	
2097-S	72+25	60 N	1,959.5	LW-50	18.9	99.1	
2098	74+75	20 N	1,961.5	LW-49	16.1	97.7	
2099	78+00	20 S	1,975.0	LW-49	15.7	98.2	
2100	49+50	50 N	1,930.0	LW-44	24.0	99.6	
2101	51+00	0	1,921.0	LW-49	17.1	96.4	
2110-S	57+00	60 S	1,929.0	LW-50	18.3	97.0	
2111-S	69+00	25 N	1,954.5	LW-47	22.3	99.9	
2112-S	67+00	50 N	1,950.0	LW-49	19.5	97.9	
2113	54+00	40 S	1,921.0	LW-50	22.1	98.6	
2114	61+50	60 S	1,935.0	LW-50	21.9	99.5	
2115	65+00	0	1,941.5	LW-49	16.4	99.9	
2116	56+50	50 S	1,929.0	LW-44	22.1	99.7	
2117	54+75	60 S	1,925.0	LW-46	16.8	96.9	
2118	63+50	0	1,940.0	LW-46	16.5	97.1	
2119	58+75	40 N	1,931.5	LW-45	15.8	98.6	
2120	60+00	40 S	1,932.5	LW-48	22.4	99.4	
2121	59+25	40 N	1,932.0	LW-49	16.5	97.7	
2122	65+75	50 N	1,942.5	LW-49	18.4	98.9	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2131-S	58+00	50 N	1,931.0	LW-48	19.2	99.2	
2132-S	65+00	25 N	1,942.0	LW-49	15.9	96.4	
2133-S	69+00	75 N	1,955.5	LW-49	16.9	97.5	
2134	61+50	40 S	1,935.5	LW-49	17.6	98.6	
2135	67+00	20 S	1,951.0	LW-33	19.0	97.7	
2136	59+00	50 N	1,932.5	LW-45	18.5	99.5	
2137	61+50	0	1,935.5	LW-45	17.1	96.4	
2138	63+15	50 S	1,939.5	LW-49	17.6	98.1	
2139	65+50	50 N	1,943.0	LW-50	19.8	95.2	
2140	49+75	0	1,928.5	LW-48	21.1	95.8	
2141	50+75	220 S	1,923.0	LW-49	17.8	99.2	
2149	59+00	60 S	1,941.0	LW-45	17.9	98.1	
2150	62+15	20 N	1,946.0	LW-45	17.7	98.0	
2151	63+25	30 S	1,949.5	LW-48	17.9	96.7	
2152	65+50	0	1,953.5	LW-47	14.0	95.6	
2153	65+75	20 S	1,954.0	LW-48	20.5	97.5	
2154	68+25	60 N	1,960.0	LW-49	19.1	98.3	
2155	57+50	50 N	1,937.5	LW-48	21.4	96.9	
2156	60+50	40 N	1,942.0	LW-48	21.8	96.2	
2157	62+50	20 S	1,947.5	LW-49	16.4	96.8	
2158	65+00	40 N	1,952.5	LW-49	15.4	97.7	

TABLE 2.5-62 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2159	66+50	60 S	1,957.0	LW-49	20.1	97.7	
2160	68+50	40 N	1,961.0	LW-45	18.9	96.0	
2168	56+40	20 S	1,942.0	LW-66	21.0	99.8	
2169	60+70	10 S	1,955.0	LW-48	17.7	100.6	
2178	68+80	45 N	1,966.5	LW-63	19.7	96.7	
2179	62+95	70 N	1,959.0	LW-62	18.9	101.8	
2180	73+55	130 N	1,972.5	LW-63	19.4	98.5	
2181-S	61+35	190 N	1,957.5	LW-65	20.0	95.0	
2182	60+90	5 N	1,960.5	LW-63	20.9	100.0	
2183	63+80	30 N	1,960.5	LW-63	18.6	100.0	
2184	72+90	10 S	1,969.5	LW-63	20.5	98.3	
2185	78+04	100 N	1,979.0	LW-60	16.3	99.0	
2186	73+20	85 N	1,972.0	LW-45	15.0	97.7	
2187	57+60	90 N	1,949.5	LW-61	20.1	101.1	
2188	59+90	0	1,955.5	LW-45	16.5	97.3	
2189	65+85	10 S	1,962.5	LW-45	17.8	95.4	
2190	72+35	10 N	1,969.5	LW-63	15.8	97.2	
2191	75+50	60 N	1,976.5	LW-41	18.5	95.7	
2192	71+25	45 N	1,970.0	LW-66	17.9	97.0	
2193-S	65+18	96 N	1,959.0	LW-63	17.3	96.7	
2194	61+65	20 N	1,960.0	LW-40	17.4	95.9	

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2195	67+15	5 N	1,966.5	LW-48	20.5	97.7	
2196	76+25	65 N	1,977.5	LW-42	21.1	97.0	
2197	72+10	60 N	1,971.5	LW-40	18.4	95.9	
2198	49+05	195 S	1,934.5	LW-42	13.9	97.2	
2199	63+30	10 N	1,962.0	LW-40	19.9	95.4	
2200	66+95	20 N	1,966.5	LW-40	21.3	97.6	
2218	62+40	100 N	1,962.0	LW-45	17.7	99.4	
2219-S	70+05	75 N	1,969.0	LW-43	16.9	96.0	
2220	50+90	70 S	1,925.5	LW-48	23.1	98.9	
2221	60+15	55 N	1,958.0	LW-48	19.1	98.9	
2222	67+45	0	1,966.0	LW-44	21.1	96.7	
2223	72+00	10 N	1,972.0	LW-40	21.1	96.6	
2224	68+95	90 N	1,968.5	LW-40	19.6	101.2	
2225	64+75	100 N	1,966.0	LW-40	21.1	100.1	
2226	50+07	18 N	1,932.0	LW-39	20.5	98.6	
2227	61+50	60 N	1,961.5	LW-39	17.5	98.4	
2228	51+15	210 S	1,924.0	LW-48	24.2	91.6	2229
2229	51+15	210 S	1,924.0	LW-48	22.5	95.1	
2230	50+30	210 S	1,929.0	LW-46	16.8	95.4	
2231	77+00	30 N	1,977.0	LW-50	15.7	95.0	
2232	70+00	25 N	1,972.0	LW-63	23.6	102.3	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2233	61+15	60 N	1,965.0	LW-48	22.5	99.3	
2340	I 16+00	2 W	1,996.5	LW-53	25.9	97.4	
2341	I 11+25	8 W	1,994.0	LW-53	26.9	97.1	
2342	I 7+80	4 E	1,996.0	LW-53	26.7	97.5	
2343	I 2+12	0	1,997.0	LW-75	20.3	99.9	
2344	I 16+00	5 N	1,997.0	LW-70	18.7	97.7	
2345	I 13+00	10 S	1,994.5	LW-70	21.7	95.3	
2346	I 8+00	0	1,997.0	LW-71	18.3	98.3	
2347	I 4+50	0	1,995.0	LW-76	18.9	95.9	
2372	I 15+58	8 E	1,998.0	LW-76	20.0	100.5	
2373	I 12+85	5 W	1,995.5	LW-69	18.2	97.6	
2374	I 7+12	0	1,999.0	LW-69	17.7	100.9	
2375	I 3+80	0	1,999.0	LW-74	16.1	98.1	
2564	II 1+17	5 E	1,999.5	LW-71	19.8	103.8	
2565	II 10+06	21 E	1,996.0	LW-71	18.3	104.8	
2566	II 13+50	15 W	1,996.0	LW-71	19.7	102.9	
2567	II 3+84	13 W	1,995.5	LW-71	19.3	100.0	
2568	II 9+24	0	1,996.0	LW-71	16.9	101.5	
2569	II 6+65	8 E	1,995.0	LW-71	18.0	99.1	
2574	II 6+72	3 W	1,993.5	LW-69	20.0	97.1	
2575	II 10+10	8 E	1,997.5	LW-69	19.5	96.2	

TABLE 2.5-62 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2576	II 9+80	7 W	1,997.0	LW-69	19.9	95.9	
2577	II 7+00	4 E	1,998.0	LW-64	24.3	102.0	
2578	II 10+62	0	2,000.0	LW-74	15.8	97.1	
2591	II 4+10	14 W	1,994.0	LW-74	15.6	97.5	
2592	II 6+02	36 E	1,993.5	LW-74	19.0	97.5	
2593	II 8+10	27 E	1,993.0	LW-69	16.2	96.7	
2594	II 8+77	32 W	1,992.0	LW-74	19.5	96.6	
2595	II 5+90	10 W	1,991.5	LW-70	18.5	98.2	
2596	II 7+64	0	1,993.5	LW-69	17.1	105.4	
2597	II 0+91	7 E	1,998.0	LW-69	19.7	103.8	
2598	II 9+20	22 W	1,993.5	LW-69	21.8	99.0	
2599	II 12+99	18 E	1,995.5	LW-69	19.6	98.9	

TABLE 2.5-63

RESULTS FROM MOISTURE AND DENSITY TESTS

Location	Depth (feet)	Field or Initial Moisture Content (percent)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
HS-1	1.0	9.0	-	107.8	CL
HS-1	2.5	25.6	27.5	105.3	CL
HS-1	4.5	17.4	-	110.6	SC
HS-2	1.0	14.0	-	97.6	ML
HS-2	2.0	8.5	-	125.8	CL
HS-2	4.0	18.8	20.8	105.6	CL
HS-2	6.0	22.6	-	96.9	CL
HS-2	8.0	23.3	-	99.1	CL
HS-3	1.0	25.0	27.5	91.2	CL
HS-5	2.0	35.4	-	86.4	CH
HS-5	2.5	36.7	-	83.9	
HS-6	9.0	20.3	-	102.6	CL
HS-6	10.0	34.8	-	87.3	CL
HS-6	11.0	15.2	16.1	119.9	CL
HS-7	3.5	21.6	-	101.4	CL

Location	Depth (feet)	Field or Initial Moisture Content (percent)	Saturated Moisture Content (percent)	Dry Density (pcf)	Soil Type
HS-14	4.0	27.2	28.3	90.3	CH
HS-14	6.0	22.6	23.3	99.2	CH
HS-15	1.0	29.7	31.0	90.6	MH-OH
HS-15	4.0	19.0	21.2	104.2	CH
HS-16	4.0	39.2	41.9	82.6	CH
HS-17	2.5	20.4	21.6	105.2	CL
HS-17	4.0	22.4	23.1	104.2	CL
HS-21	1.0	34.3	35.1	83.2	CH
HS-21	2.5	33.0	34.2	87.1	CH
HS-22	3.5	28.1	-	96.3	CH
TP-1	1.0-3.0	18.0	23.1	102.8	CL
TP-2	1.0-4.0	23.3	26.1	97.9	CH
TP-3	1.0-5.0	20.9	34.4	87.3	CH
TP-4/ TP-6	2.0-4.0/ 1.5-4.5	19.3	33.9	87.7	CH
TP-5	2.0-4.0	26.1	40.3	82.0	CH
TP-6	5.0-6.0	24.9	33.9	87.6	CL

TABLE 2.5-64

RESULTS OF CLASSIFICATION TESTS
(ATTERBERG LIMITS AND GRAIN SIZE ANALYSIS)

Location	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	>#4 Sieve (percent)	<#200 Sieve (percent)	<0.005 mm (percent)	Soil Type
HS-2	4.0	46.8	17.7	29.0				CL
HS-6	4.0	57.7	24.9	32.8				CH
HS-6	9.0	38.2	18.4	19.8				CL
HS-7	3.5	44.4	17.9	26.5				CL
HS-14	1.0	57.0	27.5	29.5				CH
HS-15	1.0	50.1	28.1	22.0				MO-O
HS-15	4.0	51.1	20.4	30.7				CH
HS-16	1.0	48.4	23.0	25.4				CL
HS-16	4.0	90.7	32.2	58.5				CH
HS-17	2.5	49.8	19.4	30.4				CL
HS-17	4.5	61.5	23.8	37.7				CL
HS-21	2.5	73.0	31.8	41.2				CH
HS-22	3.5	69.1	25.2	43.9				CH
TP-1	1.0-3.0	41.0	19.0	22.0	0.0	73.9	30.0	CL

Location	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	>#4 Sieve (percent)	<#200 Sieve (percent)	<0.005 mm (percent)	Soil Type
TP-2	1.0-2.0	67.0	28.0	39.0	6.0	66.8	42.5	CH
TP-2	2.0-4.0	66.0	25.0	41.0	4.0	63.3	52.8	CH
TP-3	1.0-3.0	64.0	22.0	42.0	0.0	90.9	50.0	
TP-3	3.0-5.0	62.0	21.0	41.0	2.3	86.4	49.9	CH
TP-4	2.0-4.0	63.0	23.0	40.0	0.0	96.2	50.1	CH
TP-5	2.0-4.0	77.0	26.0	51.0	0.0	97.5	64.3	CH
TP-6	1.5-4.5	69.0	26.0	43.0	0.0	94.4	68.0	CH
TP-6	5.0-6.0	48.0	24.0	24.0	0.0	98.4	70.0	CL

TABLE 2.5-65

EFFECTIVE STRESS PARAMETERS - MODIFIED MOHR DIAGRAM

Test Pit	Depth (Ft.)	σ_1	σ_3	u	$\sigma_1'=\sigma_1-u$	$\sigma_3'=\sigma_3-u$	$\frac{\sigma_1'+\sigma_3'}{2}$	$\frac{\sigma_1'-\sigma_3'}{2}$
TP-1	1'-3'	0.84	0.30	0.22	0.62	0.08	0.350	0.270
"	"	1.17	0.60	0.45	0.72	0.15	0.435	0.285
"	"	1.60	0.90	0.65	0.95	0.25	0.600	0.350
"	"	0.78	0.30	0.20	0.58	0.10	0.340	0.240
"	"	1.62	0.90	0.58	1.04	0.32	0.680	0.360
TP-2	1'-4'	0.88	0.30	0.13	0.75	0.17	0.460	0.290
"	"	1.29	0.60	0.30	0.99	0.30	0.645	0.345
"	"	1.77	0.90	0.50	1.27	0.40	0.835	0.435
"	"	0.89	0.30	0.14	0.75	0.16	0.455	0.295
"	"	1.72	0.90	0.50	1.22	0.40	0.810	0.410
TP-3	1'-3'	0.78	0.30	0.22	0.56	0.08	0.320	0.240
"	"	1.64	0.90	0.54	1.10	0.36	0.730	0.370
"	"	1.20	0.60	0.40	0.80	0.20	0.500	0.300
TP-9	5'	1.94	0.72	-0.17	2.11	0.89	1.500	0.610
"	"	3.04	1.44	0.17	2.88	1.27	2.075	0.800
"	5'-6'	1.96	0.61	-0.06	2.02	0.67	1.345	0.675
"	5'-7'	1.44	0.65	0.12	1.32	0.53	0.925	0.395
TP-10	2'-3'	2.72	1.08	-0.06	2.78	1.14	1.960	0.820
"	"	1.57	0.61	0.65	0.92	-0.04	0.440	0.480
"	"	2.75	0.58	0.19	2.56	0.39	1.475	1.085

σ_1 and u are at peak deviator stress. All units are tsf.

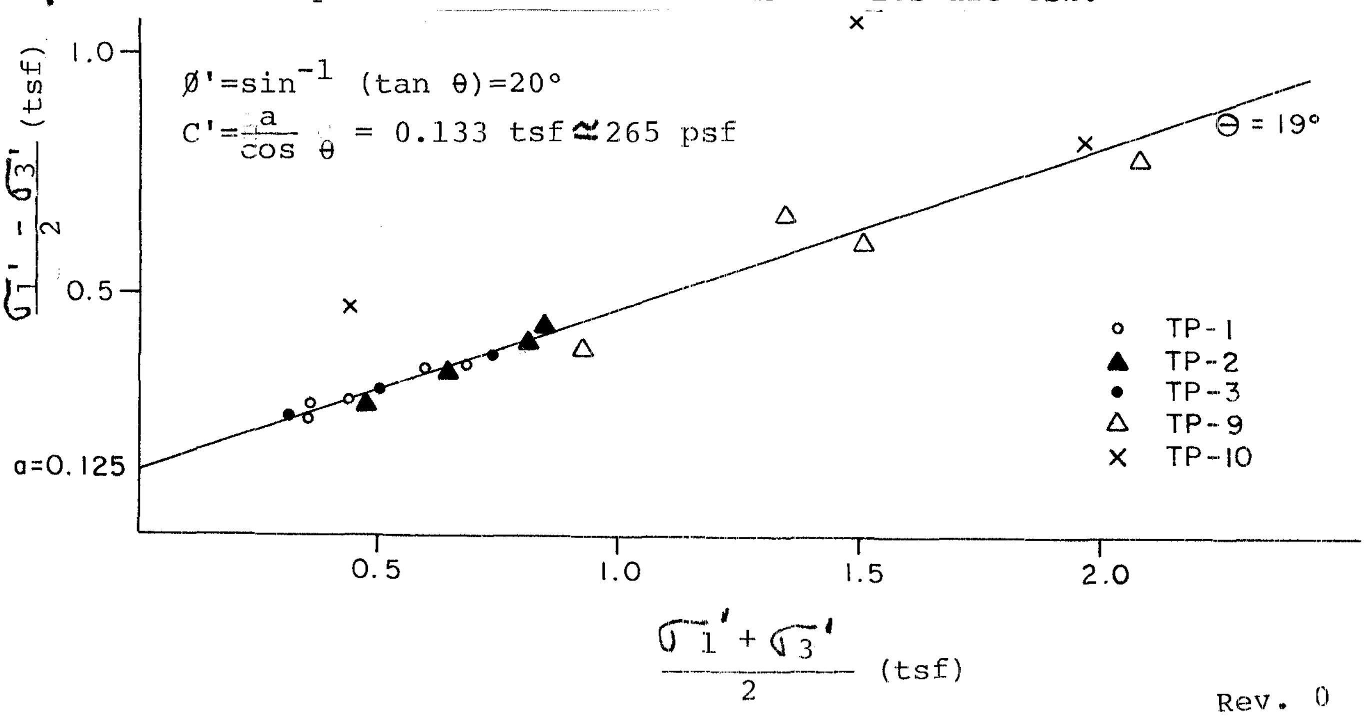


TABLE 2.5-66

STRESS CONTROLLED DYNAMIC TRIAXIAL TEST RESULTS

Sample No.	Test No.	Kc	$\sigma_{3}c$ (tsf)	Cyclic Axial Load Δdp (tsf)	No. of Cycles to 5% Total Axial Strain
TP-3	1	1.25	0.6	0.61	-*
TP-3	2	1.25	0.6	0.69	18
TP-3	3	1.25	0.6	0.80	5
TP-3	1	1.25	0.9	0.69	18
TP-3	2	1.25	0.9	0.93	3
TP-3	3	1.25	0.9	0.62	41
TP-3	1	1.75	0.6	0.58	16
TP-13	2	1.75	0.6	0.71	15
TP-13	3	1.75	0.6	0.81	3
TP-13	1	1.75	0.2	0.15	-*
TP-13	2	1.75	0.2	0.43	39
TP-13	3	1.75	0.2	0.69	3

*5% strain was not reached for a large number of cycles.

TABLE 2.5-67

TEST FOR DISPERSIVE SOILS

Test Pit No.	Sample Depth (ft)	Soil Type	Atterberg Limits Test			Natural Water Content	SCS[(a)] Dispersion Test, %	SCS Chemical Test[(a)]		ASTM D 698		Results Pinhole[(a)] Samples at Natural Water Or Dried to B.L.		Results Pinhole For Samples[(a)] Air Dried And Moisture Added To ~ O.M.C.					Remarks
			L.L.	P.L.	P.I.			TDS (meq/ℓ)	Na (%)	γ-γ max (pcf)	O.M.C. (%)	ω%	Dispersive Class[(b)]	ω%	±O.M.C.	γd (PCF)	% γd max ASTM 698	Dispersive Class[(b)]	
HSDC-1	3.0-3.5	CH (Residual Heumader)	55	21	34	22.0	63	6.95	82	101	21	21	ND-3	20.4	-1	101	100	ND-2	
HSDC-1	6.0-6.5	CL (Residual Heumader)	42	20	22	21.6	73.5	12.17	77	106	20	20	ND-3	19.0	-1	106	100	(3 Tests) D-1	Only sample with dispersive failure by pinhole and only after air drying.
HSDC-2	3.0-4.0	CH (Residual Heumader)	48	20	28	19.0	37.5	10.80	73	102	21	20	ND-1	18.8	-2	102	100	ND-1	
HSDC-2	5.5-6.0	CH (Residual Heumader)	51	20	31	23.8	19.4	5.75	87	100	23	20	ND-3	20	-3	101	101	ND-2	
HSDC-3	2.0-3.0	CH (Residual Heumader)	64	22	42	23.5	45.4	9.32	81	95	24	22	ND-2	23.7	-	95	100	ND-3	
HSDC-3	4.5-5.0	CH (Residual Heumader)	77	29	48	32.5	73.6	10.16	80	93	27	29	ND-3	25.8	-1	94	101	ND-2	
MDTP-1	6 -8	CL (Alluvium)	40	18	22	21.6	56.1	2.88	24			18	ND-1						
MDTP-2	8.5-9.8	CL	36	17	19	28.7	77.4	4.67	2										

[a]Test procedures described in "Identification and Nature of Dispersive Soils," ASCE Geotechnical Journal, 102, No. 4, 287-301 (1976; April.

[b]Classification procedures described in "Pinhole Testing for Identifying Dispersive Soils," ASCE Geotechnical Journal, 102, No. 1, 69-85 (1976) January.

[c]Estimated at optimum.

TABLE 2.5-67 (continued)

Test Pit No.	Sample Depth (ft)	Soil Type	Atterberg Limits Test L.L.	P.L.	P.I.	Natural Water Content	SCS[a] Dispersion Test, %	SCS Chemical Test[a] TDS (meq/ℓ)	Na (%)	ASTM D 698 γ-γd max (pcf)	O.M.C. (%)	Results Pinhole[a] Samples at Natural Water Or Dried to B.L. ω%	Dispersive Class[b]	Results Pinhole For Samples[a] Air Dried And Moisture Added To ~ O.M.C. ω%	±O.M.C.	γd (PCF)	% γd max ASTM 698	Dispersive Class[b]	Remarks
ASTP-1	3-4	CH (Weathered Heebner Shale)	62	27	35		3.3	1.77	16										From residual soils at location of main dam auxillary spillway.
ASTP-1	6-6.5	CL (Weathered Snyderville Shale)	42	22	20		0.3	3.60	17										
BORINGS																			
HS-22	1.8-2.3	CH (Residual Pohu)					70	2.18	59.6										Samples air dried during storage - moisture added for chemical testing.
BAK-6	5-7	CL (Alluvium)					7	64.19	6.7										
UHS-1	5	CL (Heumader)						94.54	48	100[c]	18		D-1						
UHS-2	4	CL (Heumader)						212.8	21	100[c]	18		D-1						
UHS-3	4	CH (Heumader)						42.5	37	100[c]	20		ND-1						

WOLF CREEK

TABLE 2.5-67A

FILLING OF ULTIMATE HEAT SINK RESERVOIR

The filling procedure shall be as follows:

1. Fill UHS reservoir by pumping from downstream of the UHS dam or by discharging the water from the raw water line into the ESWS discharge pipeline.

   If the water is to be discharged into the heat sink other than through the ESWS discharge Point, the discharge point should be at least 200’ upstream of the UHS dam toe. The Dames & Moore Resident Geotechnical shall approve the discharge provisions and may require construction of a splash pad.

2. The water level in the area downstream of the UHS dam shall be maintained below elevation 1955.

3. Fill UHS Reservoir to elevation 1969.5 maintaining water level downstream of UHS dam below elevation 1955.

4. A 30-day observation period shall begin when the UHS reservoir water level reaches elevation 1969. When the water level reaches 1969.5, pumping shall stop until the remainder of the 30-day observation is complete.

5. If at any time during the 30-day observation period the water level in the UHS reservoir exceeds elevation 1969.5, the water shall be pumped out of the UHS to elevation 1969.5. A 1000 gpm pump should be used for this pumping.

6. After completion of the 30-day observation period, the water from the raw water pumps shall be pumped into the area downstream of the UHS dam.

7. After the completion of the 30-day observation period, the water level in the UHS reservoir shall be maintained at elevation 1969.5 by pumping and discharging to the area downstream. The discharge point shall be at least 200 feet downstream of the UHS dam toe. The discharge provisions shall be approved by the Resident Geotechnical Engineer and construction of a splash pad may be required.

8. After the area downstream of the UHS dam has been filled to elevation 1969.5, the water levels upstream and downstream shall be equalized by pumping until the water level has reached the top of the fine bedding.

The estimated filling time to elevation 1969.5 for the UHS reservoir at 2 cfs through the raw water pipeline is approximately 95 days. For record, the pumping rate, pumping time and UHS water level should be recorded daily.

TABLE 2.5-67b

OBSERVATION PERIOD

In Sargent & Lundy letters ALK-3542 and ALK-3543 a 30 daily observation was required in the filling procedure of the UHS dam. This observation period was recommended by James L. Sherard in a letter dated May 16, 1980 to make a positive assurance of the safety of the UHS dam against the remote possibility of a dispersive piping failure. The boundary conditions of this observation were that the UHS water level was to be maintained between elevations 1969 and 1969.5 while maintaining the water level downstream of the UHS dam below elevation 1955 for 30 days. Filling of the UHS began on June 2, 1980 and the boundary conditions specified in ALK-3543 were met on November 7, 1980. During the filling of the UHS and the 30-day observation period Kansas Gas and Electric Co. personnel recorded the amount of water pumped from the downstream toe of the UHS dam as a determination of the volume of seepage through the dam. During the observation period only 388,740 cubic feet of water were pumped into the UHS basin. During the observation period, no significant change in the UHS basin water level was observed and seepage quantities observed were in line with what Sargent & Lundy had anticipated for normal seepage. The seepage water also remained clear throughout the period. During UHS filling and hold period Dames & Moore personnel made a weekly inspection of the downstream area of the UHS dam. No unusual or deleterious features were observed.

KANSAS GAS & ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

ULTIMATE HEAT SINK FILL SPECIAL PROCEDURE

SU8 0001

Classification: Non-Nuclear Safety Related

Spencer W. Semmes
PREPARED BY — DATE 11/12/80

J.D. Roberts
GROUP LEADER — DATE 11/12/80

C. Michael Estes
SECTION SUPERVISOR APPROVAL — DATE 11/13/80

TABLE OF CONTENTS

1.0 OBJECTIVES

The objectives of this procedure are to provide a method to initially fill the ultimate heat sink portion of the cooling lake using temporarily installed piping, to record and transmit specific data required by Nuclear Plant Engineering during the hold period, to fill the temporary lake on the southwest side of the Ultimate Heat Sink Dam, to document and control the water levels on either side of the Ultimate Heat Sink (UHS) Dam, and to minimize overtopping of the Ultimate Heat Sink Dam.

2.0 LIMITING CONDITIONS

2.1 The Ultimate Heat Sink (northeast of the UHS dam) shall be filled to approximately elevation between 1969.0' and 1969.5' and maintained within those elevations until directed by Nuclear Plant Engineering. The water on the southwest side of the UHS dam shall be maintained below elevation 1955' to the extent practical.

2.2 After Nuclear Plant Engineering has determined that the water has been retained behind the UHS dam for a sufficient period of time (approximately 30 days) the water level in the Ultimate Heat Sink shall be maintained between elevations 1969.0' and 1969.5', and the water level on the southwest side of the UHS dam may be increased.

2.3 When the water level on the southwest side of the UHS dam reaches the water level on the northeast side of the UHS dam, the water levels on both sides of the UHS dam shall be allowed to increase until the temporary lake is filled. Care shall be exercised to minimize waterflow across the top of the UHS dam (overtopping).

3.0 REFERENCES

3.1 Piping and Instrumentation Diagrams

3.1.1 M-21, Rev. D, Circulating Water System P&ID

3.1.2 M-24, Sheet 1, Rev. E, Cooling Lake Makeup and Blowdown System P&ID

3.1.3 M-24, Sheet 2, Rev. C, Cooling Lake Makeup and Blowdown System P&ID

3.1.4 M-25, Sheet 1, Rev. D, Makeup Demineralizer System P&ID

3.1.5 M-26, Sheet 2, Rev. C, Screen Wash System P&ID

3.2 Schematic Diagrams

3.2.1 E1005-PG/WL010, Rev. C, Auxiliary Raw Water Pump OA

3.2.2 E1005-PG/WL011, Rev. D, Auxiliary Raw Water Pump OB

3.2.3 E1005-PG/WM010, Rev. D, Raw Water Pump 1A

3.2.4 E1005-PG/WM011, Rev. D, Raw Water Pump 1B

3.3 Daniel Temporary Fill Line drawing for UHS

3.4 Telephone conversation between G. Boyer and M.L. Johnson, 27 May 1980, 11:20 A.M.

3.5 Sargent and Lundy letter to M.L. Johnson, ALK-3543, June 3, 1980, Filling the Ultimate Heat Sink Reservoir.

4.0 <u>EQUIPMENT</u>

4.1 Two 600 gpm engine driven portable pumps, or equivalent

4.2 Four lengths of suction hosing for pumps specified in Section 4.1

4.3 Three lake level indication markings, in 1/10 foot increments, located in the UHS basin and in the pond on SW side of the UHS dam and in the toe of the UHS dam on the SW side. The upper most increment shall be above 1970 .0'.

5.0 <u>NOTES AND PRECAUTIONS</u>

5.1 Due to the extremely large area which drains into the northeast side of the UHS dam, the northeast side of the UHS dam is expected to fill rapidly during periods of heavy precipitation.

5.2 Care should be exercised to avoid a raw water pump trip on low suction water level in the Makeup Discharge Structure.

5.3 The two 600 gpm pumps shall be capable of pumping water in either direction through the temporary piping shown in Appendix C.

5.4 The elevation on the both sides of the UHS dam will be measured at the elevation markers.

6.0 PREREQUISITES

6.1 Provision has been made to supply water to the auxiliary raw water pumps.

6.2 All testing has been completed on the raw water pumps, auxiliary raw water pumps and associated piping and systems required to supply water to the UHS.

6.3 The Makeup Discharge Structure Raw Water Pump suction pit is clear of personnel and debris.

6.4 Complete the Initial Valve Lineup as shown in Appendix A.

6.5 Notify Dames and Moore before pumping any water into the UHS to allow them to monitor erosion of the discharge water if erosion may occur.

7.0 PROCEDURE

7.1 Filling the Ultimate Heat Sink

7.1.1 If the makeup water line has been dewatered, start the Auxiliary Raw Water Pumps OWL02PA and OWL02PB according to operating procedure WL-002. If the makeup water line is filled, start the Auxiliary Raw Water Pumps OWL02PA and OWL02PB according to operating procedure WL-001.

7.1.2 The Makeup Discharge Structure Raw Water pump suction pit has filled with water as identified by a water discharge over the weir.

7.1.3 Start the Raw Water Pumps 1WM01PA and 1WM01PB according to operating procedure WM-001.

NOTE: Lake level monitoring and adjustment shall be performed in accordance with section 7.3.

7.1.4 Fill the Ultimate Heat Sink to an elevation between 1969.0' and 1969.5' as indicated on the elevation markers located in the UHS basin (after being corrected) to the SNUPPS elevaton datum).

7.1.5 Maintain the water level in the Ulimate Heat Sink between 1969.0' and 1969.5' until directed by Nuclear Plant Engineering to proceed with the fill of the temporary lake finger.

7.2 Filling the Temporary Lake Finger

Note: Lake level monitoring and adjustment shall be performed in accordance with section 7.3.

7.2.1 At the direction of Nuclear Plant Engineering, begin fill of the temporary lake finger.

7.2.2 Fill the southwest side of UHS dam to the same elevation as the northeast side of the UHS dam equalizing the water levels on both sides of the UHS dam.

7.2.3 Complete filling of the temporary lake finger. Care shall be exercised to minimizr waterflow across the top of the UHS dam.

7.3 Lake Level Monitoring and Adjustment

7.3.1 During the hold period, daily level measurements will be recorded for the UHS basin, the downstream toe of the UHS dam, and the downstream pond on the SW side of the UHS dam. Pumping flow rates and time durations will also be recorded. These records will be transmitted to KG&E Construction and the Dames and Moore Geotechnical Engineer for disposition per instructions by Nuclear Plant Engineering.

7.3.2 All lake measurements and pumping rates shall be recorded on Appendix B.

7.3.3 Water level on either side of the UHS dam shall be maintained as practical by appropriate use of the temporary pumps.

7.3.4 Following periods of heavy precipitation and because of the large area draining into the northeast side of the UHS dam, it may be necessary to align the temporary pumps to transfer water from the northeast to the southwest side of the UHS dam to minimize waterflow over the top of the dam.

APPENDIX A

INITIAL VALVE LINEUP

VALVE NUMBER	DESCRIPTION	POSITION
OWL024A	OWL02PA Discharge PI Isolation	O
OWL004A	OWL02PA Discharge Isolation	CL
OWL005	Makeup Line PI Isolation	O
OWL001A	OWL01PA Discharge Isolation	CL
OWL024B	OWL02PB Discharge PI Isolation	O
OWL004B	OWL02PB Discharge Isolation	CL
OWL001C	OWL01PC Discharge Isolation	CL
OWL001B	OWL01PB Discharge Isolation	CL
OWL029	Manhole #2 High Point Vent Isol	O
OWL007	Manhole #2 High Pt Manual Vent	CL
OWL030	Manhole #3 High Point Vent Isol	O
OWL009	Manhole #3 High Pt Manual Isol	CL
OWL010	Manhole #3A Dewatering Isolation	CL
OWL031	Manhole #4 High Point Vent Isol	O
OWL012	Manhole #4 High Pt Manual Vent	CL
OWL032	Manhole #5 High Point Vent Isol	O
OWL027	Manhole #5 High Pt Manual Vent	CL
OWL033	Manhole #6 High Point Vent Isol	O
OWL028	Manhole #6 High Pt Manual Vent	CL
1WM003A	1WM01PA Discharge PI Isolation	O
1WM002A	1WM01PA Discharge Isolation	CL
1WM003B	1WM01PB Discharge PI Isolation	O
1WM002B	1WM01PB Discharge Isolation	CL

O = Open CL = Closed T = Throttled L = Locked (Prefix)

APPENDIX A

INITIAL VALVE LINEUP

VALVE NUMBER	DESCRIPTION	POSITION
(Later)	Temp Fill Line ISOL	L.T.
1CW002	Circ Wtr Warming Line Isolation	CL
"A"	8" PVC Fill Line Isolation	O
"B"	4" PVC Bypass	CL
"C"	6" PVC Pressure Tap	CL

O = Open CL = Closed T = Throttled L = Locked (Prefix)

APPENDIX B
WOLF CREEK
UHS LEVEL MONITOR RECORD
"Example Only"

WATER LEVELS*

DATE/TIME	UHS BASIN	DOWNSTREAM POND	DOWNSTREAM TOE OF UHS DAM

*Actual readings on level indicators. Elevation markers are marked in increments of 0.1 foot. Read to nearest 0.1 foot.

Recorded by ____________________

DAILY PUMPING RECORDS: (Record type of pump, run time, and location to where water was pumped).

DATUM ELEVATIONS	UHS BASIN	DOWNSTREAM POND	DOWNSTREAM TOE OF UHS DAM

WATER ELEVATIONS*

DATE	UHS BASIN	DOWNSTREAM POND	DOWNSTREAM TOE OF UHS DAM

*In feet (by KG&E)

Calculation by ____________________

DAILY PUMPING ACTIVITY Summary: (Record total amount of water, in gallons, and location it was pumped to).

WOLF CREEK

APPENDIX C

Temporary Piping - Circulating Water Intake Structure to Ultimate Heat Sink

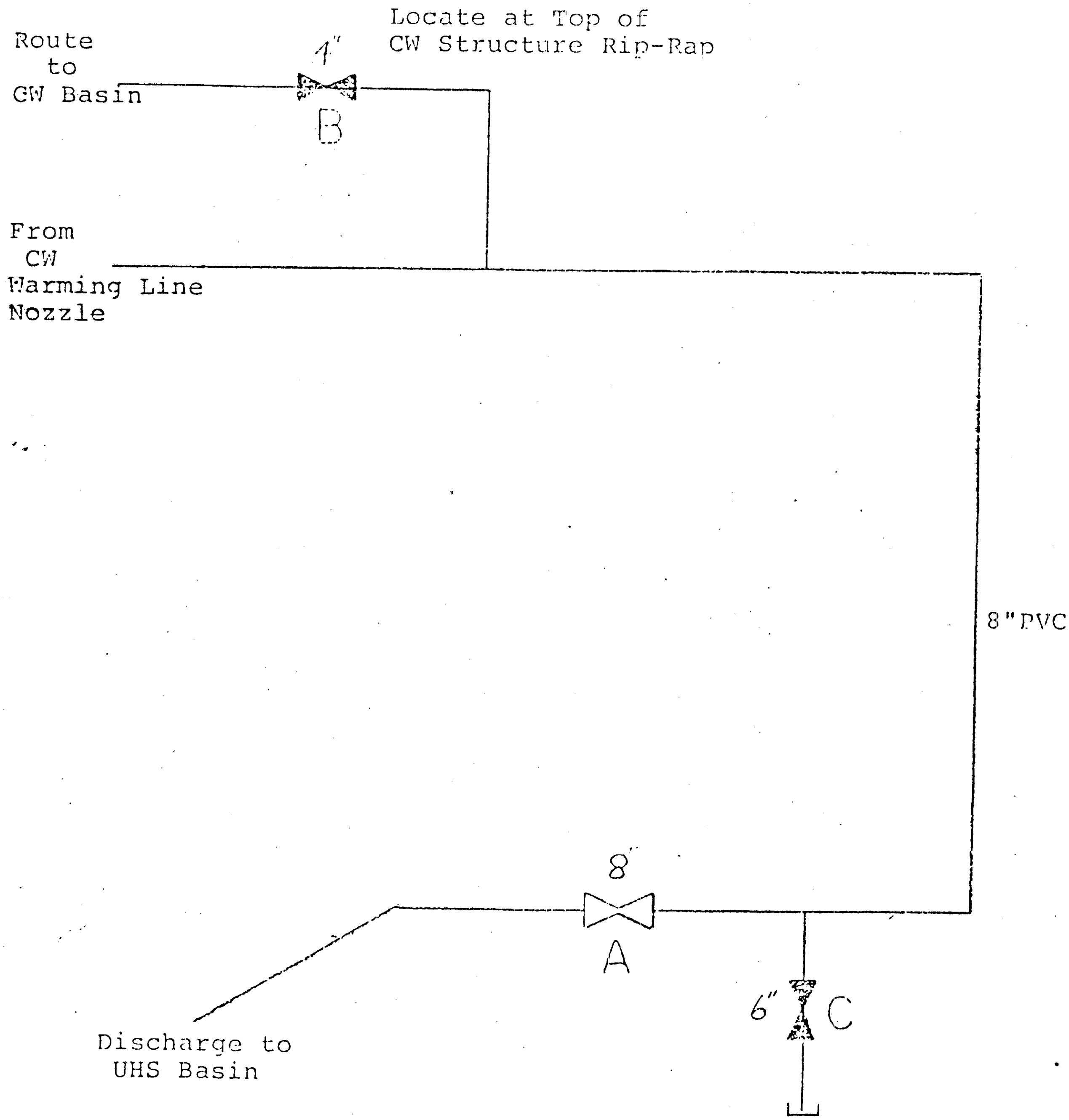


Table 2.5-67d

TEST FOR DISPERSIVE SOILS
UHS DAM

Test Pit No.	Sample Depth (ft)	Soil Type	Atterberg Limits Test L.L.	Atterberg Limits Test P.L.	Atterberg Limits Test P.I.	Natural Water Content	SCS[a] Dispersion Test, %	SCS Chemical Test[a] TDS (meq/ℓ)	SCS Chemical Test[a] Na (%)	ASTM D 698 γ-γ max (pcf)	ASTM D 698 O.M.C. (%)	Results Pinhole[a] Samples at Natural Water Or Dried to P.L. Water Content (%)	Results Pinhole[a] Samples at Natural Water Or Dried to P.L. Dispersive Class[b] Tests With Distilled Water	Results Pinhole[a] Samples at Natural Water Or Dried to P.L. Dispersive Class[b] Tests With Redmond Water[c]	Results Pinhole For Samples[a] Air Dried And Moisture Added To ~ O.M.C. Water Content (%)	±O.M.C.	γd (PCF)	% γd max ASTM 698	Dispersive Class[b]	Remarks
HSDC-1	3.0-3.5	CH (Residual Heumader)	55	21	34	22.0	63	6.95	82	101	21	21	ND-3		20.4	-1	101	100	ND-2	
HSDC-1	6.0-6.5	CL (Residual Heumader)	42	20	22	21.6	73.5	12.17	77	106	20	20	ND-3		19.0	-1	106	100	(3 Tests) D-1	Only sample with dispersive failure by pinhole and only after air drying.
HSDC-2	3.0-4.0	CH (Residual Heumader)	48	20	28	19.0	37.5	10.80	73	102	21	20	ND-1		18.8	-2	102	100	ND-1	
HSDC-2	5.5-6.0	CH (Residual Heumader)	51	20	31	23.8	19.4	5.75	87	100	23	20	ND-3		20	-3	101	101	ND-2	
HSDC-3	2.0-3.0	CH (Residual Heumader)	64	22	42	23.5	45.4	9.32	81	95	24	22	ND-2		23.7	-	95	100	ND-3	
HSDC-3	4.5-5.0	CH (Residual Heumader)	77	29	48	32.5	73.6	10.16	80	93	27	29	ND-3		25.8	-1	94	101	ND-2	

[a]Test procedures described in "Identification and Nature of Dispersive Soils," ASCE Geotechnical Journal, 102, No. 4, 287-301 (1976) April.

[b]Classification procedures described in "Pinhole Testing for Identifying Dispersive Soils," ASCE Geotechnical Journal, 102, No. 1, 69-85 (1976) January.

[c]Water pumped from John Redmond Reservoir.

[d]Estimated at optimum.

Table 2.5-67d (continued)

Test Pit No.	Sample Depth (ft)	Soil Type	Atterberg Limits Test L.L.	Atterberg Limits Test P.L.	Atterberg Limits Test P.I.	Natural Water Content	SCS[a] Dispersion Test, %	SCS Chemical Test[a] TDS (meq/l)	SCS Chemical Test[a] Na (%)	ASTM D 698 γ-γ max (pcf)	ASTM D 698 O.M.C. (%)	Results Pinhole[a] Samples at Natural Water Or Dried to P.L. — Water Content (%)	Dispersive Class[b] Tests With Distilled Water	Dispersive Class[b] Tests With Redmond Water[c]	Results Pinhole For Samples[a] Air Dried And Moisture Added To ~ O.M.C. — Water Content (%)	±O.M.C.	γd (PCF)	% γd max ASTM 698	Dispersive Class[b]	Remarks
ASTP-1	3-4	CH (Weathered Heebner Shale)	62	27	35		3.3	1.77	16											From residual soils at location of main dam auxillary spillway.
ASTP-1	6-6.5	CL (Weathered Snyderville Shale)	42	22	20		0.3	3.60	17											
BORINGS																				Samples air dried during storage - moisture added for chemical testing.
HS-22	1.8-2.3	CH (Residual Pohu)					70	2.18	59.6											
UHS-1	5	CL (Heumader)						94.54	48	100(d)	18		D-1							
UHS-2	4	CL (Heumader)						212.8	21	100(d)	18		D-2							
UHS-3	4	CH (Heumader)						42.5	37	100(d)	20		ND-1							
CUHS-1	7.0	CL (Residual)					-					27.2	D-2							
CUHS-2	12.0	CL (Residual)					48					18.4	D-1	ND-1						
CUHS-3	4.0	CL (Residual)					60					15.1	D-1	ND-3/ND-2						

Table 2.5-67e

TEST FOR DISPERSIVE SOILS
MAIN DAM AND SADDLE DAM IV

Test Pit No.	Sample Depth (ft)	Soil Type	Atterberg Limits Test L.L.	Atterberg Limits Test P.L.	Atterberg Limits Test P.I.	Natural Water Content	SCS[a] Dispersion Test, %	SCS Chemical Test[a] TDS (meq/ℓ)	SCS Chemical Test[a] Na (%)	Results Pinhole[a] Samples at Natural Water Or Dried to P.L. — Dispersive Class[b]: Water Content (%)	Tests with Distilled Water	Tests with Redmond Water[c]
MDTP-1	6-8	CL (Alluvium)	40	18	22	21.6	56.1	2.88	24	18	ND-1	
MDTP-2	8.5-9.8	CL (Alluvium)	36	17	19	28.7	77.4	4.67	2			
BAK-6	5-7	CL (Alluvium)					7	64.19	6.7			
Boring	Elevation											
1B	1976	CL					56				ND-1	—
2B	1970	CL					8				ND-1	—
3B	1964	CL					17				D-1	—
3C	1964	CL					—				D-1	ND-2
4B	1956	CL					5				ND-1	—
7A	1906	CL					4				ND-1	—
10A	1912	CL					60				D-2	—
10C	1914	CL					—				D-2	ND-1
11B	1922	CL					1				ND-2	—
12B	1926	CL					12				ND-1	—
14A	1935	CL					—				D-1	ND-2
14B	1935	CL					3				D-1	—

[a]Test procedures described in "Identification and Nature of Dispersive Soils," ASCE Geotechnical Journal, 102, No. 4, 287-301 (1976) April.

[b]Classification procedures described in "Pinhole Testing for Identifying Dispersive Soils," ASCE Geotechnical Journal, 102, No. 1, 69-85 (1976) January.

[c]Water pumped from John Redmond Reservoir.

[d]Saddle Dam IV.

[e]Main Dam closure section.

Table 2.5-67e (continued)

Test Pit No.	Sample Depth (ft)	Soil Type	Atterberg Limits Test L.L.	Atterberg Limits Test P.L.	Atterberg Limits Test P.I.	Natural Water Content	SCS[a] Dispersion Test, %	SCS Chemical Test[a] TDS (meq/ℓ)	SCS Chemical Test[a] Na (%)	Results Pinhole[a] Samples at Natural Water Or Dried to P.L. — Dispersive Class[b] Water Content (%)	Tests with Distilled Water	Tests with Redmond Water[c]
Boring	Elevation											
SDA-1[d]	1994	CL					53				ND-4	
Sample[e]												
C-1	1921.5	CL									ND-1	
C-2	1928.5	CL									ND-1	
C-3	1942	CL									ND-1	
C-4	1950	CL									ND-1	
C-5	1954	CL									ND-1	
C-6	1961.5	CL									ND-1	
C-7	1966.5	CL									ND-1	
C-8	1974.5	CL									ND-1	
C-9	1979	CL									ND-1	
C-10	1995	CL									ND-1	

LETTER FROM JAMES L. SHERARD CONCERNING DISPERSIVE CLAYS IN THE UHS DAM

JAMES L. SHERARD
CONSULTING ENGINEER
3483 KURTZ STREET
SAN DIEGO, CALIFORNIA 92110

TELEPHONE: (714) 224-0455
TELEX: 910 3351607 MESA SERV SDG

May 16, 1980

Dames and Moore
1550 Northwest Highway
Park Ridge, Ill 60068

Attention: Mr. Terje Preber, Senior Engineer

Gentlemen:

I am writing in your response to your letter of May 12, 1980 (DMLK-678), in connection with the dispersive clay problem at the Ultimate Heat Sink Dam, Wolf Creek Generating Station No. 1.

In this letter and in several telephone discussions with Mr. Preber, you have described for me the main aspects of this structure, generally as follows:

1). It is a homogeneous clay dam about 20 feet maximum height above the natural ground surface, 4:1 side slopes on both sides with riprapand filter blankets as shown on a sketch you sent me (attachment 5).

2). All soil overlying bedrock has been excavated over the whole foundation of the dam, with maximum deptr of excavated soil of about 10 feet.

3). The bedrock is horizontaly bedded shale and limestone, apparently highly impervious and relativelyfree from joints and cracks.

4). The UHS Dam is an emergency structure to be submerged in the main cooling water reservoir and only would be called to act as a dam in the event of failure of the main dam.

5). The UHS dam has been completed recently under careful, specialized engineering control of the construction and foundation preparation.

6). Water is presently being pumped into a portion of the main reservoir in such a way that there will be water on both sides of the UHS Dam at about the same level, but so far the rising water level has not reached the toes of the UHS dam.

7). It has recently been demonstrated by laboratory tests that the UHS Dam embankment material is a dispersive clay.

On the basis of this information you have asked me to form on the safety of the dam as related to the special problem of dispersive clay erosion. You have asked me to do this because I have spent a lot of time in the last several years studying the problem of dams of dispersive clay.

I am pleased to consult with you on this problem on the basis that I consider it essentially as a theoretical problem, since I have not visited the site and have no personal knowledge of the foundation condition or construction operations. My opinions below are based on the assumptions that the foundation is relatively impervious and the embankment was well built with the details,shown on attachment 5.

As a first general observation it seems apparent that the dam is built of dispersive clay, the test results presented (Samples UHS 1-3 and CUHS 1-3) are typical of this type of clay.

My main opinion is that the dam should be completely safe. With 4:1 side slopes, excavation to impervious bedrock over the whole foundation area, and a sand filter at the downstream side, the likelihood of piping due to dispersive clay erosion is negligible.

On the other hand, because of the importance of the structure I strongly suggest consideration of testing it by filling the UHS reservoir first with water only on the one side and the downstream toe kept dry for observation. All experience and theory indicates that problems with dams of dispersive clay develop very soon after the first reservoir filling (usually within a few days). Hence, if the reservoir is filled for about one month with no observed leakage at the downstream toe, I believe that it can be concluded with complete confidence that the dam is a wholly safe structure.

Very truly yours,

James L. Sherard

James L. Sherard

TABLE 2.5-68

CHARACTERISTICS OF ON-SITE AGGREGATE SOURCES[2]

	Toronto	Plattsmouth
Specific-Saturated Gravity	2.45-2.51	2.56-2.66
Specific Gravity-Dry	2.33-2.41	2.48-2.59
Los Angeles Abrasion Test	31.4-38.2%	26.5-35.8%
Absorption	2.46-5.26%	1.2-3.2%
Soundness Loss Ratio[1]	.91-.96%	.92-.96%

Notes: 1. Soundness Loss Ratio determined according to Kansas State Department of Transportation procedures.

2. For characteristics of the riprap in the UHS, see Table 2.5-68a.

Ref: 1. Stallard, A.H., 1966, Materials Inventory of Coffey County, Kansas: prepared by the State Highway Commission of Kansas in cooperation with the U.S. Department of Commerce, Bureau of Public Roads.

TABLE 2.5-68a

QUALIFICATION TEST DATA
RIPRAP UHS DAM

Test Number	Rock Type	Petrographic Analysis*	LA Abrasion (Req < 35% Loss)	Freeze-Thaw (Req < 15% Loss)	Sodium Sulfate Soundness (Req <10% Loss)	Specific Gravity (Req ≥ 2.4)	Absorption (Req ≤ 6%)
RRAT-12	Southbend Limestone	Acceptable	24.1	0.45	1.36	2.67	0.52
RRAT-13	Plattsmouth Limestone	Acceptable	26.5	0.56	6.96	2.68	0.69
RRAT-14	Southbend Limestone	Acceptable	28.8	10.80	3.41	2.69	0.26
RRAT-15	Plattsmouth Limestone	Acceptable	31.6	3.00	6.51	2.63	1.06
RRAT-16	Southbend Limestone	Acceptable	31.0	4.38	6.48	2.68	0.29
RRAT-17	Plattsmouth Limestone	Acceptable	29.0	2.20	5.15	2.67	0.60
RRAT-18	Southbend Limestone	Acceptable	27.5	1.47	5.10	2.65	0.70
RRAT-19	Plattsmouth Limestone	Acceptable	32.2	3.18	6.15	2.65	0.42

* Petrographic examinations were performed by Law Engineering Testing Company.

Ref: (1) Dames & Moore - Final Report, Surveillance of Earthwork UHS & UHS Dam. Wolf Creek Generating Station, Unit No. 1, August 18, 1981.

TABLE 2.5-69

RESULTS OF CONSOLIDATION TESTS ON
UNDISTRUBED AND RECOMPACTED SOIL SAMPLES

Location	Depth (feet)	Preconsolidation Pressure (psf)	Compressibility Index[a] (in/in)	Swelling Index[b] (in/in)	Soil Type
TP-1	1.0-3.0	1,600	0.124	-	CL
HSA-1	3.0	3,600	0.134	0.050	CL
HS-2	6.0	-	0.170	0.034	CL
HS-5	2.0	4,600	0.150	-	CH
HS-16	4.0	8,400	0.180	0.022	CH
HS-17	4.5	8,600	0.112	0.040	CL

[a] Compressibility Index is defined as Cc/(1+e).

[b] Swelling Index is defined as Cs/(1+e).

TABLE 2.5-70

GRANULAR DRAINAGE BLANKET TEST FILL RESULTS

Test Number	Date	Station Location Main Dam	Lift Thickness (inches)	Relative Density (%)	Dry Density (pcf)	Percent Passing #200 Screen After Compaction	Gradation Test Date
1	08/10/78	39+00 to 40+00	18	106.0	117.4	10.5	
2	08/10/78	39+00 to 40+00	18	119.3	123.8	9.2	
3	08/10/78	39+00 to 40+00	18	126.0	127.3	9.1	
4	08/10/78	39+00 to 40+00	18	105.4	117.1	10.8	
5	08/10/78	39+00 to 40+00	18	110.6	119.5	8.3	
6	08/10/78	39+00 to 40+00	18	106.3	117.5	7.7	
7	08/10/78	39+00 to 40+00	18	97.5	113.6	8.2	
8	08/10/78	39+00 to 40+00	18	119.9	124.1	8.6	
6	10/31/78	66+95	18	96.9	121.5	-	
7	10/31/78	66+95	18	59.5	109.8	-	

TABLE 2.5-70 (continued)

Test Number	Date	Station Location Main Dam	Lift Thickness (inches)	Relative Density (%)	Dry Density (pcf)	Percent Passing #200 Screen After Compaction	Gradation Test Date
8	10/31/78	66+80	18	75.7	114.6	1.8	
9	10/31/78	66+80	18	63.3	110.9	2.9	
10	11/02/78	67+00 and 66+50	18	98.6	122.1	3.9	
11	11/02/78	67+00	18	77.0	116.3	-	
12	11/02/78	67+05	18	37.2	105.4	-	
13	11/02/78	67+05	18	64.6	112.9	-	
14	11/02/78	67+15	18	97.8	122.0	2.7	
15	11/02/78	67+15	18	67.5	113.7	-	
16	11/02/78	67+15	18	92.3	120.5	-	
1	10/28/78	69+60	36	30.6	102.2	-	
2	10/28/78	69+60	36	100.8	122.9	-	
3	10/28/78	69+60	36	16.3	98.8	-	
1	10/31/78	69+60	36	109.9	126.2	3.8	10/28/78
2	10/31/78	69+60	36	91.6	119.7	-	

TABLE 2.5-70 (continued)

Test Number	Date	Station Location Main Dam	Lift Thickness (inches)	Relative Density (%)	Dry Density (pcf)	Percent Passing #200 Screen After Compaction	Gradation Test Date
3	10/31/78	69+68	36	55.9	108.8	-	
4	10/31/78	68+80	36	104.2	124.1	-	
5	10/31/78	68+85	36	66.1	111.7	-	
9	09/05/78	40+00 to 40+75	72	79.1	113.3	1.6	08/28/78
10	09/05/78	40+00 to 40+75	72	96.1	117.9	2.8	08/28/78
11	09/05/78	40+00 to 40+75	72	81.4	113.9	1.0	08/28/78
1E	10/26/78	78+00	72	69.1	112.6	3.2	
2E	10/26/78	75+00	72	10.6	97.5		
3E	10/26/78	74+20	72	26.1	101.1		
4E	10/26/78	73+75	72	34.7	103.2		
5E	10/26/78	73+00	72	35.5	103.4		
1	10/27/78	76+90	72	0	91.2	3.2	

TABLE 2.5-70 (continued)

Test Number	Date	Station Location Main Dam	Lift Thickness (inches)	Relative Density (%)	Dry Density (pcf)	Percent Passing #200 Screen After Compaction	Gradation Test Date
2	10/27/78	76+25	72	10.1	97.4	4.6	
3	10/27/78	75+50	72	0	93.5	1.9	
4	10/27/78	75+50	72	16.7	98.9	-	
5	10/27/78	76+25 78+00	72	0	92.7	1.2	10/26/78
6	10/27/78	76+90 78+00	72	5.1	96.3	1.2	10/26/78

TABLE 2.5-71

GRAIN-SIZE DISTRIBUTION FOR MAIN DAM
GRANULAR DRAINAGE BLANKET AND GRANULAR TOE DRAIN

Material Identification	Test Number	Location		Grain-Size Distribution		
		Station	Offset[(a)]	Percent Passing 3/8 in.	Percent Passing #10	Percent Passing #200
Granular Drainage Blanket	LGDB-1	71+00	175 S	86	20	1
	LGDB-2	71+00	175 S	84	14	1
	LGDB-3	75+00	175 S	85	17	1
	LGDB-4	73+50	175 S	77	16	2
	LGDB-5	73+50	175 S	83	19	2
	LGDB-6	73+50	175 S	82	19	2
	LGDB-7	74+25	200 S	95	38	5
	LGDB-8	74+25	200 S	95	34	4
	LGDB-9	74+25	200 S	95	38	5
	LGDB-10	76+75	200 S	92	30	4
	LGDB-11	76+75	200 S	92	34	5
	LGDB-12	76+75	200 S	93	29	4

(a) Direction and footage offset from centerline.

Material Identification	Test Number	Location Station	Location Offset[(a)]	Grain-Size Distribution Percent Passing 3/8 in.	Percent Passing #10	Percent Passing #200
	LGDB-13	74+00	145 S	91	27	2.8
	LGDB-14	76+20	135 S	71	19	1.6
	LGDB-15	74+50	160 S	83	16	1.6
	LGDB-16	74+50	160 S	84	20	2.1
	LGDB-17	74+50	160 S	82	25	2.1
	LGDB-18	78+00	150 S	86	30	3.2
	LGDB-19	78+00	150 S	82	12	1.2
	LGDB-20	78+00	150 S	81	14	1.2
	LGDB-21	66+50		84	26	3.9
	LGDB-22	74+60	135 S	96	42	5.9[(b)]
	LGDB-23	68+00	180 S	86	26	5.1[(b)]
	LGDB-24	70+50	150 S	89	28	5.3[(b)]
	LGDB-25	64+00		74	14	2.0
	LGDB-26	64+00		81	19	2.4
	LGDB-27	64+00		82	22	2.8

(b) EDR 133.

Material Identification	Test Number	Location: Station	Location: Offset[(a)]	Grain-Size Distribution: Percent Passing 3/8 in.	Percent Passing #10	Percent Passing #200
	LGDB-28	66+00		80	17	2.4
	LGDB-29	67+00		72	13	2.1
	LGDB-30	68+00		82	21	3.3
	LGDB-31	65+00		82	22	4.6
	LGDB-32	66+00		81	23	4.3
	LGDB-33	67+00		78	17	3.1
	LGDB-34	65+00		80	22	3.8
	LGDB-35	64+40		89	31	4.5
	LGDB-36	64+75		82	24	4.0
	LGDB-37	64+87		77	17	2.7
	LGDB-38	65+00		90	26	3.1
	LGDB-39	64+45		95	40	4.6
	LGDB-40	86+50		77	19	2.8
	LGDB-41	85+50		86	21	3.6
	LGDB-42	86+00		93	39	6.1

TABLE 2.5-71 (continued)

Material Identification	Test Number	Location Station Location	Grain-Size Distribution Percent Passing 3 in.	Percent Passing 1 1/2 in.	Percent Passing 3/8 in.
Granular Toe Drain	LT-1	83+00	97	60	7
	TD-1	65+00	98	49	3
	TD-2	68+00	93	69	20
	TD-3	66+00	100	77	18

TABLE 2.5-72

LAKEWORK MONITORED BLASTS PERFORMED
FROM DECEMBER 20, 1977 TO FEBRUARY 2, 1979

Blast Purpose	Blast Location	Date	Blast Number/ Time of Day	Allowable Maximum Peak Particle Velocity (seconds)	Recorded Peak Particle Velocity (seconds)
Structural Excavation	Main Dam Keytrench	05/11/78	8	0.13	0.041
		05/11/78	9	0.07	0.176[(a)]
		05/12/78	10	0.13	NR[(b)]
		05/12/78	11	0.13	--[(c)]
		05/15/78	12	1.4	0.564
		05/16/78	15	0.07	0.035
		05/17/78	16	0.13	0.036
		05/17/78	17	0.13	0.009
		05/17/78	18	0.13	0.109
		05/24/78	21	0.07	NR[(d)]
		05/25/78	22	0.13	NR[(b)]
		05/25/78	23	0.13	0.016
		05/25/78	24	0.13	0.012
		05/25/78	25	0.07	0.006

(a) Reference FCR #1-0230-C.

(b) Equipment malfunction.

(c) Contractor given permission to shoot prior to equipment set-up due to severe thunderstorm.

(d) Communications failure.

TABLE 2.5-72 (continued)

Blast Purpose	Blast Location	Date	Blast Number/ Time of Day	Allowable Maximum Peak Particle Velocity (seconds)	Recorded Peak Particle Velocity (seconds)
Structural Excavation (cont'd)	Main Dam Keytrench (cont'd)	05/26/78	26	0.07	0.008
		05/26/78	27	0.07	0.012
		05/31/78	31	0.07	0.007
		06/01/78	32	0.07	0.001
		06/01/78	33	0.07	0.009
		06/02/78	34	0.13	0.011
		06/02/78	35	0.07	0.018
		06/03/78	36	0.13	0.011
		06/03/78	37	0.13	0.007
		06/06/78	40	0.07	0.004
		06/07/78	41	0.07	0.004
		06/07/78	42	0.07	0.02
		06/08/78	43	0.07	0.008
		06/08/78	44	0.07	0.027
		06/09/78	45	0.07	0.038
		06/10/78	46	0.13	0.006
		06/10/78	47	0.13	0.027
		06/13/78	50	0.07	0.015
		06/14/78	51	0.07	0.019
		06/15/78	52	0.13	0.020
	Service Spillway	09/28/78	54	0.07	NR[(b)]
		09/29/78	55	0.13	0.004

TABLE 2.5-72 (continued)

Blast Purpose	Blast Location	Date	Blast Number/ Time of Day	Allowable Maximum Peak Particle Velocity (seconds)	Recorded Peak Particle Velocity (seconds)
Structural Excavation (cont'd)	Service Spillway (cont'd)	09/29/78	56	0.13	0.007
	Ultimate Heat Sink	12/13/78	61/4:23 PM	0.1	0.002
		12/14/78	62/4:42 PM	0.5	0.02
		12/18/78	66/4:35 PM	0.1	0.02
		12/19/78	67/4:29 PM	0.5	0.02
		01/24/79	79/4:32 PM	2.0	0.335(e)
		02/06/79	82/3:35 PM	0.1	0.017
		02/19/79	88/4:27 PM	0.1	0.014
Test Blasts	Lakework Quarry	12/20/77	N/A	N/A	0.55
		12/22/77	N/A	N/A	0.22
		12/23/77	N/A	N/A	0.126
		12/27/77	N/A	N/A	0.034
		12/28/77	N/A	N/A	1.05
		12/29/77	N/A	N/A	0.044
Production Blasts		06/05/78	4:30 PM	1.4	0.0176
		06/08/78	2:00 PM	0.07	0.0157
		06/09/78	6:00 PM	0.07	0.031
		06/12/78	9:15 AM	1.4	NR(f)
		06/12/78	3:05 PM	1.4	NR(f)

(e) Test blast.

(f) Dames & Moore not notified of blast.

Blast Purpose	Blast Location	Date	Blast Number/ Time of Day	Allowable Maximum Peak Particle Velocity (seconds)	Recorded Peak Particle Velocity (seconds)
Production Blasts (cont'd)	Lakework Quarry (cont'd)	06/13/78	9:15 AM	1.4	NR(f)
		06/13/78	12:10 PM	0.07	0.017
		06/13/78	2:30 PM	0.07	0.006
		06/14/78	9:30 AM	0.07	0.020
		06/14/78	2:30 PM	0.07	0.018
		06/15/78	9:00 AM	0.13	0.024
		06/15/78	4:30 PM	0.13	0.023
		06/27/78	5:35 PM	0.07	0.0092
		06/28/78	11:30 AM	0.07	0.016
		06/28/78	5:05 PM	0.07	0.015
		06/29/78	2:30 PM	0.13	0.0089
		06/30/78	5:35 PM	0.07	0.01
		07/01/78	10:30 AM	0.07	0.0042
		07/05/78	1:05 PM	0.07	0.0069
		07/06/78	10:10 AM	0.07	0.0055
		07/06/78	4:30 PM	0.07	NR(b)
		07/07/78	11:05 AM	0.07	0.0090
		07/07/78	5:00 PM	0.07	0.012
		07/10/78	1:45 PM	0.07	0.006
		07/11/78	9:30 AM	0.13	0.0057

TABLE 2.5-72 (continued)

Blast Purpose	Blast Location	Date	Blast Number/ Time of Day	Allowable Maximum Peak Particle Velocity (seconds)	Recorded Peak Particle Velocity (seconds)
Production Blasts (cont'd)	Lakework Quarry (cont'd)	07/24/78	9:10 AM	0.07	0.00012
		07/24/78	2:40 PM	0.07	0.0071
		07/25/78	10:20 AM	0.13	0.014
		07/27/78	2:35 PM	0.07	0.03
		07/28/78	9:30 AM	0.13	0.0055
		07/28/78	4:30 PM	0.13	0.018
		08/01/78	8:45 AM	0.13	0.013
		08/03/78	2:00 PM	0.13	0.0147
		08/09/78	9:55 AM	0.13	0.021
		08/11/78	9:10 AM	0.13	NR[(d)]
		08/15/78	9:40 AM	0.13	0.007
		08/15/78	3:30 PM	0.13	0.005
		08/21/78	10:10 AM	0.13	NR[(d)]
		08/22/78	10:30 AM	0.13	0.0054
		09/22/78	10:30 AM	2.0	0.015
		09/28/78	2:00 PM	0.07	NR[(b)]
		09/29/78	9:15 AM	0.13	0.034
		09/29/78	1:40 PM	0.13	0.0156
		10/03/78	5:00 PM	0.07	0.011
		10/23/78	12:45 PM	0.07	0.002
		10/23/78	5:25 PM	0.07	0.0037
		10/24/78	11:25 AM	0.13	0.0028

TABLE 2.5-72 (continued)

Blast Purpose	Blast Location	Date	Blast Number/ Time of Day	Allowable Maximum Peak Particle Velocity (seconds)	Recorded Peak Particle Velocity (seconds)
Production Blasts (cont'd)	Lakework Quarry (cont'd)	10/24/78	3:45 PM	0.13	0.005
		10/26/78	10:15 AM	0.07	0.0028
		10/31/78	10:35 AM	0.07	0.0035
		11/01/78	10:40 AM	0.07	NR[(d)]
		11/01/78	5:25 PM	0.07	0.002
		11/03/78	2:20 PM	0.07	0.003
		11/09/78	10:10 AM	0.07	0.0045
		11/10/78	3:30 PM	0.13	0.0025
		11/11/78	10:42 AM	0.13	0.0061
		11/30/78	1:30 PM	0.07	0.0027
		12/01/78	9:50 AM	0.07	0.004
		12/14/78	9:40 AM	0.07	0.002
		12/15/78	10:25 AM	0.07	0.003
		12/19/78	10:30 AM	0.07	0.02
Miscellaneous Blasts	Service Spillway	11/02/78	Power Pole #1	0.13	0.08
		11/02/78	Power Pole #2	0.13	0.012
		11/02/78	Power Pole #3	1.4	0.022
		11/03/78	Power Pole #4	1.4	0.062
		11/03/78	Power Pole #5	1.4	0.106
	Circulating Water Intake	10/17/78	59	0.5	0.059
		10/20/78	60	0.1	0.005

TABLE 2.5-73

LIFT THICKNESS SUMMARY FOR MAIN DAM AND SADDLE DAMS
COHESIVE EMBANKMENT FILL

Date	Location: Station[(a)]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[(b)]
11/19/77	85+00	70N	1	8	C
	85+10	65N	2	8	C
	85+15	90N	3	8	C
	85+10	90N	4	8	C
	83+50	110N	1	8	C
	84+00	40N	2	8	C
	83+00	90S	1	8	C
	82+50	100S	2	8	C
11/21/77	85+00	90S	1	6	C
	84+50	100S	2	6	C
03/22/78	31+15	3E	1	8	C
	28+40	0	1	8	C
03/30/78	32+14	1W	1	8	C
	28+95	2E	1	8	C

(a) No prefix indicates Main Dam station; Roman numeral prefix (I, II, III) indicates Saddle Dam station.

(b) Fill types: C = Cohesive embankment;
R = Rock fill embankment;
GDB = Granular drainage blanket;
GTD = Granular toe drain.

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
03/31/78	19+30	-	1	8	C
	34+67	-	1	8	C
04/01/78	34+00	1W	1	8	C
	26+00	-	1	8	C
	21+00	-	1	8	C
04/13/78	99+00	-	1	8	C
	102+00	-	1	8	C
04/14/78	96+00	-	1	8	C
	82+40	100W	1	8	C
	85+00	-	1	8	C
04/15/78	81+60	10S	1	8	C
	84+00	30S	1	8	C
	84+50	60N	2	8	C
	81+00	60S	2	8	C
	84+00	50N	2	8	C
	78+00	30S	1	8	C
	99+00	3S	1	8	C
	99+00	0	1	8	C
04/21/78	101+25	3S	1	8	C
	80+50	-	1	8	C
	85+00	-	1	8	C
	83+90	84S	1	8	C
	82+00	-	2	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
04/22/78	96+00	3N	2	8	C
	102+00	3S	4	8	C
	87+00	3N	3	8	C
	98+00	20S	1	8	C
04/24/78	93+05	4N	2	8	C
	103+05	0	1	8	C
	85+42	106S	1	8	C
	81+40	-	1	8	C
04/25/78	91+06	4S	3	8	C
	85+20	14N	1	8	C
	82+40	-	1	8	C
	88+08	40S	1	8	C
04/26/78	83+60	99N	1	8	C
	81+28	77S	1	8	C
04/27/78	79+05	55S	3	8	C
	82+20	27N	1	8	C
	112+00	-	1	8	C
05/03/78	83+80	-	1	8	C
	92+00	-	1	8	C
05/04/78	82+50	-	1	8	C
	84+00	-	1	8	C
	102+25	-	1	8	C
	122+00	-	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
05/05/78	81+50	20N	1	8	C
	84+00	50S	1	8	C
	83+00	0	1	8	C
05/10/78	85+30	10N	1	8	C
	89+15	33S	1	8	C
	90+10	5N	1	8	C
	101+24	7N	1	8	C
	111+00	–	1	8	C
	87+00	–	1	8	C
05/15/78	83+00	50N	1	8	C
	84+50	0	1	8	C
	87+90	15S	1	8	C
	100+00	20S	1	8	C
05/16/78	99+48	3N	1	8	C
	84+30	7S	1	8	C
	81+40	83N	1	8	C
	87+90	15S	1	8	C
	100+00	–	1	8	C
05/17/78	95+95	6S	1	8	C
	84+00	83N	1	8	C
	100+98	8S	1	8	C
	91+40	4N	1	8	C
05/22/78	42+00	100N	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
05/25/78	6+50	-	1	8	C
	5+00	-	2	8	C
	2+00	-	1	8	C
05/26/78	5+15	70E	1	8	C
	2+40	1E	1	8	C
	7+20	49E	2	8	C
05/30/78	7+20	49E	1	6	C
	6+30	30W	1	6	C
	0+65	5E	1	6	C
	5+80	35E	2	6	C
	0+90	-	2	6	C
	2+75	-	3	6	C
	7+25	65W	2	6	C
05/31/78	6+10	75W	1	6	C
	6+20	60E	1	6	C
	5+25	70E	2	6	C
	5+90	90W	2	6	C
	1+20	0	1	6	C
	1+20	0	2	6	C
06/01/78	5+65	60E	1	6	C
	34+00	30W	1	6	C
	89+75	0	1	6	C
	85+45	20N	1	6	C
	81+00	40N	1	6	C
	2+20	-	1	6	C
	3+50	-	2	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/02/78	5+20	90N	1	6	C
06/03/78	43+50	0	1	6	C
06/05/78	6+00	120E	1	8	C
	6+80	140W	1	8	C
	6+30	75W	1	8	C
	5+00	0	2	8	C
	7+00	20E	2	8	C
	3+00	0	1	8	C
	24+00	0	1	8	C
	27+00	50E	1	8	C
	30+00	50W	1	8	C
	35+00	0	1	8	C
	39+00	0	1	8	C
	V3+00	0	1	8	C
06/06/78	42+00	75S	1	8	C
	38+00	50S	1	8	C
	5+00	100E	1	8	C
	7+00	20E	1	8	C
	3+00	0	1	8	C
06/07/78	42+00	0	1	8	C
06/08/78	V1+00	20S	1	8	C
	V3+50	30N	2	8	C
	4+50	100E	1	8	C
	5+50	90W	1	8	C
	7+00	0	1	8	C
	2+00	0	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/09/78	38+00	40S	1	8	C
	44+00	50S	1	8	C
	6+50	0	1	8	C
	4+20	110E	1	8	C
	7+00	100W	1	8	C
	83+00	20W	1	8	C
	90+00	20S	1	8	C
	100+00	0	1	8	C
06/10/78	V1+50	20N	1	8	C
	2+40	10W	1	8	C
	28+00	0	1	8	C
	31+00	50E	1	8	C
	41+00	0	1	8	C
06/12/78	31+00	0	1	8	C
	29+00	30E	1	8	C
	27+00	20W	1	8	C
	39+00	50S	1	8	C
	42+00	50S	1	8	C
06/13/78	38+00	20S	1	8	C
	44+00	80S	1	8	C
	28+00	0	1	8	C
	33+00	20W	1	8	C
	17+50	0	2	8	C
06/14/78	80+00	0	1	8	C
	86+60	20S	1	8	C
	84+00	20N	2	8	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
06/14/78	90+00	0	2	8	C
	97+00	15S	1	8	C
	100+00	0	2	8	C
	28+00	15W	1	8	C
	33+00	0	1	8	C
	44+00[c]	0	1	8	C
	16+00[c]	0	2	8	C
06/15/78	28+00	0	1	8	C
	33+00	15W	1	8	C
	36+50	20S	1	8	C
	42+50	80S	1	8	C
	24+00	0	1	8	C
	98+00	0	1	8	C
	82+00	0	1	8	C
	90+00	5S	1	8	C
06/16/78	30+00	-	1	8	C
	37+00	-	1	8	C
	42+00	-	1	8	C
	95+00	-	1	8	C
	81+00	-	1	8	C
	90+00	-	1	8	C
06/17/78	95+90	14N	1	8	C
	87+95	4N	1	8	C
	15+12	6E	1	8	C
	33+90	30E	1	8	C
	32+50	40E	1	8	C

[c] In keyway.

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/17/78	102+60	10S	1	8	C
	41+70	4N	1	8	C
06/19/78	5+00	110E	1	8	C
	7+50	0	1	8	C
	6+00	100W	1	8	C
	2+40	0	1	8	C
	97+00	0	1	8	C
	84+00	25S	1	8	C
	90+00	10N	1	8	C
	40+00	0	1	8	C
	V2+00	0	1	8	C
06/22/78	28+00	20E	1	8	C
	23+00	0	1	8	C
	4+75	100E	1	8	C
	6+50	10W	1	8	C
	7+50	110W	1	8	C
	84+00	0	1	8	C
	90+00	30S	1	8	C
	41+75	0	1	8	C
06/23/78	3+00	0	1	8	C
	25+00	10E	1	8	C
	33+00	20W	1	8	C
	82+00	30S	1	8	C
	91+50	0	1	8	C
	38+00	0	1	8	C
	V3+00	20N	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/24/78	29+95	4W	1	8	C
	22+40	4E	1	8	C
	95+91	6N	1	8	C
	6+65	120E	1	8	C
	0+60	4E	1	8	C
	91+00	9N	1	8	C
	44+15	2S	1	8	C
	30+00	-	2	8	C
06/26/78	81+00	0	1	8	C
	86+00	20N	1	8	C
	23+00	20E	1	8	C
	33+00	0	1	8	C
	9+50	40W	1	8	C
	16+00	60W	1	8	C
	15+00	90W	2	8	C
	8+15	12E	3	8	C
	14+00	0	1	8	C
06/27/78	82+00	24S	1	8	C
	85+30	0	1	8	C
	28+00	0	1	8	C
	34+00	20W	1	8	C
	11+20	0	2	8	C
	44+00	40N	1	8	C
	45+00	30N	2	8	C
06/28/78	10+00	-	1	8	C
	2+00	-	1	8	C
	36+40	60N	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/28/78	45+45	0	2	8	C
	33+82	30W	1	8	C
	21+58	15W	1	8	C
	16+00	80W	2	8	C
	13+90	4W	1	8	C
06/29/78	5+05	40W	1	6	C
	1+95	5W	1	6	C
	43+10	55N	1	6	C
	24+20	6W	1	6	C
	30+80	8E	1	6	C
	83+10	0	1	6	C
	16+00	90W	1	6	C
	13+00	-	1	6	C
	14+20	-	4	6	C
	12+90	108W	2	6	C
06/30/78	15+95	4E	1	8	C
	11+95	121E	1	8	C
	9+80	5E	2	8	C
	15+00	95W	1	8	C
	13+10	0	3	8	C
	44+60	60N	1	8	C
	38+30	4S	1	8	C
	12+00	-	4	8	C
	84+10	15N	1	8	C
	80+00	-	2	8	C
07/01/78	81+10	18N	1	6	C
	26+35	0	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/01/78	44+05	4N	1	6	C
	14+90	105E	1	6	C
	10+15	75E	1	6	C
	12+80	85W	1	8	C
	15+85	4W	1	6	C
	84+85	4S	1	6	C
	30+18	3E	1	8	C
	15+00	-	2	6	C
07/05/78	8+00	110W	1	8	C
	11+15	100W	1	8	C
	12+25	5W	1	8	C
	5+85	50E	1	8	C
	12+60	60E	1	8	C
	9+35	90E	1	8	C
	10+00	20E	1	8	C
	44+00	0	1	8	C
	38+00	10N	1	8	C
07/06/78	7+50	0	2	8	C
	12+50	20E	2	8	C
	16+10	100E	1	8	C
	7+05	90E	1	8	C
	10+00	20E	1	8	C
	15+00	15W	1	8	C
	8+50	50W	1	8	C
	14+10	110W	1	8	C
	5+95	135W	1	8	C
	4+50	100E	2	8	C
	7+30	90E	2	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/06/78	16+00	20E	2	8	C
	18+00	0	2	8	C
	10+00	40W	2	8	C
	14+30	100W	2	8	C
07/07/78	10+80	20E	1	8	C
	12+20	0	1	8	C
	4+30	125E	1	8	C
	9+20	50E	1	8	C
	13+00	130E	1	8	C
	18+20	90E	1	8	C
	7+95	40W	1	8	C
	14+90	100W	1	8	C
	18+50	80W	1	8	C
	6+60	100W	1	8	C
	10+25	115W	1	8	C
	6+95	115E	1	8	C
	42+10	20N	1	8	C
	36+00	0	1	8	C
	7+30	60W	1	8	C
07/08/78	17+10	-	1	8	C
	15+40	-	1	8	C
	11+90	101W	1	8	C
	6+75	125W	1	8	C
	4+85	96W	1	8	C
	9+95	112W	1	8	C
	37+55	6S	1	8	C
	42+90	24S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/08/78	16+30	100E	1	8	C
	14+45	85E	1	8	C
	9+85	-	1	8	C
	4+75	120E	1	8	C
	18+30	120W	1	8	C
	13+00	-	1	8	C
	3+50	-	1	8	C
07/11/78	14+60	111E	1	8	C
	18+70	90E	1	8	C
	5+10	50W	1	8	C
	17+40	100W	1	8	C
	1+40	40W	1	8	C
	12+70	100E	1	8	C
	8+80	20W	1	8	C
	43+00	10S	1	8	C
	IV17+80	1E	1	8	C
07/12/78	18+70	-	1	8	C
	18+10	70W	1	8	C
	9+00	65E	1	8	C
	15+80	85E	1	8	C
	5+98	0	1	8	C
	14+60	50W	1	8	C
	4+10	-	1	8	C
	7+50	-	2	8	C
	11+00	-	2	8	C
07/15/78	2+00	-	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/17/78	17+10	70W	1	8	C
	14+20	40W	1	8	C
	2+40	0	1	8	C
	10+00	20W	1	8	C
	73+00	150S	1	8	C
	75+00	100S	1	8	C
	73+50	40S	2	8	C
	75+50	120S	2	8	C
07/18/78	75+20	225S	1	8	C
	74+90	40S	1	8	C
	73+50	150S	2	8	C
	75+50	110S	2	8	C
	74+00	30S	3	8	C
07/19/78	73+20	110S	1	8	C
	16+60	60E	1	8	C
	17+10	20W	1	8	C
	18+05	110W	1	8	C
	75+20	210S	2	8	C
	73+40	-	2	8	C
	8+00	50W	1	8	C
	9+70	50E	2	8	C
	3+00	-	2	8	C
07/20/78	17+70	80W	1	8	C
	17+10	55E	1	8	C
	18+10	40W	2	8	C
	15+50	60E	2	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/20/78	3+15	0	2	8	C
	12+50	0	2	8	C
	76+00	275S	1	8	C
	74+00	160S	1	8	C
	73+60	30S	2	8	C
	74+50	200S	2	8	C
	73+10	100S	2	8	C
	75+50	60S	3	8	C
	73+00	280S	3	8	C
	76+25	40S	4	8	C
	73+20	180S	4	8	C
	74+00	225S	4	8	C
	73+75	50S	5	8	C
	13+25	30E	1	8	C
	7+40	20W	1	8	C
07/21/78	74+00	200S	1	8	C
	75+00	100S	1	8	C
	11+80	39E	1	8	C
	9+10	10E	1	8	C
	5+85	15W	1	8	C
	17+95	50W	1	8	C
	76+25	250S	2	8	C
	73+50	140S	2	8	C
	72+90	195S	3	8	C
	74+00	-	3	8	C
07/22/78	17+50	96E	1	8	C
	75+10	110S	1	8	C
	4+30	15W	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/22/78	72+15	270S	2	8	C
	11+05	30E	1	8	C
	76+40	260S	2	8	C
	71+15	200S	1	8	C
	74+25	130S	1	8	C
	76+00	190N	1	8	C
	74+45	28N	1	8	C
	12+90	35W	1	8	C
	5+98	5E	1	8	C
	74+10	100S	1	8	C
07/24/78	76+25	280S	1	8	C
	72+15	170S	1	8	C
	75+20	90S	1	8	C
	74+50	70N	1	8	C
	76+00	250N	1	8	C
	72+75	260S	2	8	C
	75+00	100S	2	8	C
	73+50	25S	2	8	C
	75+25	240N	2	8	C
	75+80	50N	2	8	C
	7+00	0	1	8	C
	15+00	0	1	8	C
	19+50	50E	1	8	C
07/25/78	17+00	0	1	8	C
	73+40	200N	2	8	C
	3+85	5W	1	8	C
	7+10	4E	1	8	C
	17+60	-	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/25/78	75+20	100N	2	8	C
	75+80	100N	1	8	C
	74+40	225N	1	8	C
	72+50	150S	1	8	C
	74+60	225S	1	8	C
	11+60	10W	1	8	C
07/26/78	71+10	230S	1	8	C
	72+40	150S	1	8	C
	75+40	200S	1	8	C
	76+00	70S	1	8	C
	75+00	40N	1	8	C
	75+20	95N	1	8	C
	19+00	15W	1	8	C
	14+90	0	1	8	C
	10+90	25E	1	8	C
	4+50	5E	1	8	C
	73+50	150N	2	8	C
	75+50	225N	2	8	C
	44+00	0	1	8	C
07/27/78	75+00	-	2	8	C
	73+00	-	2	8	C
	76+05	15N	1	8	C
	74+40	130N	1	8	C
	74+85	270N	1	8	C
	15+30	15W	1	8	C
	18+90	10E	1	8	C
	76+00	60S	1	8	C
	11+40	20E	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/27/78	5+80	0	2	8	C
	76+70	130N	2	8	C
	18+30	10W	2	8	C
	16+40	18W	2	8	C
	74+60	255S	2	8	C
	72+80	225S	2	8	C
07/28/78	76+70	265S	1	8	C
	76+50	40S	1	8	C
	76+85	90N	1	8	C
	73+80	275N	1	8	C
	76+25	265N	1	8	C
	72+10	60S	1	8	C
	74+00	0	1	8	C
	76+00	20S	1	8	C
	75+50	100N	1	8	C
	73+10	250N	1	8	C
	74+00	50N	1	8	C
	IV23+30	4W	1	8	C
	IV14+00	-	2	8	C
	IV7+00	-	2	8	C
	IV3+00	-	1	8	C
	V2+00	-	1	8	C
07/31/78	66+50	40N	2	8	C
	68+50	75N	2	8	C
	69+00	125S	2	8	C
	67+00	200N	2	8	C
	75+90	20S	1	8	C
	73+20	0	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
07/31/78	74+00	150N	1	8	C
	76+95	285N	1	8	C
	73+00	10S	1	8	C
	71+00	40S	1	8	C
	74+50	100N	1	8	C
	75+00	200N	1	8	C
	72+00	150N	1	8	C
	67+70	20S	1	8	C
	68+00	100S	1	8	C
	68+50	195S	1	8	C
	69+50	250S	1	8	C
08/01/78	76+50	200N	1	8	C
	73+90	220N	1	8	C
	73+00	260N	1	8	C
08/02/78	76+00	-	1	8	C
	65+50	-	1	8	C
	70+10	-	1	8	C
	69+20	200S	1	8	C
	67+30	190S	1	8	C
	66+10	80S	1	8	C
	67+70	130S	1	8	C
	68+90	0	1	8	C
	74+70	75S	1	8	C
	72+30	25S	1	8	C
	67+80	20S	1	8	C
	77+00	50N	1	8	C
	44+05	15N	1	8	C
	39+50	0	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/02/78	72+40	230N	1	8	C
	67+00	260N	1	8	C
08/03/78	76+00	75N	1	8	C
	72+30	60N	1	8	C
	69+90	120N	1	8	C
	68+10	200N	1	8	C
	65+50	175N	1	8	C
	66+10	225N	1	8	C
	65+70	260S	1	8	C
	68+60	200S	1	8	C
	73+30	275S	1	8	C
	65+20	10N	1	8	C
	75+00	25S	1	8	C
	68+80	280N	1	8	C
	73+90	250N	1	8	C
08/04/78	71+80	100N	1	8	C
	69+40	40N	1	8	C
	76+10	30S	1	8	C
	72+80	50S	1	8	C
	73+55	190N	2	8	C
	69+90	190N	2	8	C
	76+25	65S	1	8	C
	73+20	80S	1	8	C
	70+20	20S	1	8	C
	66+70	250S	1	8	C
	70+30	280S	1	8	C
	72+60	275S	1	8	C
	77+00	275N	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/04/78	73+60	255N	1	8	C
	68+00	280N	1	8	C
	65+50	200S	1	8	C
	70+00	250S	1	8	C
	76+00	25N	1	8	C
	74+00	75N	1	8	C
08/05/78	68+00	30N	1	8	C
	72+10	50S	1	8	C
	13+75	10W	1	8	C
	10+00	6W	1	8	C
	5+15	0	1	8	C
	17+60	10E	1	8	C
	76+10	30S	1	8	C
	67+10	60N	1	8	C
	69+83	0	1	8	C
	74+40	90N	1	8	C
	71+15	245N	1	8	C
	65+15	280N	1	8	C
	76+45	200S	1	8	C
	74+30	230S	1	8	C
	72+85	100S	1	8	C
	70+95	210S	1	8	C
	68+95	285S	1	8	C
	66+85	60S	1	8	C
	26+97	4E	1	8	C
08/07/78	5+00	-	1	8	C
	17+20	-	1	8	C
	19+50	-	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/07/78	11+50	-	1	8	C
	40+00	-	1	8	C
	44+50	-	1	8	C
	74+80	230N	1	8	C
	65+75	-	1	8	C
	70+50	230N	1	8	C
	74+50	210N	1	8	C
	70+00	-	1	8	C
	71+25	-	1	8	C
	65+50	-	1	8	C
	76+50	-	1	8	C
	70+50	-	1	8	C
	68+00	-	1	8	C
	74+25	-	1	8	C
	67+00	280S	1	8	C
	72+75	-	1	8	C
08/08/78	75+85	275N	2	8	C
	72+50	260N	2	8	C
	68+60	280N	2	8	C
	66+00	90N	2	8	C
	70+05	60N	2	8	C
	74+60	15N	2	8	C
	77+00	-	2	8	C
	18+10	-	1	8	C
	4+80	-	1	8	C
	76+00	60S	1	8	C
	72+90	100S	1	8	C
	69+95	120S	1	8	C
	66+10	150S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/08/78	16+15	5W	1	8	C
	12+70	15W	1	8	C
	7+15	0	1	8	C
	75+00	250S	1	8	C
	71+80	275S	1	8	C
	68+40	260S	1	8	C
	32+75	5W	1	8	C
	43+00	115N	1	8	C
	38+00	120N	1	8	C
08/09/78	68+00	75N	2	8	C
	76+65	185N	2	8	C
	72+15	280N	2	8	C
	68+45	160N	2	8	C
	18+35	22W	1	8	C
	11+80	15E	1	8	C
	5+40	0	1	8	C
	67+50	35N	1	8	C
	70+30	20N	1	8	C
	76+40	5N	1	8	C
	75+00	10S	1	8	C
	70+50	25S	1	8	C
	67+30	200S	1	8	C
	69+15	140S	1	8	C
	67+50	280N	1	8	C
	69+60	275N	1	8	C
	73+50	260N	1	8	C
08/10/78	23+00	-	2	8	C
	27+00	-	2	8	C
	68+50	-	2	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/10/78	72+10	-	2	8	C
	75+15	-	2	8	C
	68+75	60N	1	8	C
	67+95	10S	1	8	C
	74+40	0	1	8	C
	66+50	265N	1	8	C
	69+00	230N	1	8	C
	72+97	265N	1	8	C
	69+15	140S	1	8	C
	71+90	260S	1	8	C
	74+80	200S	1	8	C
	67+80	250N	1	8	C
	70+75	275N	1	8	C
	76+25	255N	1	8	C
	75+85	75N	1	8	C
08/11/78	75+50	290N	2	8	C
	75+98	5N	2	8	C
	72+10	35N	2	8	C
	68+50	25N	2	8	C
	25+65	5E	2	8	C
	68+95	225S	2	8	C
	71+00	275S	2	8	C
	66+50	265N	1	8	C
	74+40	0	1	8	C
	75+80	100N	1	8	C
	72+40	120N	1	8	C
	68+10	90N	1	8	C
	67+20	75S	1	8	C
	70+05	125S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/11/78	74+80	150S	1	8	C
	74+60	225S	1	8	C
	72+60	240S	1	8	C
	68+40	280S	1	8	C
	67+10	275N	1	8	C
	70+80	230N	1	8	C
08/12/78	68+40	-	2	8	C
	69+75	-	2	8	C
	72+00	280N	1	8	C
	67+05	200N	1	8	C
	76+05	40N	1	8	C
	73+30	110N	2	8	C
	68+85	70N	2	8	C
	67+60	5S	2	8	C
	69+95	20S	2	8	C
	72+60	0	2	8	C
	74+95	298N	2	8	C
	70+40	215N	2	8	C
	67+00	245N	2	8	C
	75+40	-	2	8	C
	71+10	-	2	8	C
	76+85	35N	1	8	C
	73+70	90N	1	8	C
	69+10	90N	1	8	C
	67+80	60S	1	8	C
	70+35	40S	1	8	C
	74+75	50S	1	8	C
	16+10	10E	1	8	C
	11+00	5W	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/12/78	4+85	10W	1	8	C
	67+75	280S	1	8	C
	70+00	210S	1	8	C
	72+95	270S	1	8	C
	75+80	210N	1	8	C
08/14/78	72+00	-	2	8	C
	70+50	-	2	8	C
	68+00	-	2	8	C
	67+00	-	2	8	C
	69+25	-	2	8	C
	76+20	290S	1	8	C
	72+80	260S	1	8	C
	68+50	275S	1	8	C
	76+10	290N	1	8	C
	69+10	100N	1	8	C
	71+50	-	1	8	C
	67+25	-	1	8	C
	74+00	-	1	8	C
	73+50	-	1	8	C
	77+00	-	1	8	C
	75+00	75N	1	8	C
	76+50	-	2	8	C
	74+25	-	2	8	C
08/15/78	75+08	305S	1	8	C
	73+00	210S	1	8	C
	69+10	295S	1	8	C
	67+35	140S	1	8	C
	70+05	50S	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/15/78	77+30	10S	1	8	C
	66+00	270N	1	8	C
	68+70	280N	1	8	C
	76+15	230N	1	8	C
	68+00	-	1	8	C
	72+30	-	1	8	C
08/16/78	69+25	125S	1	6	C
	72+00	25S	1	6	C
	74+80	25S	1	6	C
	69+85	-	1	6	C
	75+20	260S	1	6	C
	76+40	110N	1	6	C
	72+60	75N	1	6	C
	68+50	50N	1	6	C
	67+75	60S	1	6	C
	69+25	125S	1	6	C
	67+10	-	1	6	C
	70+65	-	1	6	C
08/17/78	75+85	250S	1	8	C
	73+20	220S	1	8	C
	69+20	255S	1	8	C
	67+50	-	1	8	C
	72+20	-	1	8	C
	73+50	-	1	8	C
	75+30	10N	1	8	C
	76+50	-	1	8	C
	77+00	-	1	8	C
	74+00	-	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/17/78	71+00	-	1	8	C
	70+50	-	1	8	C
08/18/78	66+05	290N	1	6	C
	68+45	275N	1	6	C
	73+35	240N	1	6	C
	76+90	180N	1	6	C
	73+00	150N	1	6	C
	67+80	160N	1	6	C
	70+10	-	1	6	C
	75+00	-	2	6	C
08/19/78	76+85	50N	1	6	C
	73+45	25S	1	6	C
	69+50	60S	1	6	C
	77+20	260N	1	6	C
	73+60	270N	1	6	C
	69+15	210N	1	6	C
08/21/78	75+00	250N	1	8	C
	71+50	200N	1	8	C
	66+50	275N	1	8	C
	76+50	100N	1	8	C
	70+25	65N	1	8	C
	68+00	0	1	8	C
	74+00	50S	1	8	C
	72+00	75S	1	8	C
	65+50	60S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/22/78	76+00	230S	1	8	C
	74+00	250S	1	8	C
	71+50	280S	1	8	C
	67+00	220S	1	8	C
	77+00	200N	1	8	C
	70+00	280N	1	8	C
	68+00	250N	1	8	C
	65+50	220N	1	8	C
08/23/78	74+60	75N	1	8	C
	70+50	25N	1	8	C
	67+80	75S	1	8	C
	69+50	125S	1	8	C
	72+25	100S	1	8	C
	74+00	250S	1	8	C
	76+50	225S	1	8	C
	71+20	175S	1	8	C
08/24/78	76+80	60S	1	6	C
	72+95	85S	1	6	C
	69+45	65S	1	6	C
	67+40	225S	1	6	C
	70+40	245S	1	6	C
	72+98	268S	1	6	C
	77+00	-	1	6	C
	77+50	-	1	6	C
	71+40	-	1	6	C
08/25/78	70+30	250N	1	6	C
	73+10	150N	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/25/78	76+15	200N	1	6	C
	75+95	0	1	6	C
	71+90	10N	1	6	C
	71+25	100S	1	6	C
	76+80	120S	1	6	C
08/26/78	70+60	285S	1	6	C
	72+90	210S	1	6	C
	76+50	245S	1	6	C
	77+00	230N	1	6	C
	72+85	240N	1	6	C
	68+10	270N	1	6	C
	74+30	-	1	6	C
	75+75	-	1	6	C
08/28/78	64+75	-	1	6	C
	67+20	-	1	6	C
	70+00	-	1	6	C
	74+50	-	1	6	C
08/29/78	76+30	150S	1	8	C
	73+00	250S	1	8	C
	69+45	275S	1	8	C
	78+30	200N	1	8	C
	75+50	215N	1	8	C
	67+75	80N	1	8	C
08/30/78	77+35	100S	1	8	C
	74+85	140S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/30/78	73+25	160S	1	8	C
	66+90	85S	1	8	C
	65+60	295S	1	8	C
	70+15	274S	1	8	C
	69+10	80S	1	8	C
08/31/78	77+80	230N	1	6	C
	74+35	250N	1	6	C
	67+90	295N	1	6	C
	66+10	130N	1	6	C
	75+05	100N	1	6	C
	73+40	0	1	6	C
	70+10	120N	1	6	C
	69+40	200N	1	6	C
	85+00	45S	1	6	C
	84+00	50S	1	6	C
09/01/78	72+70	190S	1	8	C
	70+30	90S	1	8	C
	68+80	135S	1	8	C
	66+00	245S	1	8	C
	77+10	200N	1	8	C
	72+95	280N	1	8	C
	69+90	245N	1	8	C
	78+00	200S	1	8	C
	73+20	150S	1	8	C
09/02/78	58+70	230N	1	8	C
	57+50	260N	1	8	C
	58+50	180N	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
09/02/78	59+00	160N	2	8	C
	55+50	200N	2	8	C
	58+30	285N	2	8	C
	66+00	100S	1	8	C
	69+50	250S	1	8	C
	70+00	50S	1	8	C
	71+00	280S	1	8	C
	73+00	150S	1	8	C
09/05/78	60+50	175N	1	6	C
	58+00	150N	1	6	C
	55+90	100N	1	6	C
	61+90	50S	1	6	C
	64+50	40S	1	6	C
	67+10	100S	1	6	C
	72+50	240S	1	6	C
	70+00	0	1	8	C
09/06/78	61+80	75S	1	8	C
	59+00	120S	1	8	C
	56+00	200N	1	8	C
	59+80	150N	1	8	C
	60+50	75S	1	8	C
	62+00	100N	1	8	C
	58+50	60N	1	8	C
	62+25	80S	1	8	C
09/07/78	59+00	100N	1	6	C
	61+00	80N	1	6	C
	62+30	60N	1	6	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
09/07/78	65+00	60S	1	6	C
	67+00	65S	1	6	C
09/11/78	56+20	190N	1	8	C
	61+20	200N	1	8	C
	62+50	60N	1	8	C
	64+50	100S	1	8	C
	67+00	250S	1	8	C
	68+50	225S	1	8	C
	68+00	200S	1	8	C
	65+35	265N	1	8	C
	67+80	285N	1	8	C
	68+00	125N	1	8	C
	69+00	60N	1	8	C
	71+70	25S	1	8	C
	73+25	100N	1	8	C
	75+30	50N	1	8	C
	76+10	25N	1	8	C
	57+00	75S	1	8	C
	59+00	100S	1	8	C
	61+50	125S	1	8	C
	78+00	25S	1	8	C
	56+50	175S	1	8	C
09/12/78	65+35	265N	1	8	C
	59+80	200N	1	8	C
	58+60	100N	1	8	C
	60+30	280N	1	8	C
	64+40	275S	1	8	C
	95+05	255S	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
09/12/78	67+95	56S	1	8	C
	68+90	25S	1	8	C
	70+00	15S	1	8	C
	66+10	25S	1	8	C
09/13/78	73+10	175N	1	8	C
	57+30	280N	1	8	C
	59+25	285N	1	8	C
	76+10	100N	1	8	C
	57+90	145N	1	8	C
	62+95	100N	1	8	C
	55+00	150N	1	8	C
	56+00	200S	1	8	C
09/15/78	76+10	100N	1	8	C
	57+00	100S	1	8	C
	70+00	10N	1	8	C
	69+10	0	1	8	C
09/16/78	54+20	155S	1	8	C
	53+90	290S	1	8	C
	57+30	215N	1	8	C
	60+95	200N	1	8	C
	60+05	0	1	8	C
	62+95	20N	1	8	C
	70+00	150N	1	8	C
09/18/78	63+20	80S	1	8	C
	66+90	25S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
09/18/78	70+05	40S	1	8	C
	76+30	65S	1	8	C
	59+15	300N	1	8	C
	63+10	275N	1	8	C
	69+05	200N	1	8	C
	73+85	170N	1	8	C
	57+10	40S	1	8	C
	59+50	150S	1	8	C
09/19/78	58+00	320S	1	8	C
	60+10	295S	1	8	C
	63+40	270S	1	8	C
	66+75	220S	1	8	C
	66+05	105S	1	8	C
	63+90	90S	1	8	C
	61+10	40S	1	8	C
	57+10	75S	1	8	C
	63+95	280N	1	8	C
	59+90	240N	1	8	C
	58+85	0	1	8	C
	62+00	20S	1	8	C
	64+00	70N	1	8	C
	55+70	290S	1	8	C
	61+95	255S	1	8	C
	64+70	285S	1	8	C
	67+60	250S	1	8	C
	60+35	245N	1	8	C
	54+00	150S	1	8	C
	59+10	100S	1	8	C
	60+00	0	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
09/19/78	73+00	150N	1	8	C
	70+50	190N	1	8	C
09/21/78	57+70	0	1	8	C
	63+00	10N	1	8	C
	56+00	200S	1	8	C
	54+00	160S	1	8	C
	57+80	180S	1	8	C
	60+30	300S	1	8	C
	62+85	150S	1	8	C
09/22/78	58+40	300N	1	8	C
	63+30	275N	1	8	C
	61+85	220N	1	8	C
	58+90	100S	1	8	C
	61+30	160S	1	8	C
	63+70	5S	1	8	C
	56+30	300S	1	8	C
	62+75	280S	1	8	C
	59+15	315S	1	8	C
	58+50	15N	1	8	C
	64+30	100N	2	8	C
	62+00	150N	2	8	C
	57+40	200N	2	8	C
	61+90	5N	2	8	C
	63+20	30S	2	8	C
	59+85	20S	2	8	C
	64+90	295S	2	8	C
	62+50	300S	2	8	C
	60+60	0	2	8	C
	63+60	70S	2	8	C

Date	Location		Lift Number	Lift Thickness (inches)	Fill Type[b]
	Station[a]	Offset from Centerline (feet)			
09/23/78	59+00	275N	1	8	C
	61+70	85N	1	8	C
	58+85	80S	1	8	C
	61+20	135S	1	8	C
	64+20	40S	1	8	C
	64+85	270N	1	8	C
	58+60	290S	1	8	C
	63+35	300S	1	8	C
	69+70	130N	1	8	C
	74+40	102N	1	8	C
	58+95	5S	1	8	C
	60+00	70S	1	8	C
	63+70	50S	1	8	C
	65+75	15N	1	8	C
	70+90	20S	1	8	C
	74+20	5S	1	8	C
	78+15	30S	1	8	C
	63+50	280S	2	8	C
	59+95	295S	2	8	C
	58+00	200N	2	8	C
09/25/78	64+50	150S	1	6	C
	61+50	140S	1	6	C
	58+50	75S	1	6	C
	60+40	150S	1	6	C
	62+00	130S	1	6	C
	64+00	160S	1	6	C
	64+50	125N	1	6	C
	58+75	275N	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
09/26/78	64+90	0	1	6	C
	60+50	50N	1	6	C
	72+70	75N	1	6	C
	76+40	75N	1	6	C
	59+00	275S	1	6	C
	62+80	260S	1	6	C
	66+00	260S	1	6	C
	59+40	290N	1	6	C
	61+50	290N	1	6	C
	61+50	290N	1	6	C
	61+50	270N	1	6	C
	63+70	270N	1	6	C
	63+80	100S	1	6	C
	62+50	140S	1	6	C
	61+30	180S	1	6	C
	63+70	160S	1	6	C
09/27/78	60+50	260N	1	6	C
	61+50	260N	1	6	C
	60+50	125N	1	6	C
	58+70	100N	1	6	C
	55+70	100S	1	6	C
	56+60	230S	1	6	C
	61+00	80S	1	6	C
	59+80	70S	1	6	C
	58+70	110S	1	6	C
	78+00	100N	1	6	C
	77+10	80N	1	6	C
	75+50	80N	1	6	C
	69+50	80N	1	6	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
09/27/78	60+10	280S	1	6	C
	61+90	280S	1	6	C
	62+90	290S	1	6	C
	64+50	280S	1	6	C
	71+50	60S	1	6	C
	75+50	80S	1	6	C
	72+50	60S	1	6	C
	77+50	80S	1	6	C
09/28/78	61+00	225N	1	6	C
	63+25	175N	1	6	C
	65+00	275N	1	6	C
	62+50	100N	1	6	C
	59+90	0	1	6	C
	64+25	50N	1	6	C
	58+00	100S	1	6	C
	61+00	75S	1	6	C
	64+50	50S	1	6	C
	64+40	50S	1	6	C
	71+75	50N	1	6	C
	74+75	0	1	6	C
	77+50	75N	1	6	C
	61+60	250S	1	6	C
	62+10	260S	1	6	C
	65+25	250S	1	6	C
	63+75	225S	1	6	C
	71+00	50S	1	6	C
	74+50	70S	1	6	C
	78+00	90S	1	6	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
09/29/78	58+00	270N	1	6	C
	60+00	250N	1	6	C
	62+00	175N	1	6	C
	63+50	150N	1	6	C
	64+00	160N	1	6	C
	76+00	25N	1	6	C
	74+10	50N	1	6	C
	71+50	75N	1	6	C
	60+75	150S	1	6	C
	57+50	220S	1	6	C
	58+75	185S	1	6	C
	59+50	175S	1	6	C
	64+00	250S	1	6	C
	62+25	0	1	6	C
	62+50	100S	1	6	C
	65+25	30N	1	6	C
	77+75	75S	1	6	C
	83,635N[3]	99,734E	4	6	C
10/02/78	58+25	300N	1	6	C
	60+20	250N	1	6	C
	63+00	290N	1	6	C
	65+30	290N	1	6	C
	65+00	200S	1	6	C
	63+20	250S	1	6	C
	61+00	210S	1	6	C
	60+80	205S	1	6	C
	77+50	50N	1	6	C

(c) SNUPPS coordinates.

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/02/78	75+00	0	1	6	C
	73+25	50S	1	6	C
	72+00	75N	1	6	C
	69+85	75S	1	6	C
	64+75	0	1	6	C
	61+00	0	1	6	C
	58+75	50S	1	6	C
	56+50	100S	1	6	C
	61+50	280S	1	6	C
	63+25	275S	1	6	C
10/03/78	74+75	75N	1	8	C
	70+20	65N	1	8	C
	67+00	150N	1	8	C
	63+80	250N	1	8	C
	58+50	200N	1	8	C
	62+00	180N	1	8	C
	57+00	260S	1	8	C
	60+00	270S	1	8	C
	62+00	270S	1	8	C
	64+70	270S	1	8	C
10/04/78	59+00	0	1	6	C
	62+00	0	1	6	C
	63+50	0	1	6	C
	68+00	0	1	6	C
	70+00	0	1	6	C
	75+00	0	1	6	C
	56+50	300S	1	6	C
	58+70	280S	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/04/78	60+50	270S	1	6	C
	62+70	250S	1	6	C
10/05/78	77+00	80N	1	6	C
	72+00	80N	1	6	C
	69+00	100N	1	6	C
	67+30	110N	1	6	C
	64+00	160N	1	6	C
	61+00	260N	1	6	C
	58+50	280N	1	6	C
	57+50	70S	1	6	C
	61+00	70S	1	6	C
	62+40	90S	1	6	C
	64+00	90S	1	6	C
10/06/78	70+00	50S	1	6	C
	73+00	100S	1	6	C
	76+00	100S	1	6	C
	65+00	200S	1	6	C
	63+00	250S	1	6	C
	60+00	270S	1	6	C
	59+00	280S	1	6	C
	56+70	250S	1	6	C
	83,195N	99,569E	8	3	C
	83,195N	99,569E	8	3	C
	83,210N	99,590E	12	3	C
	83,190N	99,570E	12	3	C
10/07/78	66+75	76N	1	6	C
	68+60	100N	1	6	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/07/78	71+00	0	1	6	C
	74+00	50S	1	6	C
	77+00	50N	1	6	C
	78+50	75S	1	6	C
	64+50	220N	1	6	C
	59+50	275N	1	6	C
	57+00	220N	1	6	C
	56+75	235N	1	6	C
	57+75	100S	1	6	C
	57+50	100S	1	6	C
	62+50	150S	1	6	C
	64+75	125S	1	6	C
	54+75	325N	1	6	C
	53+50	300N	1	6	C
	54+75	275N	1	6	C
	53+30	280N	1	6	C
	61+00	250S	1	6	C
	63+00	225S	1	6	C
	63+50	225S	1	6	C
	57+50	200S	1	6	C
	59+50	175S	1	6	C
10/09/78	59+00	250N	1	6	C
	58+30	220N	1	6	C
	58+50	80N	1	6	C
	60+50	50N	1	6	C
	64+00	0	1	6	C
	66+50	30N	1	6	C
	70+00	0	1	6	C
	72+00	40S	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/09/78	73+00	50S	1	6	C
	75+00	0	1	6	C
	78+50	80S	1	6	C
	73+00	100S	1	6	C
	68+00	80S	1	6	C
	68+00	80S	1	6	C
	69+00	100S	1	6	C
	63+50	150N	1	6	C
	64+25	100N	1	6	C
	65+00	6N	1	6	C
	55+00	150N	1	6	C
	57+00	200N	1	6	C
10/10/78	60+00	150N	1	6	C
	61+00	90S	1	6	C
	62+15	75N	1	6	C
	61+50	225S	1	6	C
	62+00	220S	1	6	C
	60+50	250S	1	6	C
	59+00	270S	1	6	C
	58+00	190S	1	6	C
	56+00	240S	1	6	C
	55+70	240S	1	6	C
	55+00	100N	1	6	C
	59+00	150N	1	6	C
	63+00	250N	1	6	C
	61+80	260N	1	6	C
	59+00	200N	1	6	C
	57+00	50S	1	6	C
	56+00	55S	1	6	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
10/10/78	56+00	50S	1	6	C
	59+00	50S	1	6	C
	61+00	60S	1	6	C
	62+00	40N	2	6	C
	62+50	100N	2	6	C
	54+50	100S	2	6	C
	55+50	80S	2	6	C
10/11/78	57+00	55S	1	6	C
	66+00	60S	1	6	C
	67+00	60S	1	6	C
	69+50	60S	1	6	C
	67+00	50S	1	6	C
	67+00	55S	1	6	C
	63+50	100N	1	6	C
	61+50	80N	1	6	C
	59+50	80N	1	6	C
	57+00	90N	1	6	C
	54+00	100N	1	6	C
	53+50	100N	1	6	C
	54+00	180S	1	6	C
	55+00	160S	1	6	C
	58+00	190S	1	6	C
	60+00	280S	1	6	C
10/12/78	62+75	80N	1	6	C
	61+00	60N	1	6	C
	60+00	150N	1	6	C
	59+00	200N	1	6	C
	57+00	50N	1	6	C
	55+50	100N	1	6	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/12/78	54+50	100N	1	6	C
	63+00	200N	1	6	C
	62+00	40N	1	6	C
	59+00	50N	1	6	C
	56+00	250S	1	6	C
	59+00	280S	1	6	C
10/13/78	62+60	230N	1	8	C
	58+05	200N	1	8	C
	60+85	185N	1	8	C
	54+10	135N	1	8	C
	57+30	60N	1	8	C
	60+25	200S	1	8	C
	58+40	276S	1	8	C
	56+30	240S	1	8	C
	57+10	260N	1	8	C
	61+10	280N	1	8	C
	53+40	270N	1	8	C
10/14/78	59+00	280N	1	8	C
	54+00	290N	1	8	C
	55+00	220N	1	8	C
	59+10	190N	1	8	C
	60+70	190N	1	8	C
	63+00	290N	1	8	C
	67+00	30S	1	8	C
	71+00	20S	1	8	C
	75+00	40S	1	8	C
	63+50	80S	1	8	C
	60+00	50S	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/14/78	57+50	50S	1	8	C
	77+00	70N	1	8	C
	75+00	75N	1	8	C
	70+00	20N	1	8	C
10/16/78	73+00	0	1	6	C
	68+00	25N	1	6	C
	61+00	175N	1	6	C
	54+00	100N	1	6	C
	75+00	25N	1	6	C
	73+25	25S	1	6	C
	71+50	75S	1	6	C
	70+00	100S	1	6	C
	69+50	50N	1	6	C
	68+00	0	1	6	C
	65+00	50S	1	6	C
	63+00	100S	1	6	C
	61+00	100N	1	6	C
	60+00	100S	1	6	C
	58+00	0	1	6	C
	59+00	125S	1	6	C
	61+00	125S	1	6	C
	58+75	100N	1	6	C
	56+25	100S	1	6	C
	54+50	150N	1	6	C
	53+50	100S	1	6	C
10/17/78	59+00	175S	1	6	C
	56+00	200S	1	6	C
	53+50	275S	1	6	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/17/78	55+00	100S	1	6	C
	62+00	100S	1	6	C
	66+00	125S	1	6	C
	70+00	120S	1	6	C
	75+00	100S	1	6	C
	77+00	120S	1	6	C
	62+25	150N	1	6	C
	63+00	150N	1	6	C
	68+00	125N	1	6	C
	69+50	125N	1	6	C
	74+00	125N	1	6	C
	75+75	125N	1	6	C
	76+50	100N	1	6	C
10/18/78	57+00	250S	1	6	C
	55+00	275S	1	6	C
	53+75	215S	1	6	C
	64+55	25S	1	6	C
	66+50	35S	1	6	C
	69+00	50S	1	6	C
	69+00	45S	1	6	C
	69+00	52S	1	6	C
	65+00	75S	1	6	C
	63+00	0	1	6	C
	60+50	75N	1	6	C
	58+75	50N	1	6	C
	56+00	0	1	6	C
10/19/78	59+50	250N	1	6	C
	61+50	250N	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/19/78	57+00	200N	1	6	C
	59+00	100S	1	6	C
	61+00	100S	1	6	C
	61+00	0	1	6	C
	63+00	100S	1	6	C
	64+50	50S	1	6	C
	66+50	0	1	6	C
	68+75	65S	1	6	C
	70+50	75S	1	6	C
	71+25	75S	1	6	C
	73+00	75S	1	6	C
	74+00	0	2	6	C
	75+00	25S	2	6	C
	76+00	50S	2	6	C
	77+00	75S	2	6	C
	78+00	0	2	6	C
10/20/78	71+25	80N	1	6	C
	71+50	80N	1	6	C
	71+60	60N	1	6	C
	78+00	85S	1	6	C
	61+75	0	1	6	C
	62+00	0	1	6	C
	65+00	50S	1	6	C
	65+10	55S	1	6	C
	65+05	45S	1	6	C
	65+10	45S	1	6	C
	65+00	55S	1	6	C
	61+75	0	1	6	C
	62+00	50S	1	6	C

TABLE 2.5-73 (continued)

Date	Location		Lift Number	Lift Thickness (inches)	Fill Type[b]
	Station[a]	Offset from Centerline (feet)			
10/20/78	85+00	50S	1	6	C
	76+00	75S	1	6	C
10/21/78	55+00	40S	1	6	C
	59+00	50S	1	6	C
	61+25	35S	1	6	C
	65+00	50S	1	6	C
	69+00	60S	1	6	C
	72+50	75S	1	6	C
	59+00	125N	1	6	C
	62+00	100N	1	6	C
	65+00	100N	1	6	C
	68+00	100N	1	6	C
	72+00	110N	1	6	C
	75+00	100N	1	6	C
10/23/78	55+00	120S	1	6	C
	58+00	100S	1	6	C
	62+00	100S	1	6	C
	63+50	55S	1	6	C
	65+00	125S	1	6	C
	67+00	70S	1	6	C
	69+00	75S	1	6	C
	71+00	25S	1	6	C
	74+75	100N	1	6	C
	62+50	100N	1	6	C
	65+50	80N	1	6	C
	58+50	100N	1	6	C

Date	Location		Lift Number	Lift Thickness (inches)	Fill Type(b)
	Station(a)	Offset from Centerline (feet)			
10/24/78	54+00	0	1	6	C
	57+00	75S	1	6	C
	59+00	100S	1	6	C
	61+00	120S	1	6	C
	64+00	100S	1	6	C
	67+00	0	1	6	C
	69+00	50S	1	6	C
	71+00	100S	1	6	C
	57+00	100N	1	6	C
	62+50	100N	1	6	C
	65+50	100N	1	6	C
	71+00	25N	1	6	C
10/25/78	72+00	100N	2	6	C
	73+00	0	1	6	C
	75+00	100S	1	6	C
	76+00	50S	1	6	C
	77+00	50S	1	6	C
	78+00	0	1	6	C
	79+00	100N	2	6	C
	79+00	90N	2	6	C
	79+00	95N	2	6	C
	76+50	50N	2	6	C
	71+50	0	2	6	C
	69+00	0	2	6	C
	55+50	100N	1	6	C
	57+00	25N	1	6	C
	58+50	0	1	6	C
	60+75	25S	1	6	C
	62+50	75S	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/25/78	65+00	75N	1	6	C
	67+50	100N	1	6	C
	69+00	50N	1	6	C
	59+75	100S	1	6	C
	62+00	100S	2	6	C
	65+00	100S	2	6	C
	68+00	75S	2	6	C
	70+00	0	2	6	C
10/26/78	56+00	75S	1	6	C
	57+00	50S	1	6	C
	57+50	75S	1	6	C
	59+50	0	1	6	C
	61+50	75N	1	6	C
	64+00	75S	1	6	C
	66+00	0	1	6	C
	68+00	50S	1	6	C
	69+00	25S	1	6	C
	71+50	50S	1	6	C
	73+75	25N	1	6	C
	74+25	25S	1	6	C
	75+75	50S	1	6	C
	77+00	50N	2	6	C
	78+00	0	2	6	C
	79+00	40N	2	6	C
10/27/78	69+25	40N	1	6	C
	72+50	20N	1	6	C
	75+60	15S	1	6	C
	78+50	20S	1	6	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/27/78	58+50	50N	1	6	C
	61+00	25N	1	6	C
	63+50	75N	1	6	C
	66+25	50N	1	6	C
	64+50	0	1	6	C
	62+00	20S	2	6	C
	57+50	20N	2	6	C
	54+50	60N	2	6	C
	56+50	50S	2	6	C
	59+75	60S	2	6	C
	72+00	60N	2	6	C
	73+50	0	2	6	C
	75+50	50S	2	6	C
	78+25	0	2	6	C
10/28/78	58+40	50S	1	8	C
	60+00	25S	1	8	C
	63+00	0	1	8	C
	66+00	10S	1	8	C
	59+00	75N	1	8	C
	62+00	100N	1	8	C
	65+20	110N	1	8	C
	68+00	115N	1	8	C
	70+70	30S	1	8	C
	74+90	25S	1	8	C
	77+00	90N	1	8	C
	73+00	100N	1	8	C
	60+00	60S	2	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/30/78	56+00	0	1	6	C
	59+00	100S	1	6	C
	62+00	75S	1	6	C
	66+00	50S	1	6	C
	69+00	25S	1	6	C
	71+00	0	1	6	C
	74+00	25S	1	6	C
	76+50	50S	1	6	C
	78+25	50S	1	6	C
	54+50	75N	2	6	C
	57+00	75N	2	6	C
	57+00	60N	2	6	C
	63+25	75N	2	6	C
	67+00	75N	2	6	C
	69+75	60N	2	6	C
	71+50	70N	2	6	C
	74+00	75N	2	6	C
	77+50	25N	2	6	C
	78+50	50N	2	6	C
	77+60	50S	2	6	C
10/31/78	57+00	75S	1	6	C
	61+50	75S	1	6	C
	65+00	75S	1	6	C
	70+50	0	1	6	C
	72+00	0	1	6	C
	74+50	15N	1	6	C
	76+00	20N	1	6	C
	78+00	20N	1	6	C
	55+00	60N	2	6	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/31/78	57+10	40N	2	6	C
	59+50	50N	2	6	C
	61+80	20N	2	6	C
	64+25	40S	2	6	C
	66+50	25N	2	6	C
	68+90	70S	2	6	C
	71+75	50S	2	6	C
	74+25	20N	2	6	C
	76+00	25N	2	6	C
	54+00	50N	3	6	C
	56+50	50N	3	6	C
	59+00	80N	3	6	C
	62+50	75N	3	6	C
	65+50	60N	3	6	C
	69+00	0	3	6	C
	72+75	30N	3	6	C
11/01/78	50+00	75N	1	6	C
	49+85	75S	1	6	C
	49+25	50N	1	6	C
	53+50	0	1	6	C
	56+75	100N	1	6	C
	58+25	50N	1	6	C
	60+50	25N	1	6	C
	62+40	50N	1	6	C
	68+50	70N	1	6	C
	64+75	75N	1	6	C
	72+25	60N	1	6	C
	74+75	20N	1	6	C
	78+00	20S	2	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/01/78	49+50	50N	2	6	C
	51+00	0	2	6	C
11/02/78	57+00	60S	1	6	C
	69+00	25N	1	6	C
	67+00	50N	1	6	C
	54+80	40S	1	6	C
	61+50	60S	1	6	C
	65+00	0	1	6	C
	56+50	50S	2	6	C
	54+75	60S	2	6	C
	63+50	0	2	6	C
	58+75	40N	2	6	C
	60+00	40S	2	6	C
	59+25	40N	2	6	C
	65+25	50N	2	6	C
11/03/78	58+00	50N	1	6	C
	65+00	25N	1	6	C
	69+00	75N	1	6	C
	61+50	40S	1	6	C
	67+00	20S	1	6	C
	59+00	50N	2	6	C
	61+50	0	2	6	C
	63+15	50S	2	6	C
	65+50	50N	2	6	C
	49+75	0	1	6	C
	50+75	270S	1	6	C

	Location				
Date	Station[a]	Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
11/04/78	59+00	60S	1	6	C
	62+15	20N	1	6	C
	63+25	30S	1	6	C
	65+50	0	1	6	C
	65+75	20S	1	6	C
	68+25	60N	1	6	C
	57+50	50N	2	6	C
	60+50	40N	2	6	C
	62+50	20S	2	6	C
	65+00	40N	2	6	C
	66+50	60S	2	6	C
	68+50	40N	2	6	C
11/08/78	56+40	20S	1	8	C
	60+70	10S	1	8	C
	70+40	40N	1	8	C
	67+70	70N	1	8	C
	64+00	20N	1	8	C
11/09/78	68+80	45N	1	8	C
	62+95	70N	1	8	C
	73+55	130N	1	8	C
	61+35	190N	1	8	C
	60+90	5N	1	8	C
	63+80	30N	1	8	C
	72+90	10S	1	8	C
	78+04	100N	2	8	C
	73+20	85N	2	8	C
	57+60	90N	2	8	C
	59+90	0	2	8	C
	65+85	10S	2	8	C

TABLE 2.5-73 (continued)

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
11/10/78	75+50	60N	2	8	C
	71+25	45N	2	8	C
	65+18	96N	1	8	C
	61+65	20N	1	8	C
	67+15	5N	1	8	C
	76+25	65N	1	8	C
	72+10	60N	1	8	C
	49+05	195S	1	8	C
	50+50	0	1	8	C
	63+30	10N	2	8	C
	66+95	20N	2	8	C
11/11/78	62+40	100N	2	8	C
	70+05	75N	2	8	C
	50+90	70S	1	8	C
	60+15	55N	1	8	C
	67+95	0	1	8	C
	72+00	10N	1	8	C
	68+95	90N	1	8	C
	64+75	100N	2	8	C
	50+07	18N	1	8	C
	61+50	60N	2	8	C
	51+15	210S	1	8	C
	50+30	210S	1	8	C
11/14/78	77+00	30N	1	8	C
	70+00	25N	1	8	C
	61+15	60N	1	8	C

TABLE 2.5-73 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/21/78	82+00	100S	1	8	C
	80+50	130S	1	8	C
	75+00	180S	1	8	C
12/05/78	66+00	100S	1	8	C
	70+00	150S	1	8	C
12/12/78	I16+00	5W	1	6	C
	I11+10	15E	1	6	C
12/13/78	I16+00	2W	1	8	C
	I11+25	8W	1	8	C
	I7+80	4E	2	8	C
	I2+12	0	2	8	C
12/14/78	I16+70	0	1	8	C
	I11+00	5S	2	8	C
	I8+00	5N	2	8	C
12/15/78	I15+58	8E	1	8	C
	I12+85	5W	2	8	C
	I7+12	0	2	8	C
	I3+80	0	3	8	C
12/20/78	II4+10	14W	2	8	C
	II6+02	36E	2	8	C
	II8+10	27E	2	8	C
	II8+77	32W	2	8	C
	II5+90	10W	3	8	C
	II7+64	0	3	8	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
12/20/78	II0+91	7E	2	8	C
	II9+20	22W	2	8	C
	II12+99	18E	2	8	C
12/21/78	II1+17	5E	2	8	C
	II10+06	21E	2	8	C
	II13+50	15W	2	8	C
	II3+84	13W	1	8	C
	II9+24	0	1	8	C
	II6+65	8E	2	8	C
12/22/78	II6+72	3W	1	8	C
	II10+10	8E	1	8	C
	II9+80	7W	2	8	C
	II7+00	4E	3	8	C
	II10+62	0	4	8	C

TABLE 2.5-74

SUMMARY OF COMPACTION DATA FOR MAIN DAM AND SADDLE DAMS

Material Identification Number	Location[a]	Depth (feet)	Compaction Data: Optimum Moisture Content (%)	Compaction Data: Maximum Dry Density (pcf)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain Size Distribution: Percent Passing #4	Grain Size Distribution: Percent Passing #200	Grain Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
LW-1	MD Excavation 67+00 5 N	2.0	20.0	104.0	52	32	100	95.2	48.5	CH
LW-2	MD Excavation 67+00 5 N	5.0	19.3	106.5	46	26	100	96.0	44.2	CL
LW-3	MD Excavation 51+00 0	5.0	18.3	108.4	41	21	100	82.9	41.0	CL
LW-4	MD Excavation 51+00 0	2.0	17.0	109.0	38	19	100	89.3	35.6	CL
LW-5	MD Excavation 55+00 0	3.0-4.0	18.4	106.3	39	19	100	99.1	47.0	CL
LW-14	MD Fill 29+60 0	1,976.0 (EL)[b]	17.7	108.6	43	20	100	98.0	43.0	CL
LW-15	MD Fill 96+00 0	--	22.5	101.3	66	36	100	96.8	57.9	CH
LW-17	MD Fill 80+60 57 S	1,962.0 (EL)	21.9	101.4	57	30	100	95.5	50.0	CH
LW-18	MD Fill 85+20 14 N	1,972.0 (EL)	20.3	103.3	61	39	100	96.8	53.1	CH
LW-19	MD Fill 41+00 4 N	1,963.0 (EL)	21.9	101.6	57	36	100	96.0	50.4	CH
LW-20	SW Corner BAG	2.0	22.7	99.8	56	32	100	96.3	54.7	CH
LW-21	SW Corner BAG	5.0	20.2	102.9	53	30	100	94.7	53.6	CH
LW-22	NE Corner BAG	2.0	19.3	102.0	43	20	100	95.9	43.2	CL
LW-23	NE Corner BAG	5.0	18.6	105.0	42	22	100	97.1	45.2	CL

(a) MD indicates Main Dam; BA indicates Borrow Area; BD indicates Baffle Dike; UHS indicates Ultimate Heat Sink; 00+00 indicates station; 107 N indicates 107 feet north of centerline (offset); 0 indicates on the centerline.

(b) Elevation in SNUPPS datum.

Material Identification Number	Location(a)	Depth (feet)	Compaction Data: Optimum Moisture Content (%)	Compaction Data: Maximum Dry Density (pcf)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain Size Distribution: Percent Passing #4	Grain Size Distribution: Percent Passing #200	Grain Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
LW-24	MD Fill 75+20 225 S	1,908.5 (EL)	16.1	111.9	36	21	100	92.8	40.5	CL
LW-26	E Side BAK	4.0	16.6	112.3	35	17	100	92.8	42.8	CL
LW-27	NW Corner BAJ	4.0	15.8	111.9	29	10	100	92.1	32.3	CL
LW-29	SE Corner BAJ	8.0	17.3	110.0	39	22	100	86.3	38.5	CL
LW-30	NW Corner BAJ	10.0	18.8	105.2	38	20	100	91.1	37.4	CL
LW-31	E Side BAK	10.0	14.3	113.6	29	12	100	79.1	27.5	CL
LW-32	SE Corner BAK	10.0-12.0	15.4	113.7	34	16	100	79.4	35.2	CL
LW-33	SW Corner BAK	10.0	19.4	105.8	47	25	100	98.3	51.2	CL
LW-34	Center BAK	6.0	21.6	102.6	54	32	100	97.6	55.3	CH
LW-36	NE Corner BAK	2.0-6.0	16.9	108.8	33	13	100	97.5	41	CL
LW-37	MD Fill 75+00 100 S	1,913.0 (EL)	18.6	107.1	42	23	100	92.4	43.7	CL
LW-38	MD Fill 76+25 280 S	1,930.0 (EL)	15.1	116.7	34	16	96.1	77.1	32.2	CL
LW-39	MD Fill 70+00	--	21.6	103.3	52	30	100	95.9	47.9	CH
LW-40	W Side BAI	6.0-12.0	20.8	104.4	50	30	100	92.8	42.7	CH
LW-41	Center BAI	--	16.6	110.5	34	16	100	89.1	27.6	CL
LW-42	Center BAH	--	18.0	107.0	39	20	100	97.2	38.5	CL
LW-43	SE Corner BAH	--	16.6	112.2	34	19	100	88.1	25.7	CL
LW-44	W Side BAH	1.0-6.0	21.1	102.9	63	46	100	93.9	44.9	CH
LW-45	W Side BAF	6.0	17.7	109.7	47	34	100	83.3	37.6	CL
LW-46	E Side BAF	1.0-5.0	18.2	105.4	46	30	100	98.3	40.8	CL
LW-47	E Side BAF	5.0	17.8	107.7	35	20	100	96.4	36.7	CL

Material Identification Number	Location[a]	Depth (feet)	Compaction Data: Optimum Moisture Content (%)	Compaction Data: Maximum Dry Density (pcf)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain Size Distribution: Percent Passing #4	Grain Size Distribution: Percent Passing #200	Grain Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
LW-48	W Side BAF	--	21.4	102.1	63	47	100	93.8	49.3	CH
LW-49	MD Fill 66+00 100 N	--	18.3	106.8	41	22	100	95.2	31.7	CL
LW-50	MD Fill 59+25 285 N	1,906.0 (EL)	20.5	103.8	57	36	100	94.4	40.0	CH
LW-59	SE Corner BAJ	1.0-2.0	21.8	97.5	44	20	100	96.8	39.0	CL
LW-61	NE Corner BAD	6.0	20.4	103.2	44	24	100	85.4	41.9	CL
LW-62	Center BAE	1.0-2.0	19.6	101.9	35	15	100	90.7	16.6	CL
LW-63	SE Corner BAD	1.0-6.0	20.0	103.2	47	27	100	96.8	50.1	CL
LW-64	NW Corner BAD	1.0-6.0	22.0	99.9	52	31	100	95.8	51.4	CH
LW-65	NE Corner BAE	1.0-2.0	20.7	101.0	45	25	100	92.0	51.1	CL
LW-66	Center BAE	5.0-6.0	19.8	100.3	45	22	100	95.8	53.0	CL
LW-67	SW Corner BAC	1.0-5.0	20.3	103.5	52	32	100	94.1	49.8	CH
LW-68	SW Corner BAC	5.0-8.0	18.7	106.6	45	27	100	94.5	45.2	CL
LW-69	SW Corner BAC	--	19.9	105.4	49	29	100	94.5	47.4	CL
LW-72	N Side BAC	1.0-8.0	18.8	105.2	45	28	100	96.2	40.4	CL
LW-73	BAC	1.0-5.0	19.0	106.9	42	22	100	91.8	39.3	CL
LW-74	E Side BAB	2.0-6.0	17.1	107.9	34	14	100	97.1	30.0	CL
LW-75	W Side BAB	2.0-8.0	20.2	103.2	51	29	100	98.3	49.1	CH

TABLE 2.5-75

SOIL PROPERTIES FOR MAIN DAM AND SADDLE DAMS

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-238	84+00	40 N	LW-8	70	41	100	96.1	56.0	CH
A-241	30+00	0	LW-5	42	18	100	97.4	37.0	CL
A-243	32+80	0	LW-13	52	28	100	96.9	44.0	CH
A-246	96+80	0	LW-5	51	31	100	95.5	48.0	CH
A-247	103+60	0	LW-4	57	29	99.9	94.5	50.5	CH
A-253	80+90	0	LW-2	48	28	100	90.5	45.0	CL
A-256	98+00	0	LW-2	45	23	99.9	91.7	42.5	CL
A-257	93+25	0	LW-4	34	14	100	95.8	36.0	CL
A-258	80+90	0	LW-4	32	15	100	86.3	31.5	CL
A-259	88+50	0	LW-2	36	20	100	87.1	32.0	CL
A-261	79+80	0	LW-3	37	19	99.9	80.8	35.0	CL
A-262	82+00	0	LW-4	37	20	--	--	--	CL
A-263	84+00	0	LW-2	54	36	--	--	--	CH
A-264	88+00	0	LW-18	59	35	--	--	--	CH
A-265	86+00	0	LW-15	70	48	100	96.6	56.0	CH
A-266	100+00	0	LW-2	64	41	--	--	--	CH
A-267	--	0	LW-2	40	22	--	--	--	CL
A-268	42+00	0	LW-14	64	41	--	--	--	CH
A-269	6+90	0	LW-2	38	20	--	--	--	CL
A-270	7+15	0	LW-18	59	35	99.9	94.0	47.0	CH

*No prefix indicates Main Dam station; Roman numeral (I, II, III) indicates Saddle Dam station.

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-271	7+00	0	LW-2	48	29	--	--	--	CL
A-272	5+50	0	LW-10	43	26	--	--	--	CL
A-273	34+70	0	LW-2	49	31	--	--	--	CL
A-274	41+00	0	LW-19	57	36	--	--	--	CH
A-275	7+00	0	LW-18	64	43	--	--	--	CH
A-276	60+00	0	LW-17	57	37	--	--	--	CH
A-277	47+00	0	LW-19	60	39	--	--	--	CH
A-278	44+00	0	LW-4	44	28	100	92.1	41.0	CL
A-279	80+00	0	LW-4	40	24	--	--	--	CL
A-280	3+00	0	LW-3	53	34	100	94.3	48.5	CH
A-282	32+00	0	LW-2	46	31	--	--	--	CL
A-284	35+00	0	LW-2	38	20	--	--	--	CL
A-286	29+00	0	LW-2	41	23	--	--	--	CL
A-288	83+00	0	LW-2	41	22	--	--	--	CL
A-289	37+00	0	LW-2	49	31	100	89.6	38.0	CH
A-290	21+50	0	LW-2	37	21	--	--	--	CL
A-291	8+00	0	LW-3	35	19	--	--	--	CL
A-293	7+50	0	LW-2	37	20	99.9	73.2	28.5	CL
A-295	V 3+00	0	LW-3	40	23	--	--	--	CL
A-296	91+00	0	LW-3	44	26	100	87.9	35.0	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-297	6+00	0	LW-2	34	18	--	--	--	CL
A-298	85+80	0	LW-3	39	22	--	--	--	CL
G-633	82+60	0	LW-3	--	--	99.9	86.1	34.2	
A-300	8+50	0	LW-2	34	17	--	--	--	CL
A-301	43+50	0	LW-3	34	17	100	85.5	38.0	CL
A-305	11+00	0	LW-3	36	19	--	--	--	CL
A-306	13+10	0	LW-19	51	30	100	95.6	52.2	CH
A-308	13+50	0	LW-3	34	16	100	87.0	38.0	CL
A-313	12+25	0	LW-2	47	26	100	93.4	45.0	CL
A-314	16+00	0	LW-1	38	20	99.9	89.7	37.0	CL
A-315	11+00	0	LW-18	43	25	100	93.5	40.5	CL
A-316	5+00	0	LW-3	35	17	100	84.9	35.0	CL
A-317	8+80	0	LW-1	37	19	99.9	86.9	37.5	CL
A-318	16+00	0	LW-2	33	16	100	84.7	34.0	CL
A-319	14+60	0	LW-3	34	17	99.9	84.1	35.0	CL
A-320	17+00	0	LW-2	34	16	100	90.2	32.0	CL
A-321	18+00	0	LW-3	37	20	--	--	--	CL
A-324	75+00	50 S	LW-3	35	19	100	87.3	37.0	CL
A-325	75+50	60 S	LW-4	35	19	100	82.4	38.0	CL
A-326	12+90	35 W	LW-18	51	32	100	95.8	51.5	CH

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-331	16+00	0	LW-4	35	18	--	--	--	CL
A-335	75+80	100 N	LW-4	39	22	100	91.8	41.5	CL
A-339	75+00	0	LW-38	38	20	99.9	88.4	41.0	CL
A-340	6+00	0	LW-24	36	19	99.9	79.1	31.5	CL
A-341	73+00	0	LW-15	41	21	--	--	--	CL
A-342	75+00	0	LW-3	49	39	99.9	91.3	45.0	CL
A-343	72+00	0	LW-26	37	19	100	86.4	36.0	CL
A-344	74+00	30 N	LW-15	57	36	100	96.6	49.5	CH
A-345	76+25	65 S	LW-22	40	19	100	96.6	33.0	CL
A-346	77+00	0	LW-26	53	33	100	95.9	47.0	CH
A-347	65+70	260 S	LW-33	41	21	100	94.6	39.8	CL
A-349	70+00	100 N	LW-15	51	32	--	--	--	CH
A-350	37+50	75 N	LW-14	43	25	100	96.5	44.0	CL
A-351	72+00	0	LW-15	36	16	100	94.2	35.0	CL
A-353	8+35	22 W	LW-34	39	21	--	--	--	CL
A-354	32+75	5 W	LW-15	41	21	--	--	--	CL
A-355	11+80	15 E	LW-34	46	25	--	--	--	CL
A-356	72+15	280 N	LW-33	45	26	100	97.1	45.0	CL
A-357	76+90	0	LW-33	53	33	100	96.2	53.0	CH
A-359	78+00	0	LW-33	51	32	99.9	96.6	51.5	CH

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-360	68+45	160 N	LW-33	50	32	100	96.2	49.0	CH
A-362	82+50	0	LW-3	30	12	--	--	--	CL
A-364	16+00	0	LW-24	34	16	--	--	--	CL
A-365	73+00	0	LW-15	55	35	--	--	--	CH
A-366	68+00	0	LW-15	54	39	100	97.1	45.0	CH
A-367	70+00	0	LW-33	56	42	100	96.7	44.5	CH
A-369	77+00	0	LW-39	50	35	--	--	--	CL-CH
A-370	96+47	0	LW-3	34	20	--	--	--	CL
A-371	85+00	0	LW-3	35	22	--	--	--	CL
A-372	72+00	0	LW-15	54	26	100	95.1	52.5	CH
A-373	80+00	0	LW-24	31	13	--	--	--	CL
A-374	98+00	0	LW-3	38	20	--	--	--	CL
A-375	5+00	0	LW-3	42	29	--	--	--	CL
A-376	18+00	0	LW-3	41	29	--	--	--	CL
A-377	12+00	0	LW-24	38	25	--	--	-	CL
A-378	71+50	0	LW-15	50	34	--	--	--	CH
A-379	8+00	0	LW-24	39	25	--	--	--	CL
A-380	69+00	0	LW-15	56	37	--	--	--	CH
A-381	69+00	0	LW-33	50	29	--	--	--	CH
A-382	67+00	0	LW-15	53	33	--	--	--	CH

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-383	77+00	0	LW-15	55	25	100	96.8	48.5	CH
A-384	76+50	0	LW-15	59	37	100	96.2	51.0	CH
A-385	68+60	250 N	LW-15	55	33	--	--	--	CH
A-386	73+70	0	LW-15	52	24	100	90.3	39.0	CH
A-387	70+00	0	LW-4	44	19	--	--	--	CL
A-388	74+50	0	LW-18	43	22	--	--	--	CL
A-389	67+00	0	LW-34	48	28	--	--	--	CL
A-390	68+00	0	LW-4	57	37	--	--	--	CH
A-391	75+50	0	LW-15	45	27	100	90.9	44.4	CL
A-392	74+00	0	LW-4	49	30	100	96.1	51.5	CL
A-412	72+00	70 S	LW-41	37	16	100	82.0	31.5	CL
A-413	69+00	100 S	LW-41	39	19	100	89.4	34.0	CL
A-414	57+50	0	LW-40	53	34	100	92.3	42.0	CH
A-415	54+95	0	LW-45	44	26	--	--	--	CL
A-416	75+50	0	LW-23	34	15	--	--	--	CL
A-417	57+00	0	LW-36	36	14	--	--	--	CL
A-418	77+50	0	LW-4	46	27	100	86.5	44.5	CL
A-419	59+00	0	LW-30	47	27	--	--	--	CL
A-420	76+90	0	LW-33	55	32	100	95.0	55.0	CH
A-421	56+00	0	LW-36	35	15	100	95.8	29.0	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-422	65+00	0	LW-34	48	30	100	95.2	34.0	CL
A-423	73+90	0	LW-34	40	23	--	--	--	CL
A-424	73+00	0	LW-15	53	36	--	--	--	CH
A-425	71+25	0	LW-37	45	29	--	--	--	CL
A-426	56+00	0	LW-18	50	31	--	--	--	CH
A-427	68+80	0	LW-37	35	17	100	92.6	35.0	CL
A-428	68+00	0	LW-15	44	26	99.9	91.5	39.0	CL
A-429	76+25	0	LW-37	42	25	100	87.5	41.4	CL
A-430	69+50	0	LW-37	42	25	100	87.8	37.0	CL
A-431	72+70	0	LW-33	40	23	100	85.0	39.0	CL
A-432	70+00	0	LW-30	36	20	100	79.5	28.1	CL
A-433	77+50	0	LW-37	31	13	100	88.6	27.5	CL
A-434	76+00	0	LW-4	39	22	100	90.1	35.0	CL
A-436	66+00	0	LW-37	44	27	100	92.4	40.5	CL
A-437	69+00	200 N	LW-23	39	22	100	85.4	39.5	CL
A-438	75+00	0	LW-37	42	24	100	77.9	39.5	CL
A-439	70+00	0	LW-33	37	18	100	85.3	24.9	CL
A-440	58+00	0	LW-48	51	33	100	91.2	48.3	CH
A-441	77+50	0	LW-44	54	35	100	95.4	44.8	CH
A-442	63+00	0	LW-50	45	27	100	92.0	41.3	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-443	57+00	0	LW-50	43	25	99.9	87.2	39.0	CL
A-444	58+00	0	LW-49	40	19	100	94.5	38.5	CL
A-445	63+50	0	LW-50	55	36	100	91.8	46.0	CH
A-446	64+00	0	LW-20	44	27	100	91.2	45.0	CL
A-447	64+50	0	LW-48	44	27	100	91.5	46.0	CL
A-448	62+50	0	LW-48	45	28	100	92.8	45.1	CL
A-449	67+00	50 N	LW-33	40	22	--	--	--	CL
A-450	81+00	0	LW-24	33	16	--	--	--	CL
A-451	69+00	0	LW-20	40	23	--	--	--	CL
A-452	76+00	0	LW-20	38	21	--	--	--	CL
A-453	66+50	0	LW-37	39	23	--	--	--	CL
A-454	83+00	0	LW-3	36	18	--	--	--	CL
A-455	119+00	0	LW-3	36	18	--	--	--	CL
A-456	81+50	0	LW-3	39	21	--	--	--	CL
A-457	98+00	0	LW-2	35	17	--	--	--	CL
A-458	101+50	0	LW-2	36	21	--	--	--	CL
A-459	90+75	0	LW-3	38	22	--	--	--	CL
A-460	74+00	0	LW-15	54	36	--	--	--	CH
A-467	78+50	75 S	LW-39	48	29	100	94.8	34.5	CL
A-468	70+00	100 N	LW-45	60	37	100	78.6	44.1	CH

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-469	69+00	0	LW-50	52	33	100	93.7	40.8	CH
A-470	76+00	0	LW-40	52	31	100	95.9	42.1	CH
A-471	58+50	200 N	LW-50	53	31	100	94.1	40.0	CH
A-472	104+10	0	LW-3	37	20	--	--	--	CL
A-473	100+50	0	LW-3	31	14	--	--	--	CL
A-474	89+00	0	LW-3	41	23	--	--	--	CL
A-475	75+50	0	LW-2	48	30	--	--	--	CH
A-476	103+00	0	LW-2	33	16	--	--	--	CL
A-477	71+50	0	LW-15	56	36	--	--	--	CH
A-478	98+00	0	LW-24	33	15	--	--	--	CL
A-479	102+50	0	LW-2	34	19	--	--	--	CL
A-480	72+00	0	LW-37	37	17	--	--	--	CL
A-481	65+00	0	LW-37	39	21	--	--	--	CL
A-482	69+50	0	LW-34	35	16	--	--	--	CL
A-483	76+50	0	LW-37	34	16	--	--	--	CL
A-484	63+50	100 S	LW-50	43	21	100	91.7	39.6	CL
A-486	65+50	200 S	LW-45	37	17	100	85.7	33.1	CL
A-487	58+00	100 S	LW-44	49	30	100	95.6	44.2	CL
A-488	60+00	300 N	LW-44	40	20	100	96.3	43.3	CL
A-489	74+00	0	LW-37	35	17	--	--	--	CL

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-490	84+00	0	LW-3	43	23	--	--	--	CL
A-491	71+00	0	LW-37	34	17	--	--	--	CL
A-492	74+50	0	LW-33	46	24	--	--	--	CL
A-493	67+50	0	LW-15	54	33	--	--	--	CH
A-495	76+00	60 N	LW-40	57	36	100	98.2	54.0	CH
A-496	59+50	100 N	LW-46	38.	19	100	97.3	42.0	CL
A-498	113+00	0	LW-3	33	15	--	--	--	CL
A-499	72+00	0	LW-17	35	16	--	--	--	CL
A-500	73+00	0	LW-36	45	24	--	--	--	CL
A-501	75+00	0	LW-15	45	24	--	--	--	CL
A-502	84+00	0	LW-3	33	15	--	--	--	CL
A-503	111+00	0	LW-3	34	16	--	--	--	CL
A-504	70+00	0	LW-33	50	30	--	--	--	CH
A-505	77+50	0	LW-33	35	16	--	--	--	CL
A-506	72+00	150 S	LW-49	40	21	--	--	--	CL
A-507	73+00	0	LW-4	35	17	--	--	--	CL
A-508	76+00	120 S	LW-47	48	30	--	--	--	CL
A-510	85+25	0	LW-2	48	29	--	--	--	CL
A-511	96+75	0	LW-2	34	17	--	--	--	CL
A-512	70+00	50 N	LW-49	45	24	--	--	--	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-513	70+00	0	LW-23	43	24	--	--	--	CL
A-514	58+00	200 S	LW-2	52	33	--	--	--	CH
A-515	59+00	0	LW-45	48	29	--	--	--	CL
A-517	66+00	200 N	LW-46	43	23	--	--	--	CL
A-518	60+00	280 S	LW-47	44	24	--	--	--	CL
A-519	64+00	0	LW-39	51	31	--	--	--	CH
A-520	57+00	300 S	LW-45	40	23	--	--	--	CL
A-521	61+50	125 S	LW-45	50	31	--	--	--	CH
A-522	78+00	0	LW-49	39	19	--	--	--	CL
A-523	58+00	300 N	LW-39	42	25	--	--	--	CL
A-524	64+00	100 S	LW-45	34	17	--	--	--	CL
A-526	58+50	100 S	LW-39	47	27	--	--	--	CL
A-527	70+00	100 W	LW-45	36	19	100	94.5	43.3	CL
A-528	78+00	50 N	LW-49	37	19	100	94.8	42.5	CL
A-529	76+80	0	LW-47	46	26	100	98.0	52.3	CL
A-530	65+00	100 N	LW-49	40	20	100	93.6	40.6	CL
A-531	59+00	0	LW-48	35	17	100	92.7	42.2	CL
A-532	59+75	50 N	LW-44	40	21	--	--	--	CL
A-534	60+00	0	LW-45	41	21	100	93.6	44.5	CL
A-535	72+00	50 N	LW-50	46	25	--	--	--	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-536	66+00	0	LW-45	39	22	100	91.0	42.2	CL
A-538	62+00	200 N	LW-48	37	18	--	--	--	CL
A-540	66+00	0	LW-40	49	28	--	--	--	CL
A-541	77+00	40 S	LW-41	37	20	--	--	--	CL
A-542	57+00	0	LW-30	40	21	--	--	--	CL
A-543	59+00	0	LW-42	46	28	--	--	--	CL
A-544	73+00	0	LW-30	38	20	--	--	--	CL
A-545	67+00	0	LW-50	44	25	--	--	--	CL
A-546	57+75	0	LW-44	53	36	--	--	--	CH
A-547	74+50	0	LW-43	41	25	--	--	--	CL
A-548	60+00	0	LW-48	45	25	--	--	--	CL
A-549	71+90	0	LW-44	46	26	--	--	--	CL
A-550	78+00	0	LW-42	35	17	--	--	--	CL
A-551	69+00	0	LW-45	40	22	--	--	--	CL
A-552	65+00	0	LW-50	49	29	--	--	--	CL
A-553	59+00	100 N	LW-15	42	22	--	--	--	CL
A-554	64+50	0	LW-45	42	24	--	--	--	CL
A-555	60+20	0	LW-33	58	37	--	--	--	CH
A-556	64+00	0	LW-50	40	22	--	--	--	CL
A-559	73+75	215 S	LW-40	46	25	100	98.5	43.3	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-560	57+00	250 S	LW-40	43	24	100	97.8	42.5	CL
A-566	68+00	0	LW-47	42	22	100	94.6	39.0	CL
A-568	59+50	250 N	LW-43	33	16	100	89.5	32.9	CL
A-569	53+50	0	LW-48	41	22	100	88.6	39.2	CL
A-576	72+00	0	LW-48	37	20	99.9	84.3	38.0	CL
A-579	74+00	0	LW-49	42	23	100	92.8	47.0	CL
A-580	65+00	75 S	LW-45	37	20	100	86.9	41.7	CL
A-581	56+00	100 S	LW-50	36	15	100	93.7	39.2	CL
A-582	67+00	75 N	LW-49	43	25	100	94.2	38.8	CL
A-583	54+00	0	LW-45	42	24	100	90.7	43.4	CL
A-584	60+50	0	LW-50	46	28	100	99.1	43.5	CL
A-588	67+00	0	LW-45	40	23	100	91.7	45.0	CL
A-589	56+00	250 S	LW-45	36	18	100	90.4	39.8	CL
A-590	65+00	100 W	LW-43	36	18	100	92.2	39.5	CL
A-591	59+00	100 N	LW-48	46	26	100	95.0	48.5	CL
A-592	57+00	50 N	LW-48	39	21	100	88.8	41.5	CL
A-598	57+00	60 W	LW-45	42	24	100	93.8	46.0	CL
A-599	66+00	0	LW-50	40	19	100	95.2	46.0	CL
A-600	76+00	50 N	LW-40	52	30	100	95.3	50.0	CH
A-601	70+00	0	LW-49	41	22	100	94.0	39.7	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-603	76+00	0	LW-17	40	20	100	91.4	39.0	CL
A-609	68+00	100 N	LW-45	37	20	100	90.3	30.6	CL
A-610	62+25	0	LW-49	47	27	100	94.1	42.0	CL
A-611	57+00	0	LW-45	49	29	100	95.8	44.0	CL
A-612	75+00	0	LW-48	37	18	100	94.7	33.8	CL
A-613	63+00	0	LW-47	49	28	100	94.5	46.0	CL
A-615	67+00	50 N	LW-49	42	22	--	--	--	CL
A-616	68+50	80 N	LW-48	37	20	--	--	--	CL
A-617	76+00	30 N	LW-50	43	23	--	--	--	CL
A-619	73+00	0	LW-43	40	19	--	--	--	CL
A-620	57+00	60 S	LW-50	40	18	--	--	--	CL
A-622	64+00	50 S	LW-48	47	28	--	--	--	CL
A-623	58+00	0	LW-61	31	11	--	--	--	CL
A-625	61+50	75 S	LW-45	46	27	--	--	--	CL
A-626	72+00	75 N	LW-45	48	30	--	--	--	CL
A-627	72+00	60 W	LW-53	66	44	--	--	--	CH
A-628	69+50	100 S	LW-39	54	34	--	--	--	CH
A-629	80+00	0	LW-45	40	23	--	--	--	CL
A-634	75+00	60 S	LW-39	42	24	--	--	--	CL
A-635	60+50	30 N	LW-24	42	23	--	--	--	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-636	58+50	40 N	LW-44	56	35	--	--	--	CH
A-637	71+50	0	LW-48	46	26	--	--	--	CL
A-647	64+00	250 N	LW-47	52	33	--	--	--	CH
A-648	62+00	75 N	LW-41	35	16	--	--	--	CL
A-649	57+00	100 S	LW-42	41	22	--	--	--	CL
A-652	69+50	0	LW-45	50	29	--	--	--	CH
A-654	66+00	150 S	LW-15	45	28	--	--	--	CL
A-655	59+00	75 S	LW-49	41	24	--	--	--	CL
A-661	75+00	0	LW-45	43	23	100	92.7	45.8	CL
A-662	59+00	150 W	LW-44	42	21	100	97.5	47.2	CL
A-663	61+00	20 S	LW-45	42	25	100	83.5	35.0	CL
A-669	64+75	75 N	LW-48	46	25	100	95.8	39.0	CL
A-670	72+75	60 N	LW-50	36	17	100	90.5	34.1	CL
A-672	65+00	25 N	LW-49	38	19	--	--	--	CL
A-673	59+50	100 S	LW-30	57	36	--	--	--	CH
A-674	58+70	0	LW-47	44	24	--	--	--	CL
A-675	61+50	250 N	LW-50	48	27	--	--	--	CL
A-676	68+00	0	LW-45	45	27	--	--	--	CL
A-677	60+00	0	LW-50	53	33	--	--	--	CH
A-679	69+00	25 N	LW-47	41	23	99.9	88.9	38.5	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-680	58+00	0	LW-45	45	24	100	94.6	44.2	CL
A-682	69+00	75 N	LW-49	44	27	100	87.7	39.0	CL
A-683	58+00	50 N	LW-48	42	23	100	95.0	42.0	CL
A-687	70+50	0	LW-43	40	20	100	88.5	42.2	CL
A-689	66+50	0	LW-66	41	21	100	88.6	42.3	CL
A-690	82+90	0	LW-67	41	22	99.5	87.7	42.4	CL
A-691	61+00	0	LW-66	47	27	100	91.2	44.0	CL
A-693	61+35	0	LW-65	55	38	100	97.3	46.0	CH
A-696	60+25	0	LW-65	37	19	100	96.1	32.2	CL
A-698	65+18	0	LW-63	36	16	100	96.0	37.0	CL
A-699	49+05	0	LW-49	36	19	99.8	90.0	34.5	CL
A-700	61+15	0	LW-48	47	27	99.9	89.3	44.1	CL
A-709	50+00	0	LW-48	37	20	--	--	--	CL
A-710	57+00	75 N	LW-45	48	28	--	--	--	CL
A-711	51+00	0	LW-48	39	19	--	--	--	CL
A-712	62+00	100 N	LW-48	50	31	--	--	--	CH
A-713	55+00	0	LW-15	65	45	--	--	--	CH
A-714	75+00	100 N	LW-45	36	19	--	--	--	CL
A-716	57+00	200 N	LW-50	51	34	--	--	--	CH
A-717	70+00	125 N	LW-43	45	26	--	--	--	CL

TABLE 2.5-75 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-718	60+00	100 S	LW-48	40	20	--	--	--	CL
A-719	69+00	100 S	LW-45	47	27	--	--	--	CL
A-720	49+90	0	LW-42	31	12	--	--	--	CL
A-721	73+00	0	LW-37	43	23	--	--	--	CL
A-724	63+00	0	LW-47	46	24	--	--	--	CL
A-725	54+00	0	LW-45	53	31	--	--	--	CH
A-726	67+50	50 S	LW-41	40	20	--	--	--	CL
A-729	72+00	110 N	LW-49	39	23	--	--	--	CL
A-730	62+00	25 S	LW-45	48	28	--	--	--	CL
A-732	64+55	25 S	LW-48	42	21	--	--	--	CL
A-734	76+00	75 S	LW-50	39	21	--	--	--	CL
A-736	62+00	200 N	LW-46	45	26	--	--	--	CL
A-739	55+00	0	LW-48	39	22	--	--	--	CL
A-740	56+00	0	LW-46	38	17	--	--	--	CL
A-741	57+00	75 S	LW-44	47	25	--	--	--	CL
A-743	75+00	50 S	LW-50	50	31	--	--	--	CH
A-744	78+00	85 S	LW-50	43	25	--	--	--	CL
A-745	63+25	75 N	LW-49	47	26	--	--	--	CL
A-747	59+00	0	LW-43	45	25	--	--	--	CL
A-748	55+00	275 S	LW-50	51	30	--	--	--	CH

TABLE 2.5-75 (continued)

Test Number	Location	Station*	Offset from Centerline (feet)	Material Identification Number	Atterberg Limits Liquid Limit	Plasticity Index	Grain-Size Distribution Percent Passing #4	Percent Passing #200	Percent Passing 0.005 mm	Unified Soil Classification
A-749		59+00	100 S	LW-48	46	27	--	--	--	CL
A-750		75+00	75 S	LW-42	39	19	--	--	--	CL
A-756	I	17+00	0	LW-75	64	38	100	97.9	54.0	CH
A-767	I	16+70	3 S	LW-75	56	35	--	--	--	CH
A-780	II	10+62	0	LW-74	50	29	100	95.4	46.0	CH
A-786	II	6+65	8 E	LW-71	47	27	--	--	--	CL
A-790	II	8+77	32 W	LW-74	45	26	100	94.4	38.4	CL
A-802	II	5+40	0	LW-74	45	27	--	--	--	CL
A-803	II	9+80	7 W	LW-69	48	26	--	--	--	CL
A-805	II	9+30	10 N	LW-69	42	22	--	--	--	CL
A-815	II	13+50	15 W	LW-71	48	29	100	92.8	43.1	CL

TABLE 2.5-76

IN-PLACE DENSITY TEST SUMMARY FOR MAIN DAM AND SADDLE DAMS
GRANULAR DRAINAGE BLANKET

Test Number[a]	Location: Station	Location: Offset from Centerline (feet)	Elevation[b] (feet)	Material Identification Number	Dry Density (pcf)	Relative Density (%)	Correcting Test Number
LFB-1	84+60	60 S	1,980.0	LWRD-3	115.0	80.4	LFB-2
LFB-2	84+60	60 S	1,980.0	LWRD-3	121.0	102.1	
LFB-3	83+75	60 S	1,979.0	LWRD-3	124.2	112.8	
LFB-4	83+60	65 S	1,979.0	LWRD-3	119.4	96.5	
LFB-5	83+50	55 S	1,979.0	LWRD-3	124.1	112.4	
LFB-6	83+25	60 S	1,978.0	LWRD-3	126.0	118.5	
LFB-7	83+40	65 S	1,979.0	LWRD-3	122.3	106.5	
LGB-1	76+50	215 S	1,946.5	LWRD-4	120.9	95.1	
LGB-2	74+25	205 S	1,944.0	LWRD-4	124.5	105.3	
LGB-3	77+50	185 S	1,947.0	LWRD-4	118.0	86.5	
LGB-4	71+00	150 S	1,941,0	LWRD-4	111.5	65.4	LGB-17
LGB-5	72+00	140 S	1,942.0	LWRD-4	112.0	67.1	LGB-18
LGB-6	77+75	215 S	1,947.5	LWRD-4	126.5	110.7	
LGB-7	78+00	180 S	1,948.0	LWRD-4	118.5	88.0	
LGB-8	78+75	215 S	1,948.5	LWRD-4	122.7	100.3	
LGB-9	73+50	190 S	1,943.0	LWRD-4	121.0	95.4	

Note: Saddle dam drainage blanket not placed as of February, 1979.

[a] The "S" following the test number indicates that a sand cone correlation test was run with the nuclear test indicated.

[b] SNUPPS datum.

TABLE 2.5-76 (continued)

Test[(a)] Number	Location: Station	Location: Offset from Centerline (feet)	Elevation[(b)] (feet)	Material Identification Number	Dry Density (pcf)	Relative Density (%)	Correcting Test Number
LGB-10	74+00	185 S	1,944.0	LWRD-4	123.8	103.4	
LGB-11	74+50	200 S	1,944.5	LWRD-4	122.2	98.9	
LGB-12	71+00	150 S	1,941.0	LWRD-4	122.6	100.0	
LGB-13	72+00	140 S	1,942.0	LWRD-4	120.1	92.8	
LGB-14	75+00	185 S	1,945.0	LWRD-4	120.0	92.5	
LGB-15	75+50	205 S	1,945.5	LWRD-4	120.3	93.1	
LGB-16	76+00	210 S	1,946.0	LWRD-4	121.1	95.7	
LGB-17	71+00	150 S	1,941.0	LWRD-4	124.0	103.9	
LGB-18	72+00	140 S	1,942.0	LWRD-4	123.2	101.7	
LGB-19-S	73+00	180 S	1,937.5	LWRD-4	125.7	108.5	
LGB-20-S	72+75	160 S	1,937.5	LWRD-4	120.7	94.5	
LGB-21-S	71+50	150 S	1,937.0	LWRD-4	124.7	105.9	
LGB-22	73+25	160 N	Top of Blanket	LWRD-4	118.8	88.9	
LGB-23	71+53	195 S	1,934.5	LWRD-4	119.0	89.5	
LGB-24	75+64	130 S	1,944.0	LWRD-4	124.4	105.0	
LGB-25	66+00	100 S	1,926.5	LWRD-4	122.3	99.1	
LGB-26	74+10	167 S	1,939.0	LWRD-4	129.6	118.8	
LGB-27	78+35	110 S	1,965.0	LWRD-4	130.0	119.8	
LGB-28	70+15	98 S	1,935.0	LWRD-4	129.5	118.5	
LGB-29	70+69	147 S	1,935.0	LWRD-4	127.3	112.8	

Test[a] Number	Location Station	Location Offset from Centerline (feet)	Elevation[b] (feet)	Material Identification Number	Dry Density (pcf)	Relative Density (%)	Correcting Test Number
LGB-30	69+50	123 S	1,928.0	LWRD-4	121.2	96.0	
LGB-31	83+40	55 S	1,976.0	LWRD-4	122.7	100.3	
LGB-32	64+60	105 S	1,924.5	LWRD-4	120.0	92.5	
LGB-33	81+10	65 S	1,972.0	LWRD-4	118.7	88.6	
LGB-34	80+60	30 S	1,971.0	LWRD-4	122.3	99.1	
LGB-35	64+33	130 S	1,924.5	LWRD-4	132.3	125.5	
LGB-36	69+50	147 S	1,928.0	LWRD-4	132.2	125.2	
LGB-37	79+45	100 S	1,965.5	LWRD-4	127.8	114.1	
LGB-38	79+05	70 S	1,967.5	LWRD-4	126.6	111.0	
LGB-39	65+60	200 S	1,926.5	LWRD-4	124.7	105.9	
LGB-40	66+30	184 S	1,926.5	LWRD-4	127.6	113.6	
LGB-41	67+10	200 S	1,928.0	LWRD-4	128.0	114.7	
LGB-42	69+00	210 S	1,928.0	LWRD-4	127.9	114.4	
LGB-43-S	64+40	90 S	1,926.0	LWRD-4	131.8	124.3	
LGB-44-S	64+15	110 S	1,924.5	LWRD-4	125.3	107.5	
LGB-45-S	65+00	71 S	1,927.5	LWRD-4	122.6	100.0	
LGB-46-S	65+00	155 S	1,929.0	LWRD-4	122.0	98.3	
LGB-47-S	64+45	110 S	1,927.5	LWRD-4	120.5	93.9	
LGB-48-S	64+87	70 S	1,928.5	LWRD-4	115.3	78.0	LGB-49
LGB-49-S	64+87	70 S	1,928.5	LWRD-4	121.4	96.6	

TABLE 2.5-77

SOIL PROPERTIES FOR BAFFLE DIKES A AND B

Test Number	Location		Material Identification Number	Atterberg Limits		Grain-Size Distribution			Unified Soil Classification
	Station*	Offset from Centerline (feet)		Liquid Limit	Plasticity Index	Percent Passing #4	Percent Passing #200	Percent Passing 0.005 mm	
A-190	A83+00	0	LW-6	44	26	100	65.0	46.0	CL
G-489	A93+00	0	LW-9	--	--	99.9	94.7	57.0	--
G-490	A83+30	0	LW-6	--	--	100	99.7	70.5	--
A-195	A100+50	0	LW-9	66	36	100	97.8	63.4	CH
A-196	A104+20	0	LW-7	81	58	100	96.6	65.5	CH
A-197A	A	0	LW-5	70	41	100	96.9	59.5	CH
A-197	A82+00	10 W	LW-5	62	41	100	97.2	46.0	CH
A-198	A80+00	0	LW-6	67	46	100	95.2	64.5	CH
A-199	A101+00	0	LW-7	77	55	100	97.1	57.0	CH
A-200	A89+50	0	LW-6	38	18	100	91.6	49.7	CL
A-201	A82+00	100 S	LW-5	46	26	100	94.6	40.0	CL
A-202	A	0	LW-5	68	41	100	96.2	51.1	CH
A-203	A89+95	0	LW-5	48	26	100	96.1	42.5	CL
A-204	A72+80	0	LW-7	74	52	100	97.5	52.5	CH
A-205	A91+00	0	LW-7	77	52	100	96.4	62.8	CH
A-207	A98+00	190 E	LW-9	77	54	100	95.8	59.5	CH
A-208	A91+25	50 E	LW-7	76	50	100	97.5	64.2	CH
A-209	A104+00	0	LW-9	68	42	100	95.8	53.8	CH
A-210	A89+50	40 E	LW-9	65	43	100	96.6	53.1	CH
A-211	A85+50	0	LW-3	46	24	100	95.6	44.0	CL

*A and B indicate Baffle Dike A or B.

Test Number	Location		Material Identification Number	Atterberg Limits		Grain-Size Distribution			Unified Soil Classification
	Station*	Offset from Centerline (feet)		Liquid Limit	Plasticity Index	Percent Passing #4	Percent Passing #200	Percent Passing 0.005 mm	
A-215	A103+90	0	LW-7	76	54	100	95.5	59.3	CH
A-217	A99+50	0	LW-7	67	38	100	97.4	52.4	CH
A-218	A102+30	0	LW-7	64	36	99.8	92.8	51.0	CH
A-219	A60+00	0	LW-11	69	44	100	97.7	60.6	CH
A-220	A49+00	0	LW-13	68	46	100	97.6	56.5	CH
A-221	A43+00	0	LW-8	72	48	100	92.5	59.8	CH
A-222	A44+00	0	LW-11	75	53	100	96.2	53.8	CH
A-223	A76+20	0	LW-8	80	51	100	95.4	59.7	CH
A-224	A56+00	0	LW-12	76	48	98.8	94.2	54.5	CH
A-225	A69+00	0	LW-8	70	42	99.8	96.0	56.5	CH
A-226	A104+35	0	LW-7	73	44	99.9	93.4	56.2	CH
A-227	A52+00	0	LW-12	63	37	100	96.2	54.2	CH
A-228	A51+70	0	LW-11	77	51	100	98.2	55.5	CH
A-229	A45+40	0	LW-8	86	54	100	94.8	59.8	CH
A-230	A65+80	0	LW-9	70	39	100	95.4	61.5	CH
A-231	A61+72	0	LW-5	71	43	100	96.6	55.8	CH
A-232	A46+50	0	LW-13	48	19	100	89.9	63.7	CL
A-233	A60+50	0	LW-8	68	40	100	92.5	54.9	CH
A-234	A64+00	0	LW-12	70	42	100	97.4	57.5	CH
A-235	A99+00	0	LW-9	72	42	100	93.4	56.5	CH
A-236	A57+00	0	LW-7	62	36	100	96.6	56.0	OH/MH
A-237	A90+20	0	LW-8	65	35	100	96.5	47.5	CH

TABLE 2.5-77 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-240	A43+00	0	LW-8	50	27	100	93.7	48.0	CH
A-242	A44+10	0	LW-11	47	29	99.9	85.7	41.5	CL
A-245	A27+00	0	LW-7	46	23	100	94.4	42.5	CL
A-248	A61+00	0	LW-12	60	31	99.8	93.2	63.0	CH/OH
A-249	A48+00	0	LW-11	57	37	100	95.9	47.0	CH
A-251	A34+00	0	LW-1	46	27	100	95.1	42.0	CL
A-283	A91+00	0	LW-7	91	68	100	95.6	65.0	CH
A-285	A99+00	0	LW-7	71	48	--	--	--	CH
A-287	A79+00	0	LW-7	66	41	--	--	--	CH
A-292	A69+00	0	LW-12	74	49	100	95.0	55.0	CH
A-294	A85+00	0	LW-7	73	51	--	--	--	CH
A-299	A92+00	0	LW-12	70	46	--	--	--	CH
A-302	A102+05	0	LW-7	68	42	--	--	--	CH
A-303	A90+10	0	LW-7	62	35	--	--	--	CH
A-304	A100+00	0	LW-7	56	29	--	--	--	CH
A-307	A94+00	0	LW-7	61	38	--	--	--	CH
A-358	A96+00	120 W	LW-12	61	40	100	93.2	56.0	CH
A-361	A95+00	0	LW-12	66	48	--	--	--	CH
A-435	A5+00	0	S-4	28	8	75.7	50.2	13.0	CL
A-466	A7+00	0	LW-56	55	34	100	90.7	50.0	CH

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-485	A16+00	0	LW-51	46	21	100	94.8	31.0	CL
A-494	A50+00	95 E	LW-57	50	30	100	94.4	53.6	CH
A-497	A7+00	0	LW-54	51	31	100	92.6	49.0	CH
A-509	A7+00	0	LW-12	55	36	--	--	--	CH
A-516	A44+00	30 E	LW-53	48	29	--	--	--	CL
A-525	A25+00	0	LW-53	55	34	--	--	--	CH
A-533	A56+00	20 W	LW-54	48	25	100	88.1	55.0	CL
A-539	A59+00	20 E	LW-56	43	19	100	93.3	58.0	CL
A-558	A55+00	20 E	LW-54	65	36	100	92.1	49.5	CH
A-561	A70+50	50 E	LW-53	68	41	100	93.0	52.0	CH
A-565	A25+50	150 W	LW-60	47	26	100	60.5	39.5	CL
A-567	A52+00	45 E	LW-6	53	31	100	87.1	46.5	CH
A-577	A24+50	100 W	LW-52	56	35	100	86.2	50.5	CH
A-578	A26+70	130 W	LW-58	47	27	99.7	58.9	44.0	CL
A-585	A65+00	50 W	LW-6	50	30	100	80.1	46.5	CL
A-586	A24+01	0	LW-53	51	31	100	86.2	46.0	CH
A-587	A23+00	50 W	LW-53	48	27	100	86.7	49.0	CL
A-593	A27+00	0	LW-55	51	28	100	84.7	50.0	CH
A-594	A31+00	120 W	LW-57	45	25	99.7	75.5	42.0	CL
A-595	A27+00	0	LW-55	57	34	100	76.5	48.5	CH

TABLE 2.5-77 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-596	A28+30	80 E	LW-6	42	23	100	79.3	39.5	CL
A-597	A71+50	50 E	LW-53	55	30	100	87.5	54.5	CH
A-602	A72+00	5 W	S-12	44	23	100	67.8	47.0	CL
A-604	A26+00	150 E	LW-54	48	28	100	70.0	37.0	CL
A-605	A27+80	100 W	LW-53	61	39	100	88.7	47.5	CH
A-614	A30+00	120 E	LW-53	62	39	100	89.1	47.0	CH
A-618	A38+00	45 W	LW-53	45	21	--	--	--	CL
A-621	A24+00	0	LW-53	50	27	--	--	--	CH
A-624	A75+00	60 W	LW-58	51	33	--	--	--	CH
A-631	A25+00	120 W	LW-55	51	30	--	--	--	CH
A-632	A26+50	50 E	LW-57	58	37	--	--	--	CH
A-633	A70+50	0	LW-45	49	29	--	--	--	CL
A-641	A26+00	130 W	LW-54	47	28	--	--	--	CL
A-642	A27+20	160 W	LW-60	41	22	--	--	--	CL
A-650	A61+00	20 W	S-12	36	16	--	--	--	CL
A-651	A28+00	0	LW-6	56	32	--	--	--	CH
A-653	A30+20	20 W	LW-8	57	38	--	--	--	CH
A-658	A73+10	75 E	LW-60	48	27	92.0	63.8	40.0	CL
A-659	A50+00	50 W	LW-60	51	29	93.3	65.5	48.0	CH
A-668	A29+00	120 W	LW-60	40	21	99.9	60.7	39.0	CL

TABLE 2.5-77 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-671	A54+00	10 E	LW-52	60	36	100	89.6	51.0	CH
A-684	A54+00	10 W	LW-53	60	38	100	91.7	53.5	CH
A-685	A41+00	40 W	LW-53	55	32	100	91.7	54.5	CH
A-688	A23+10	40 W	LW-54	53	32	100	93.5	53.5	CH
A-692	A39+10	30 E	LW-53	41	19	100	90.4	35.5	CL
A-694	A23+85	130 E	LW-52	65	42	100	94.3	51.0	CH
A-697	B4+00	40 S	LW-71	53	33	100	90.8	48.0	CH
A-701	B44+88	25 S	LW-64	52	30	--	--	--	CH
A-702	B6+00	0	LW-66	47	25	--	--	--	CL
A-703	B4+30	10 S	LW-71	49	25	100	92.4	48.5	CL
A-704	B42+60	40 N	LW-64	56	30	100	96.1	45.0	CH
A-705	A56+00	10 E	LW-58	55	34	99.9	91.6	50.5	CH
A-706	B11+00	75 S	LW-66	39	21	100	89.9	37.0	CL
A-707	B7+00	20 S	LW-75	48	29	100	81.2	41.0	CL
A-708	B12+00	70 S	LW-61	51	31	100	88.9	37.5	CH
A-715	A23+50	120 E	LW-55	58	32	--	--	--	CH
A-723B	A49+10	25 E	LW-56	55	32	100	91.8	44.0	CH
A-727	B42+00	45 N	LW-71	52	31	100	87.5	48.5	CH
A-728	A38+80	10 W	LW-58	53	31	100	87.5	43.0	CH
A-731	A64+00	10 E	LW-14	51	28	--	--	--	CH

TABLE 2.5-77 (continued)

Test Number	Location		Material Identification Number	Atterberg Limits		Grain-Size Distribution			Unified Soil Classification
	Station*	Offset from Centerline (feet)		Liquid Limit	Plasticity Index	Percent Passing #4	Percent Passing #200	Percent Passing 0.005 mm	
A-733	A66+50	0	LW-57	64	36	--	--	--	CH
A-737	A49+30	5 E	LW-54	46	25	--	--	--	CL
A-738	A47+50	20 E	LW-52	59	37	--	--	--	CH
A-742	A67+00	55 W	LW-56	48	27	--	--	--	CL
A-746	A29+00	140 W	LW-6	49	30	--	--	--	CL
A-751	A28+50	120 W	LW-6	49	30	--	--	--	CL
A-752	B16+00	20 N	LW-63	58	32	--	--	--	CH
A-753	B37+50	0	LW-64	52	31	--	--	--	CH
A-754	B17+00	0	LW-76	59	34	100	94.3	47.5	CH
A-755	B35+00	10 S	LW-72	46	25	100	88.2	49.0	CL
A-757	A78+00	0	LW-56	55	35	100	89.5	51.0	CH
A-758	B17+00	30 S	LW-74	50	30	100	--	46.0	CH
A-760	B16+00	0	LW-71	57	33	--	--	--	CH
A-761	A68+50	60 E	LW-56	51	29	99.9	91.3	57.0	CH
A-762	B39+70	0	LW-71	49	31	99.9	92.5	47.5	CL
A-763	A78+00	0	LW-58	48	25	--	--	--	CL
A-764	B39+40	62 N	LW-70	51	31	100	93.1	46.5	CH
A-765	B34+60	48 N	LW-70	42	22	100	94.9	41.5	CL
A-766	B36+93	44 S	LW-71	47	27	--	--	--	CL
A-768	A79+84	48 E	LW-54	63	40	100	92.2	57.0	CH

TABLE 2.5-77 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-769	A72+18	69 E	LW-60	47	25	99.7	84.1	49.5	CL
A-770	B45+10	0	LW-70	52	31	100	95.7	46.5	CH
A-771	B43+85	25 S	LW-71	40	21	100	94.1	41.5	CL
A-772	B16+76	0	LW-56	52	29	100	94.0	46.0	CH
A-773	B35+10	20 N	LW-71	46	27	100	93.0	42.0	CL
A-774	A81+66	35 W	LW-52	53	29	100	84.7	43.0	CH
A-775	B34+00	40 N	LW-71	45	25	100	89.6	42.5	CL
A-776	B15+67	12 S	LW-56	53	28	99.9	95.7	49.0	CH
A-777	B44+00	0	LW-70	44	25	100	96.0	43.5	CL
A-778	A34+00	0	LW-52	51	30	100	92.3	47.5	CH
A-779	A76+40	33 W	LW-52	58	36	100	86.3	50.5	CH
A-782	B11+95	23 N	LW-76	53	30	--	--	--	CH
A-783	B17+00	25 S	LW-71	51	30	--	--	--	CH
A-784	B29+50	20 S	LW-71	38	19	--	--	--	CL
A-785	B44+60	80 S	LW-71	46	27	--	--	--	CL
A-787	B15+15	100 S	LW-70	42	21	100	95.4	41.0	CL
A-788	B18+00	0	LW-71	41	22	100	89.9	35.5	CL
A-789	B29+00	0	LW-70	52	32	100	95.6	39.0	CH
A-791	B19+00	0	LW-70	45	26	100	95.8	37.0	CL
A-792	A22+00	0	LW-57	54	31	100	89.2	46.5	CH

TABLE 2.5-77 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-793	B42+40	30 S	LW-71	51	30	--	--	--	CH
A-794	A29+00	0	LW-53	53	32	--	--	--	CH
A-795	B14+98	70 N	LW-71	45	24	--	--	--	CL
A-796	B18+04	47 N	LW-70	40	20	--	--	--	CL
A-797	B30+45	90 S	LW-70	41	21	--	--	--	CL
A-798	B19+50	0	LW-70	46	27	--	--	--	CL
A-799	B16+00	0	LW-70	43	24	--	--	--	CL
A-800	B10+40	0	LW-70	44	25	--	--	--	CL
A-801	B17+20	25 S	LW-71	43	22	--	--	--	CL
A-804	B14+75	0	LW-70	42	22	--	--	--	CL
A-806	B38+30	45 N	LW-70	50	30	--	--	--	CH
A-807	B37+60	0	LW-71	44	26	--	--	--	CL
A-808	B16+00	80 N	LW-71	42	23	--	--	--	CL
A-809	B40+55	15 N	LW-70	48	28	--	--	--	CL-CH
A-810	B14+50	85 S	LW-71	40	20	--	--	--	CL
A-811	B14+50	0	LW-71	36	20	--	--	--	CL
A-812	B12+00	0	LW-71	48	30	100	87.2	39.0	CL
A-813	B14+00	0	LW-70	44	25	100	94.3	40.0	CL
A-814	A23+50	0	LW-54	52	31	100	84.2	46.0	CH
A-816	B16+00	0	LW-71	46	27	100	94.7	43.5	CL

TABLE 2.5-77 (continued)

Test Number	Location: Station*	Location: Offset from Centerline (feet)	Material Identification Number	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain-Size Distribution: Percent Passing #4	Grain-Size Distribution: Percent Passing #200	Grain-Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
A-817	B19+00	0	LW-71	39	20	100	96.3	36.5	CL
A-818	B32+00	80 N	LW-70	42	21	100	95.9	43.5	CL
A-819	B18+30	70 N	LW-71	48	29	100	95.9	44.5	CL
A-820	B31+00	60 N	LW-70	48	29	100	95.2	47.0	CL

TABLE 2.5-78
IN-PLACE DENSITY TEST SUMMARY FOR BAFFLE DIKES A AND B
COHESIVE EMBANKMENT FILL

	Location						
Test Number[(a)]	Station[(b)]	Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1	A 73+45	62 W	1,964.0	LW-8	27.7	95.1	
2	A 72+50	80 W	1,964.0	LW-8	25.6	96.4	
3	A 72+61	77 W	1,964.0	LW-8	26.9	92.7	29
4	A 86+70	40 E	1,964.0	LW-7	24.8	102.3	
5	A 86+70	40 E	1,964.0	LW-7	26.7	97.7	
6	A 86+70	40 E	1,964.0	LW-7	25.2	104.0	
7	A 79+50	32 W	1,950.0	LW-8	16.7	98.4	
8	A 78+06	20 E	1,956.0	LW-8	19.9	99.1	
9	A 78+12	24 E	1,955.0	LW-8	18.9	102.3	
10	A 81+27	107 E	1,951.0	LW-6	17.9	91.5	14
11	A 81+27	107 E	1,951.0	LW-6	23.6	98.3	14
12	A 81+17	97 E	1,951.0	LW-7	34.9	90.5	13
13	A 81+17	97 E	1,951.0	LW-6	19.5	100.8	
14-S	A 81+27	107 E	1,951.0	LW-6	20.5	100.6	
15	A 80+94	95 E	1,951.0	LW-6	20.7	95.5	
16	A 80+65	4 E	1,951.0	LW-6	20.7	97.9	
17	A 83+06	115 E	1,956.0	LW-6	21.5	97.8	

(a) The "S" following the test number indicates that a sand cone correlation test was run with the nuclear test indicated.

(b) A and B prefixes denote Baffle Dike A or B.

(c) SNUPPS datum.

TABLE 2.5-78 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
18	A 79+71	41 E	1,952.0	LW-6	16.3	104.7	
19	A 79+60	38 E	1,953.0	LW-6	16.8	101.2	
20	A 83+12	85 W	1,959.0	LW-6	18.0	105.3	
21	A 82+98	81 W	1,958.0	LW-6	19.7	98.3	
22	A 77+97	114 E	1,957.0	LW-7	26.4	100.4	
23	A 78+30	104 E	1,956.0	LW-7	28.1	99.0	
25	A 89+50	100 E	1,954.0	LW-9	28.0	108.0	
26	A 89+55	90 E	1,954.0	LW-9	30.2	104.0	
27	A 88+92	25 E	1,956.0	LW-6	26.2	91.8	34
28	A 88+70	30 E	1,956.0	LW-6	22.1	94.3	35
29	A 72+61	77 W	1,964.0	LW-7	25.9	102.4	
30	A 88+66	101 W	1,958.0	LW-9	24.3	111.5	
34	A 88+92	25 E	1,956.0	LW-9	31.0	104.2	
35	A 88+70	30 E	1,956.0	LW-9	31.9	103.5	
40	A 89+30	116 W	1,959.0	LW-7	24.8	101.0	
41	A 90+89	134 E	1,957.0	LW-7	27.2	100.0	
42	A 90+76	130 E	1,957.0	LW-7	23.8	103.5	
43	A 89+30	5 E	1,959.0	LW-7	27.4	97.5	
44	A 89+18	10 E	1,959.0	LW-7	27.8	95.6	
45	A 90+10	97 W	1,956.0	LW-7	25.6	102.7	
46	A 89+95	90 W	1,956.0	LW-7	27.4	101.8	
47-S	A 89+14	15 E	1,959.0	LW-7	28.2	99.4	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
48	A 91+90	55 E	1,951.0	LW-8	23.4	95.1	
49	A 92+15	50 E	1,950.0	LW-8	23.2	98.3	
50	A 89+70	30 E	1,957.0	LW-7	32.0	96.3	
51	A 89+00	20 W	1,960.0	LW-7	28.9	97.7	
52	A 102+80	110 E	1,958.0	LW-9	28.6	109.7	
53	A 100+40	100 E	1,953.0	LW-9	26.7	110.6	
54	A 102+40	80 W	1,952.0	LW-9	30.0	103.1	
55	A 101+15	80 W	1,949.0	LW-9	25.1	112.2	
56	A 88+60	90 W	1,964.0	LW-7	27.3	101.6	
57	A 92+90	185 W	1,950.0	LW-7	26.2	100.2	
58	A 93+80	100 W	1,946.0	LW-7	25.8	103.5	
59	A 92+00	20 E	1,954.0	LW-7	26.7	102.7	
60	A 98+90	105 E	1,946.0	LW-7	27.9	98.5	
61	A 100+65	75 W	1,950.0	LW-7	26.1	102.6	
62	A 103+50	65 E	1,957.0	LW-7	25.6	104.1	
63	A 104+05	135 W	1,955.0	LW-7	26.7	102.3	
64	A 104+30	100 E	1,959.0	LW-7	26.1	103.1	
65-S	A 104+35	105 E	1,959.0	LW-7	30.2	95.8	
66	A 102+50	100 W	1,953.0	LW-8	22.0	96.8	
67	A 102+55	104 W	1,953.0	LW-8	23.5	94.3	71
68	A 104+12	150 E	1,960.0	LW-8	23.0	96.4	
69	A 92+00	125 W	1,954.0	LW-7	28.5	98.8	

TABLE 2.5-78 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
70	A 91+50	110 W	1,955.0	LW-7	26.3	100.4	
71	A 102+55	104 W	1,953.0	LW-6	19.4	101.0	
72-S	A 102+30	130 E	1,958.0	LW-7	31.7	92.4	73
73	A 102+30	130 E	1,958.0	LW-7	29.0	95.8	
74	A 98+23	187 E	1,949.0	LW-7	38.1	88.9	75
75	A 98+23	187 E	1,949.0	LW-7	30.3	96.7	
76	A 103+36	126 E	1,960.0	LW-7	25.9	101.7	
77	A 103+25	30 E	1,960.0	LW-9	34.6	100.2	
78	A 83+15	97 W	1,965.0	LW-8	22.8	97.9	
79	A 83+00	104 W	1,965.0	LW-8	25.4	93.4	80
80	A 83+00	104 W	1,965.0	LW-8	22.4	100.4	
81	A 85+92	70 W	1,970.0	LW-8	24.6	100.8	
82	A 86+00	74 W	1,970.0	LW-8	22.5	101.1	
83	A 76+77	90 W	1,966.0	LW-9	34.0	101.9	
84	A 76+85	95 W	1,966.0	LW-9	31.4	103.9	
85	A 76+89	100 W	1,966.0	LW-9	33.4	102.7	
86	A 61+30	50 E	1,965.0	LW-8	22.3	102.4	
87	A 61+42	54 E	1,965.0	LW-7	28.2	101.5	
88	A 55+85	0	1,970.0	LW-8	23.6	98.7	
89	A 55+90	4 W	1,970.0	LW-8	23.5	99.3	
90	A 72+00	80 W	1,967.0	LW-7	28.2	101.0	
91	A 72+20	70 W	1,967.0	LW-7	25.5	104.2	

WOLF CREEK

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
92	A 82+75	90 W	1,965.0	LW-8	25.4	96.5	
93	A 83+10	100 W	1,968.0	LW-8	24.0	99.9	
94	A 68+50	30 E	1,956.0	LW-7	29.5	97.8	
95	A 68+00	20 E	1,955.0	LW-7	30.5	96.6	
96	A 68+20	0	1,956.0	LW-7	29.1	97.8	
97	A 67+50	75 E	1,958.0	LW-7	25.9	100.6	
98-S	A 61+00	90 E	1,963.0	LW-8	22.0	96.5	
99	A 64+42	44 E	1,962.0	LW-1	22.8	92.4	104
100	A 64+42	44 E	1,962.0	LW-1	22.4	94.2	104
101	A 82+80	96 E	1,963.0	LW-10	20.5	101.0	
102	A 82+23	107 W	1,963.0	LW-10	22.4	96.4	
103	A 69+10	100 E	1,962.0	LW-10	23.0	92.1	104
104	A 69+10	100 E	1,962.0	LW-7	26.5	102.3	
105	A 64+42	44 E	1,964.0	LW-7	28.4	102.2	
106	A 59+94	30 E	1,969.0	LW-7	27.7	98.4	
107	A 60+10	20 E	1,968.0	LW-7	25.4	99.0	
108	A 67+27	105 E	1,958.0	LW-7	28.9	94.2	109
109	A 67+27	105 E	1,958.0	LW-7	28.3	97.4	
110	A 53+60	59 W	1,970.0	LW-7	26.4	104.2	
111	A 54+10	45 W	1,970.0	LW-7	27.2	101.5	
112	A 52+00	70 W	1,968.0	LW-12	31.7	95.3	113
113	A 52+00	70 W	1,968.0	LW-12	27.9	100.1	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
114	A 47+00	50 W	1,960.0	LW-12	26.9	102.2	
115	A 67+81	12 W	1,958.0	LW-7	26.7	100.7	
116	A 68+10	3 W	1,956.0	LW-7	23.8	102.1	
117	A 69+19	122 W	1,953.0	LW-9	37.9	101.7	
118	A 66+15	110 W	1,962.0	LW-9	32.5	105.4	
119	A 65+90	100 W	1,962.0	LW-7	27.0	99.9	
120	A 70+40	106 E	1,964.0	LW-7	25.0	103.6	
121	A 47+50	60 E	1,961.0	LW-13	29.6	94.3	146
122	A 47+20	50 E	1,961.0	LW-13	29.0	95.8	146
123	A 64+00	30 W	1,965.0	LW-10	22.9	94.4	124
124	A 64+00	30 W	1,965.0	LW-11	27.2	101.6	
125	A 60+07	10 W	1,967.0	LW-7	23.9	102.4	
126	A 48+50	25 W	1,965.0	LW-11	30.9	99.3	
127	A 51+70	19 E	1,970.0	LW-11	29.2	98.0	
128	A 38+40	75 W	1,977.0	LW-11	33.2	95.7	144
129	A 45+30	85 W	1,960.0	LW-11	33.3	93.1	145
130	A 52+10	40 W	1,971.0	LW-11	32.7	95.8	140
131	A 52+00	35 W	1,971.0	LW-13	25.0	101.5	
132	A 58+00	60 W	1,969.0	LW-11	24.6	99.3	
133	A 60+00	30 W	1,970.0	LW-12	27.3	100.1	
134	A 63+50	50 W	1,966.0	LW-11	31.6	96.4	141
135	A 65+00	20 W	1,963.0	LW-12	27.1	102.1	

TABLE 2.5-78 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
136	A 59+00	0	1,970.0	LW-12	25.7	103.0	
137	A 63+00	20 E	1,968.0	LW-7	25.1	104.3	
138	A 58+80	10 E	1,971.0	LW-12	25.9	97.7	
139	A 55+00	50 E	1,972.0	LW-12	26.6	99.6	
140	A 52+10	40 W	1,971.0	LW-8	21.0	100.1	
141	A 63+50	50 W	1,966.0	LW-11	29.3	101.2	
142	A 84+50	70 W	1,967.0	LW-12	27.0	97.2	
143	A 77+10	80 W	1,966.0	LW-8	22.2	101.2	
144	A 38+40	75 W	1,977.0	LW-11	28.1	102.5	
145	A 45+30	85 W	1,960.0	LW-11	27.4	102.9	
146	A 47+50	60 E	1,961.0	LW-8	24.1	97.3	
147	A 67+00	0	1,958.0	LW-7	30.3	84.5	168
148	A 68+00	20 E	1,956.0	LW-7	32.2	81.5	169
149	A 66+90	20 W	1,958.0	LW-7	31.6	89.6	168
150	A 69+00	0	1,955.0	LW-7	30.2	82.8	151
151	A 69+00	10 W	1,955.0	LW-8	21.7	97.8	
152	A 76+45	100 E	1,962.0	LW-8	21.3	101.5	
153	A 83+50	100 E	1,960.0	LW-6	19.4	101.0	
154	A 96+50	150 E	1,942.0	LW-10	19.1	100.8	
155	A 94+40	145 E	1,942.0	LW-8	21.5	101.4	
156	A 95+00	145 E	1,943.0	LW-8	22.4	100.8	
157	A 90+50	110 W	1,959.0	LW-12	26.2	98.6	

TABLE 2.5-78 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
158	A 85+50	95 W	1,962.0	LW-11	28.6	101.5	
159	A 64+40	60 W	1,966.0	LW-11	27.7	98.4	
160	A 60+00	20 W	1,965.0	LW-8	23.4	95.3	
161	A 56+00	0	1,966.0	LW-8	20.4	98.0	
162	A 52+00	40 W	1,971.0	LW-12	24.3	99.6	
163	A 39+00	20 W	1,977.0	LW-9	33.2	100.3	
164	A 43+00	40 W	1,961.0	LW-11	28.3	92.9	166
165	A 35+00	40 W	1,965.0	LW-9	33.2	98.4	
166	A 43+00	40 W	1,961.0	LW-11	28.5	97.2	
167	A 45+70	75 W	1,959.0	LW-11	30.6	95.8	
168	A 67+00	0	1,958.0	LW-7	29.8	95.5	
169	A 68+00	20 E	1,956.0	LW-7	28.2	97.1	
170	A 46+00	75 E	1,963.0	LW-10	16.2	99.8	
171	A 49+50	75 W	1,970.0	LW-11	26.0	100.8	
172	A 53+00	85 W	1,971.0	LW-11	28.4	98.1	
173	A 42+50	30 W	1,969.0	LW-8	22.2	100.7	
174	A 36+00	60 W	1,973.0	LW-7	24.1	99.2	
175	A 46+20	30 E	1,960.0	LW-11	26.8	97.3	
176	A 47+00	40 W	1,963.0	LW-11	26.8	97.6	
177	A 46+50	75 E	1,963.0	LW-13	21.7	99.8	
178	A 41+00	50 W	1,970.0	LW-8	19.8	100.5	
179	A 38+00	0	1,975.0	LW-8	21.8	97.1	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
180	A 35+00	20 E	1,970.0	LW-8	21.8	97.3	
181	A 39+00	30 W	1,976.0	LW-8	22.3	96.2	
188	A 50+00	10 E	1,970.0	LW-13	18.0	98.7	
189	A 51+80	0	1,972.0	LW-13	22.4	97.5	
190	A 56+00	10 W	1,972.0	LW-13	19.6	100.5	
191	A 58+90	0	1,971.0	LW-13	18.7	103.3	
192	A 61+00	20 W	1,970.0	LW-2	17.1	97.8	
193	A 62+20	10 E	1,970.0	LW-2	18.5	95.6	
194	A 65+50	5 W	1,965.0	LW-13	21.3	98.6	
195	A 67+50	20 E	1,959.0	LW-2	16.6	98.6	
196	A 64+50	30 E	1,970.0	LW-8	24.8	92.5	197
197	A 64+50	30 E	1,970.0	LW-8	19.1	102.4	
198	A 67+00	20 E	1,960.0	LW-11	26.7	99.3	
199	A 65+00	40 W	1,970.0	LW-13	23.2	97.8	
204	A 44+10	35 W	1,964.0	LW-12	24.1	98.7	
205	A 47+05	30 W	1,961.0	LW-12	23.3	100.4	
206	A 44+50	60 W	1,964.0	LW-8	21.8	95.0	
207	A 47+80	90 W	1,965.0	LW-13	21.6	101.2	
208	A 45+30	75 W	1,963.0	LW-13	22.6	101.1	
261	A 96+75	160 W	1,950.0	LW-11	32.9	91.0	--[d]
262	A 82+00	94 E	1,956.0	LW-11	32.6	92.2	349

[d]Material removed.

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
272	A 96+75	160 W	1,950.0	LW-11	33.7	88.6	--[d]
273	A 81+75	94 E	1,956.0	LW-11	33.2	88.9	349
274	A 93+85	85 E	1,961.0	LW-10	22.0	97.7	
311	A 89+90	70 E	1,961.0	LW-6	20.2	100.0	
312	A 74+00	65 W	1,961.0	LW-7	26.0	102.7	
313	A 80+00	60 W	1,949.5	LW-7	31.6	93.4	350
314	A 73+00	65 E	1,961.0	LW-7	24.1	103.0	
349	A 81+75	94 E	1,956.0	LW-11	30.5	95.3	
350	A 80+00	60 W	1,949.5	LW-7	28.8	97.0	
351	A 96+75	160 W	1,950.0	LW-11	31.6	94.7	--[d]
385	A 93+00	150 E	1,950.0	LW-11	25.7	100.8	
386	A 77+00	90 E	1,965.0	LW-7	30.3	96.1	
387	A 86+00	75 W	1,971.0	LW-7	28.8	99.8	
388	A 77+00	70 W	1,965.0	LW-7	27.4	100.8	
389	A 96+75	160 W	1,950.0	LW-11	31.0	93.7	
390	A 88+00	95 E	1,968.0	LW-7	28.8	97.9	
391	A 75+00	75 E	1,970.0	LW-7	25.9	98.9	
414	A 99+40	160 W	1,948.0	LW-7	26.2	100.1	
415	A 97+00	155 W	1,947.0	LW-7	29.2	95.2	
416	A 89+00	85 E	1,964.0	LW-7	26.7	100.2	
417	A 81+50	90 E	1,967.0	LW-7	25.4	101.4	
427	A 84+85	0	1,978.5	LW-7	30.7	96.1	

TABLE 2.5-78 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
428	A 76+10	5 W	1,984.5	LW-7	28.7	98.5	
450	A 88+75	60 W	1,968.0	LW-7	31.3	94.4	451
451	A 88+75	60 W	1,968.0	LW-7	29.0	98.0	
452	A 88+75	95 W	1,958.5	LW-7	31.4	95.9	
469	A 93+05	100 W	1,955.0	LW-7	28.4	98.9	
470	A 99+03	108 E	1,953.5	LW-7	26.5	96.4	
471	A 77+00	100 W	1,964.5	LW-7	28.9	97.6	
512	A 88+20	60 E	1,973.0	LW-12	23.7	98.6	
513	A 86+50	55 W	1,972.5	LW-7	26.6	98.6	
514	A 79+90	120 W	1,955.0	LW-12	24.8	101.1	
515	A 86+60	43 W	1,973.0	LW-10	19.5	96.1	
516	A 100+05	135 W	1,950.5	LW-7	31.4	96.3	
531	A 96+75	120 E	1,958.0	LW-12	24.1	100.3	
532	A 99+90	110 W	1,952.5	LW-8	22.6	99.1	
533	A 84+80	53 W	1,974.0	LW-7	25.3	100.2	
534	A 93+60	107 E	1,953.5	LW-7	26.3	99.3	
547	A 84+70	45 E	1,975.0	LW-7	24.4	99.9	
548	A 99+30	123 W	1,953.5	LW-7	25.8	99.0	
561	A 93+75	100 W	1,955.0	LW-7	28.8	94.6	562
562	A 93+75	100 W	1,955.0	LW-7	25.2	101.4	
676-S	A 100+80	50 E	1,966.0	LW-6	15.1	102.3	
677	A 97+10	20 E	1,958.0	LW-6	15.5	102.4	

TABLE 2.5-78 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
678-S	A 94+50	10 E	1,957.5	LW-6	10.6	108.3	
970	A 100+00	110 W	1,957.5	LW-12	23.6	98.2	
992	A 95+70	120 E	1,945.5	LW-10	19.8	97.0	
1007	A 95+50	125 W	1,958.0	LW-12	23.4	100.4	
1077	A 99+30	100 E	1,951.0	LW-8	23.4	99.1	
1112	A 96+80	130 W	1,958.5	LW-8	21.0	99.8	
1200	A 5+60	2 W	1,988.0	LW-1	17.8	96.6	
1201	A 3+70	15 W	1,990.0	LW-1	22.4	96.5	
1202	A 0+95	0	1,990.5	LW-12	26.3	98.7	
1238	A 101+80	125 W	1,962.0	LW-25	10.4	111.6	
1483	A 10+00	0	1,992.5	S-12	15.9	96.3	
1502	A 37+00	0	1,978.5	S-14	17.1	97.9	
1503	A 39+50	25 E	1,977.5	S-14	19.0	96.4	
1504	A 40+00	25 W	1,977.5	S-14	17.5	95.7	
1505	A 12+80	40 E	1,979.0	LW-55	24.1	96.1	
1506	A 16+10	80 W	1,972.0	LW-9	31.9	100.1	
1507	A 19+30	0	1,967.0	LW-53	25.9	96.9	
1527	A 52+25	0	1,976.0	LW-54	20.0	99.0	
1528	A 44+75	50 E	1,964.5	LW-54	19.5	97.4	
1539	A 45+00	60 W	1,959.0	LW-53	23.2	98.4	
1540	A 45+40	32 W	1,969.5	LW-54	23.3	99.1	
1541	A 44+50	30 W	1,970.5	LW-53	24.7	99.4	

TABLE 2.5-78 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1542	A 48+60	24 W	1,968.0	LW-54	20.7	98.0	
1543	A 49+40	18 W	1,968.0	LW-53	27.8	96.5	
1565	A 16+50	40 W	1,968.5	LW-52	24.7	99.0	
1566	A 17+70	20 W	1,966.5	LW-52	24.8	99.7	
1567	A 18+50	0	1,967.0	LW-55	26.3	98.6	
1568	A 10+00	30 E	1,981.0	LW-54	21.5	102.4	
1569	A 7+00	0	1,985.0	LW-54	20.3	101.6	
1615	A 38+00	25 E	1,981.0	LW-6	16.3	102.3	
1616	A 40+10	25 W	1,980.0	LW-6	17.9	100.0	
1617	A 42+50	30 W	1,978.0	LW-6	16.4	101.4	
1618	A 46+75	30 E	1,976.0	LW-6	15.7	102.7	
1619	A 49+50	25 W	1,977.0	LW-6	15.6	96.7	
1636	A 48+00	25 W	1,976.0	LW-6	18.2	104.9	
1637	A 46+00	25 W	1,972.0	LW-6	16.9	102.8	
1638	A 56+00	25 E	1,979.5	LW-6	16.8	104.9	
1639	A 50+00	0	1,977.0	LW-6	17.0	99.5	
1640	A 52+00	25 E	1,979.0	LW-6	18.5	99.1	
1665	A 49+00	25 W	1,976.5	S-12	14.7	102.3	
1666	A 52+00	50 E	1,974.5	S-12	14.2	102.7	
1667	A 55+00	20 W	1,980.0	S-12	16.0	102.1	
1668	A 59+00	20 E	1,980.0	S-12	14.2	99.7	
1669	A 60+00	15 E	1,975.5	S-12	12.6	101.1	

TABLE 2.5-78 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1670	A 57+50	10 E	1,977.0	S-12	14.0	101.5	
1693	A 54+00	40 E	1,972.0	S-12	13.9	102.5	
1694	A 58+25	5 E	1,978.0	S-12	14.9	100.8	
1695	A 72+00	5 W	1,977.0	S-12	12.7	101.5	
1716	A 61+75	50 E	1,971.5	S-12	15.9	101.6	
1717	A 66+50	15 E	1,972.0	LW-14	23.6	96.7	
1718	A 64+00	10 E	1,972.0	LW-14	20.7	99.9	
1733	A 54+50	45 W	1,977.0	LW-57	24.1	97.4	
1734	A 70+40	5 E	1,981.5	LW-54	22.8	97.8	
1735	A 59+25	50 W	1,969.0	LW-57	24.2	98.9	
1736	A 56+75	45 E	1,974.0	LW-53	14.4	98.9	
1758	A 71+00	60 E	1,968.0	LW-6	14.3	99.4	
1759	A 68+50	0	1,959.0	LW-6	20.4	96.3	
1760	A 67+50	50 E	1,961.5	LW-58	20.1	97.9	
1761	A 56+50	50 E	1,982.0	LW-56	24.2	99.2	
1762	A 48+00	55 E	1,979.5	LW-6	20.4	100.8	
1779	A 46+50	30 E	1,976.0	LW-56	20.1	97.4	
1780	A 49+50	35 E	1,983.0	LW-53	18.1	97.7	
1781	A 55+00	20 E	1,982.5	LW-54	21.6	95.6	
1795	A 68+00	60 E	1,961.0	LW-55	24.1	90.9	1796
1796	A 68+00	60 E	1,961.0	LW-55	23.4	99.1	
1797	A 70+50	50 E	1,963.0	LW-53	24.3	99.2	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1816	A 28+50	50 E	1,957.0	LW-8	21.4	96.7	
1817	A 28+00	0	1,957.5	LW-8	18.7	98.3	
1818	A 47+50	20 E	1,974.5	LW-52	22.9	99.1	
1819	A 63+00	25 E	1,976.0	LW-8	22.8	95.1	
1820	A 71+50	50 E	1,966.5	LW-53	26.8	97.3	
1839	A 24+00	50 E	1,940.5	LW-54	20.3	101.9	
1840	A 28+50	70 E	1,935.5	LW-8	23.2	99.8	
1841	A 27+50	20 W	1,944.5	LW-54	22.4	99.4	
1842	A 25+00	120 E	1,937.5	LW-6	15.1	110.0	
1843	A 24+10	120 E	1,943.0	LW-55	24.3	98.6	
1844	A 30+00	150 W	1,951.0	LW-54	24.8	98.0	
1845	A 30+50	155 W	1,951.5	LW-8	23.6	100.1	
1846	A 30+20	20 W	1,952.5	LW-8	22.7	99.5	
1847	A 28+00	0	1,948.5	LW-6	14.4	103.8	
1848	A 27+00	0	1,940.5	LW-55	25.0	103.4	
1861	A 24+00	0	1,940.5	LW-53	24.7	104.6	
1862	A 23+10	100 W	1,938.5	LW-8	25.1	97.6	
1863	A 29+00	70 W	1,947.5	LW-56	23.4	99.5	
1864	A 30+50	100 E	1,949.5	LW-6	17.6	103.2	
1865	A 28+30	80 E	1,940.5	LW-6	14.6	99.7	
1866	A 27+00	110 E	1,937.5	LW-8	25.0	99.3	
1867	A 54+00	50 W	1,972.5	LW-8	23.0	102.0	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1868	A 67+00	55 W	1,961.0	LW-56	19.8	100.1	
1881	A 30+50	40 E	1,960.5	LW-56	22.4	99.9	
1882	A 28+50	45 E	1,960.5	LW-53	24.5	100.6	
1883	A 27+00	60 E	1,954.0	LW-56	19.9	100.9	
1884	A 24+00	0	1,942.5	LW-56	22.9	100.0	
1885	A 25+00	50 W	1,946.0	LW-56	22.2	99.7	
1886	A 27+80	100 W	1,960.5	LW-53	24.9	100.2	
1887	A 23+20	120 E	1,938.0	LW-6	16.0	108.1	
1888	A 26+50	30 E	1,947.5	LW-52	20.2	97.7	
1889	A 23+50	70 W	1,939.5	LW-52	24.6	98.6	
1890	A 24+00	140 W	1,942.5	LW-52	23.9	97.4	
1891	A 29+00	140 W	1,947.0	LW-6	18.6	97.7	
1904	A 27+00	130 E	1,952.5	LW-52	23.3	98.6	
1905	A 29+00	100 E	1,953.0	LW-51	29.0	100.2	
1906	A 29+00	120 E	1,953.5	LW-7	24.7	87.5	1907
1907	A 29+00	120 E	1,953.5	LW-7	23.3	96.7	
1908	A 23+00	50 W	1,932.5	LW-53	25.4	102.3	
1909	A 24+00	110 W	1,933.5	LW-8	24.3	100.5	
1910	A 26+00	130 W	1,944.5	LW-54	27.8	95.2	1948
1911	A 28+50	120 W	1,951.5	LW-6	16.5	105.6	
1937	A 26+00	150 E	1,949.0	LW-54	25.1	96.6	
1938	A 29+00	100 E	1,954.5	LW-54	22.3	95.7	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1939	A 27+50	80 W	1,961.5	LW-6	13.6	105.5	
1940	A 25+00	0	1,947.0	LW-54	20.7	99.3	
1941	A 25+50	150 W	1,947.0	LW-58	10.5	105.9	1945
1942	A 23+20	50 E	1,940.5	LW-54	23.0	101.2	
1943	A 24+00	80 W	1,944.5	LW-6	16.1	107.9	
1944	A 27+20	160 W	1,944.0	LW-6	12.6	107.9	
1945	A 25+50	150 W	1,947.0	LW-58	13.9	105.7	
1946	A 26+00	130 W	1,944.5	LW-54	27.2	94.8	1948
1947	A 26+50	150 W	1,949.5	LW-54	24.3	97.9	
1948	A 26+00	130 W	1,944.5	LW-54	17.9	102.2	
1965-S	A 27+00	100 W	1,957.5	LW-6	13.2	102.7	
1966-S	A 24+50	120 W	1,945.5	LW-55	25.9	96.2	
1967-S	A 23+50	30 W	1,933.5	LW-58	19.5	101.0	
1968-S	A 26+30	165 E	1,950.5	LW-55	25.7	96.4	
1969	A 28+00	100 E	1,945.5	LW-58	17.0	100.4	
1970	A 29+00	0	1,946.5	LW-58	10.8	100.5	1994
1971	A 27+50	150 E	1,955.0	LW-52	20.4	97.8	
1972	A 29+00	0	1,946.5	LW-58	12.8	110.4	1994
1973	A 25+00	120 W	1,946.0	LW-58	17.3	99.9	
1992	A 28+80	160 W	1,958.5	LW-58	15.4	102.3	
1993	A 29+00	0	1,946.5	LW-58	12.5	102.9	1994
1994	A 29+00	0	1,946.5	LW-58	13.5	105.4	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
1995	A 26+70	130 W	1,952.0	LW-58	18.8	97.8	
1996	A 24+02	170 W	1,946.0	LW-52	21.7	97.9	
1997	A 24+01	0	1,946.5	LW-53	16.9	97.5	2052
1998	A 24+00	50 W	1,947.0	LW-53	20.8	95.9	
1999	A 23+50	50 E	1,944.0	LW-53	19.7	96.4	2046
2000	A 24+05	80 E	1,946.0	LW-56	16.6	95.9	
2016	A 30+00	145 W	1,957.5	LW-55	21.1	99.8	
2017	A 28+00	120 W	1,951.0	LW-54	18.1	99.9	
2018	A 25+00	0	1,940.0	LW-53	18.3	101.3	
2019	A 23+50	50 E	1,944.0	LW-53	14.9	96.9	2046
2020	A 31+50	30 W	1,962.5	LW-52	16.9	97.2	
2021	A 33+25	25 W	1,967.0	LW-54	9.3	96.3	2050
2022	A 24+50	100 W	1,940.0	LW-52	21.2	99.8	
2023	A 26+00	110 W	1,953.0	LW-57	19.2	100.0	
2024	A 28+00	100 W	1,950.5	LW-57	20.1	99.5	
2025	A 29+00	50 W	1,952.5	LW-57	18.9	97.4	
2046	A 23+50	50 E	1,944.0	LW-53	23.8	98.8	
2047	A 25+00	90 E	1,949.5	LW-53	23.7	97.5	
2048	A 27+20	20 E	1,957.0	LW-55	21.8	96.0	
2049	A 30+00	40 E	1,959.5	LW-56	18.5	97.4	
2050	A 33+25	25 W	1,967.0	LW-54	19.4	97.2	
2051	A 24+01	0	1,946.5	LW-53	18.6	91.6	2052

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2052	A 24+01	0	1,946.5	LW-53	19.6	99.0	
2053	A 23+50	90 E	1,945.0	LW-53	23.6	97.3	
2054	A 26+00	10 E	1,950.0	LW-53	23.4	94.3	2102
2055	A 29+60	100 E	1,957.5	LW-53	25.9	95.4	
2056-S	A 26+50	80 E	1,954.0	LW-52	23.0	96.9	
2057-S	A 24+50	20 E	1,949.5	LW-52	22.0	98.6	
2058-S	A 23+50	120 E	1,938.5	LW-55	25.3	99.0	
2059-S	A 29+60	120 E	1,959.0	LW-52	20.8	96.6	
2085	A 31+00	120 W	1,961.0	LW-57	18.8	99.7	
2086	A 25+50	110 W	1,954.5	LW-58	17.5	98.6	
2102	A 26+00	10 E	1,950.0	LW-53	22.0	102.0	
2103	A 33+50	125 W	1,971.5	LW-58	19.3	101.6	
2104	A 29+00	120 W	1,955.5	LW-60	11.5	106.0	2126
2105	A 24+50	110 W	1,948.5	LW-60	16.3	98.4	
2106	A 31+50	115 W	1,962.5	LW-58	13.0	97.0	2125
2107	A 37+00	40 W	1,978.5	LW-53	22.5	98.3	
2108	A 38+50	20 W	1,980.5	LW-53	13.8	87.8	2123
2109	A 41+00	35 W	1,978.0	LW-58	20.5	98.7	
2123	A 38+50	20 W	1,980.5	LW-53	25.0	103.3	
2124	A 54+00	10 E	1,987.0	LW-52	23.9	98.0	
2125	A 31+50	115 W	1,962.5	LW-58	16.0	103.2	
2126	A 29+00	120 W	1,955.5	LW-58	14.9	104.3	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2127	A 56+20	15 E	1,983.5	LW-57	21.8	98.9	
2128	A 59+00	10 W	1,990.5	LW-56	19.4	100.2	
2129	A 57+00	60 W	1,970.5	LW-58	20.3	97.4	
2130	A 66+70	70 W	1,959.0	LW-58	16.2	99.3	
2142	A 41+00	40 W	1,980.5	LW-53	22.9	99.0	
2143	A 44+80	30 W	1,971.0	LW-60	17.6	101.4	
2144	A 26+20	170 E	1,956.0	LW-57	18.6	96.6	
2145	A 29+00	160 E	1,953.5	LW-53	26.2	100.6	
2146	A 72+00	60 W	1,970.5	LW-53	25.5	103.9	
2147	A 60+50	70 W	1,971.0	LW-54	23.2	99.2	
2148	A 47+50	25 E	1,974.5	LW-58	19.1	101.5	
2161	A 54+00	10 W	1,984.5	LW-53	25.1	102.0	
2162	A 60+35	25 E	1,980.5	LW-56	18.3	99.1	
2163	A 71+60	65 W	1,969.0	LW-57	20.0	99.8	
2164	A 62+70	80 W	1,967.0	LW-57	23.4	100.0	
2165	A 39+50	30 W	1,987.5	LW-57	21.0	103.2	
2166	A 45+00	35 E	1,973.0	LW-60	15.3	104.6	
2167	A 49+30	5 E	1,980.5	LW-54	20.4	96.0	
2170	A 39+10	30 E	1,987.0	LW-53	23.4	99.7	
2171	A 23+85	130 E	1,936.0	LW-52	22.1	98.6	
2172	A 23+50	20 E	1,936.5	LW-52	21.9	99.0	
2173	A 77+00	65 E	1,965.5	LW-58	19.0	100.4	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2174	A 70+55	70 E	1,968.0	LW-56	21.9	99.4	
2175	A 23+70	0	1,940.0	LW-53	23.9	100.1	
2176	A 75+00	60 W	1,974.0	LW-58	19.1	96.2	
2177	A 65+00	75 W	1,969.5	LW-54	23.5	99.8	
2201	A 23+10	40 W	1,930.0	LW-54	21.3	99.1	
2202	A 68+00	60 E	1,963.5	LW-60	14.2	104.9	
2203	A 78+20	70 E	1,965.0	LW-60	14.8	99.4	
2204	A 21+40	60 W	1,962.0	LW-58	19.7	97.8	
2205	A 23+90	10 E	1,945.0	LW-53	24.0	100.6	
2206	A 21+60	0	1,962.0	LW-54	20.9	97.7	
2207	A 22+00	40 W	1,960.5	LW-58	19.0	98.2	
2208	A 23+70	100 W	1,963.0	LW-54	21.4	98.3	
2209	A 67+20	50 W	1,968.5	LW-60	17.2	100.8	
2210	A 80+00	60 E	1,963.5	LW-60	14.7	105.1	
2211	A 73+10	75 E	1,972.0	LW-60	15.0	107.8	
2212	A 60+00	65 W	1,975.5	LW-60	14.8	108.6	
2213	A 24+88	110 E	1,952.0	LW-51	26.3	99.3	
2214	A 29+80	100 W	1,959.0	LW-58	17.0	98.7	
2215	A 44+08	20 W	1,983.0	LW-60	11.1	101.0	
2216	A 50+95	24 E	1,985.0	LW-60	12.9	101.9	
2217	A 54+10	10 E	1,985.5	LW-60	10.5	113.2	
2234	A 38+00	30 W	1,985.0	LW-60	17.8	99.0	

TABLE 2.5-78 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2235	A 45+00	25 W	1,979.0	LW-55	28.0	101.8	
2236	A 49+80	15 E	1,981.5	LW-52	23.7	100.4	
2237	A 56+00	10 E	1,982.0	LW-58	18.8	97.0	
2238	B 4+30	10 S	1,993.5	LW-71	15.6	97.7	
2239	B 2+70	15 S	1,993.5	LW-12	27.0	99.1	
2240	B 1+15	10 S	1,990.5	LW-71	21.1	98.5	
2241	B 2+10	20 N	1,987.5	LW-12	24.5	101.6	
2242	B 6+00	45 N	1,981.0	LW-12	23.3	97.3	
2243	B 6+00	40 S	1,981.0	LW-12	29.3	98.2	
2244	B 10+80	40 N	1,969.5	LW-12	24.4	93.4	2247
2245	B 6+50	10 N	1,979.0	LW-75	21.5	99.3	
2246	B 7+00	20 S	1,978.5	LW-75	19.8	99.7	
2247	B 10+80	40 N	1,969.5	LW-12	21.3	101.0	
2248	B 8+20	10 S	1,977.5	LW-75	16.5	95.1	
2249	B 8+60	45 S	1,975.0	LW-61	18.9	98.0	
2250	B 10+30	50 S	1,972.0	LW-61	18.8	98.9	
2251	B 12+00	70 S	1,971.5	LW-61	19.1	95.0	
2252	B 12+50	0	1,972.0	LW-61	18.2	98.7	
2253	B 44+88	25 S	1,960.5	LW-64	24.9	98.2	
2254	B 46+00	15 S	1,960.5	LW-64	21.0	99.9	
2255	B 46+80	10 S	1,963.5	LW-64	22.3	96.8	
2256	B 14+40	20 N	1,954.0	LW-71	19.0	98.4	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2257	B 14+15	40 S	1,954.0	LW-69	16.2	95.1	
2258	B 43+40	50 N	1,959.5	LW-64	25.0	96.8	
2259	B 44+90	75 N	1,960.5	LW-64	25.2	95.5	
2260	B 46+30	60 N	1,963.0	LW-64	20.4	98.8	
2261	B 6+20	40 N	1,980.0	LW-66	19.9	99.3	
2262	B 9+00	30 N	1,974.5	LW-69	17.7	98.7	
2263	B 10+00	60 S	1,972.5	LW-69	19.1	96.9	
2264	B 11+00	55 S	1,972.0	LW-66	14.2	101.2	2289
2265	B 40+00	30 S	1,957.0	LW-64	32.6	87.1	2273
2266	B 42+60	40 N	1,957.0	LW-64	29.4	87.6	2268
2267	B 42+60	40 N	1,957.0	LW-64	23.1	93.6	2268
2268	B 42+60	40 N	1,957.0	LW-64	21.5	100.5	
2269	B 43+80	20 N	1,957.5	LW-64	24.4	95.5	
2270	B 45+00	20 N	1,962.0	LW-64	24.0	99.4	
2271	B 44+50	100 S	1,960.5	LW-64	20.1	96.0	
2272	B 40+00	30 S	1,957.0	LW-64	25.5	92.4	2273
2273	B 40+00	30 S	1,957.0	LW-64	18.3	105.7	
2274	A 66+50	55 W	1,973.5	LW-57	22.2	92.9	2280
2275	A 52+00	40 W	1,984.5	LW-54	22.1	96.2	
2276	A 49+10	25 E	1,979.5	LW-56	18.3	100.6	
2277	A 41+80	30 E	1,983.5	LW-56	20.0	99.2	
2278	A 39+50	20 E	1,990.5	LW-54	23.1	95.1	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2279	A 58+00	0	1,983.5	LW-54	22.3	98.6	
2280	A 66+50	55 W	1,973.5	LW-57	18.8	98.3	
2281	B 38+80	70 N	1,959.0	LW-71	16.3	99.2	
2282	B 42+00	45 N	1,962.5	LW-71	18.0	102.6	
2283	B 43+50	20 N	1,959.5	LW-74	16.4	102.9	
2284	B 42+70	30 S	1,959.5	LW-74	17.9	97.3	
2285	B 41+20	30 S	1,961.0	LW-70	19.5	96.5	
2286	B 39+55	40 S	1,960.0	LW-73	17.9	98.8	
2287	B 15+20	120 S	1,946.5	LW-69	20.3	104.0	
2288	B 16+00	100 S	1,945.5	LW-28	22.8	100.8	
2289	B 11+00	55 S	1,972.0	LW-69	15.5	100.1	
2290	A 66+30	60 E	1,976.5	LW-58	20.6	98.5	
2291	A 71+30	50 E	1,974.5	LW-54	26.1	96.0	2314
2292	A 38+80	10 W	1,986.0	LW-58	20.1	99.5	
2293	A 42+90	20 E	1,983.5	LW-55	31.1	94.4	2294
2294	A 42+90	20 E	1,983.5	LW-55	27.5	97.0	
2295	A 66+50	65 W	1,975.0	LW-25	26.2	92.8	2312
2296	B 34+70	20 S	1,966.5	LW-72	18.2	102.1	
2297	B 35+00	10 S	1,968.5	LW-72	16.3	106.1	
2298	B 36+70	40 S	1,962.5	LW-63	19.1	103.1	
2299	B 37+50	70 S	1,961.5	LW-64	20.4	103.8	
2300	B 38+25	90 S	1,960.5	LW-72	17.7	102.9	

TABLE 2.5-78 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2301	B 16+50	40 S	1,948.0	LW-76	22.1	100.0	
2302	B 15+30	80 N	1,948.0	LW-76	21.8	104.1	
2303	B 16+20	100 N	1,950.0	LW-76	18.4	106.9	
2304	B 15+30	70 S	1,947.5	LW-76	25.9	96.5	
2305	B 15+10	90 N	1,948.5	LW-76	27.2	93.0	2306
2306	B 15+10	90 N	1,948.5	LW-76	25.0	100.6	
2307	B 16+90	30 N	1,953.5	LW-76	26.1	96.2	
2308	B 17+00	0	1,953.5	LW-76	21.7	97.4	
2309	B 16+00	40 S	1,950.5	LW-76	24.2	100.3	
2310	B 15+20	100 S	1,947.5	LW-76	19.8	102.8	
2311	B 16+00	20 N	1,953.5	LW-63	16.9	96.8	
2312	A 42+90	20 E	1,983.5	LW-55	26.2	100.3	
2313	A 66+50	65 W	1,975.0	LW-25	22.8	97.3	
2314	A 71+30	50 E	1,974.5	LW-54	24.7	96.6	
2315	A 39+85	13 W	1,984.0	LW-54	19.4	100.7	
2316	A 47+60	7 W	1,973.0	LW-54	23.4	97.5	
2317	A 56+00	20 W	1,972.0	LW-60	17.4	99.0	
2318	A 38+15	5 E	1,984.0	LW-54	24.2	96.1	
2319	B 15+80	40 N	1,951.0	LW-28	20.6	97.2	
2320-S	B 15+90	80 N	1,949.0	LW-28	22.9	96.7	
2321-S	B 16+70	0	1,953.5	LW-73	20.6	96.0	
2322-S	B 17+00	30 S	1,954.0	LW-74	18.3	98.6	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2323-S	B 15+30	90 S	1,949.0	LW-76	23.2	99.3	
2324	A 68+45	30 E	1,977.5	LW-57	22.1	99.9	
2325	B 17+00	70 N	1,954.0	LW-71	21.4	97.3	
2326	B 15+40	93 S	1,949.5	LW-71	21.9	95.4	
2327	B 16+00	0	1,953.5	LW-71	19.9	96.8	
2328	B 45+10	65 N	1,966.0	LW-70	16.7	98.0	
2329	B 42+45	40 N	1,964.0	LW-70	19.9	96.8	
2330	B 36+80	27 N	1,973.0	LW-71	20.3	100.8	
2331	B 35+05	65 S	1,976.5	LW-70	22.7	96.5	
2332	B 38+35	45 S	1,970.0	LW-70	24.8	94.5	2333
2333	B 38+35	45 S	1,970.0	LW-70	20.3	99.4	
2334	B 42+75	15 S	1,968.0	LW-70	19.5	101.5	
2335	A 68+50	60 E	1,975.0	LW-56	20.7	100.8	
2336	A 73+70	70 E	1,975.5	LW-56	20.4	100.6	
2337	A 78+00	65 E	1,966.0	LW-56	22.0	98.9	
2338-S	A 81+40	65 W	1,968.5	LW-56	21.8	98.3	
2339-S	A 74+65	47 W	1,978.5	LW-56	24.1	97.9	
2348	B 17+25	85 N	1,956.0	LW-71	22.9	99.6	
2349	B 44+06	47 N	1,966.0	LW-71	25.5	95.3	2360
2350	B 15+67	12 S	1,952.5	LW-56	17.7	95.8	
2351-S	B 34+86	35 N	1,977.0	LW-70	20.0	93.3	2358
2352-S	B 37+18	27 S	1,965.5	LW-70	23.6	91.1	2353

TABLE 2.5-78 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2353	B 37+18	27 S	1,965.5	LW-70	20.9	96.2	
2354	B 34+86	35 N	1,977.0	LW-70	18.9	94.5	2358
2355-S	B 44+06	47 N	1,966.0	LW-70	23.8	93.0	2360
2356	B 16+76	35 N	1,955.5	LW-56	19.0	98.0	
2357	B 16+85	48 S	1,956.0	LW-53	16.6	91.4	2361
2358	B 34+86	35 N	1,977.0	LW-70	18.8	99.5	
2359	B 38+41	28 N	1,971.0	LW-70	22.7	95.0	
2360	B 44+06	47 N	1,966.0	LW-70	22.2	98.3	
2361	B 16+85	48 S	1,956.0	LW-73	17.4	98.0	
2362	A 70+75	55 E	1,978.0	LW-58	18.5	99.6	
2363	A 79+84	48 E	1,968.0	LW-54	22.6	97.8	
2364	A 67+50	50 W	1,978.0	LW-54	21.8	95.6	
2365	A 70+00	39 W	1,973.0	LW-53	25.0	98.3	
2366	A 75+60	65 W	1,973.0	LW-58	17.9	101.5	
2367	A 72+18	69 E	1,981.5	LW-60	15.5	100.6	
2368	A 75+74	52 E	1,975.5	LW-60	15.9	98.9	
2369-S	A 76+00	49 W	1,976.0	LW-52	21.5	101.6	
2370	A 67+80	60 W	1,981.0	LW-60	18.1	99.3	
2371	A 82+00	65 W	1,975.5	LW-55	26.5	98.1	
2376	B 34+95	70 S	1,970.0	LW-70	22.2	99.2	
2377	B 38+99	60 S	1,964.0	LW-71	22.5	98.2	
2378	B 15+45	30 N	1,952.0	LW-76	24.5	97.6	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2379	B 33+00	17 N	1,973.0	LW-70	20.8	99.5	
2380	B 31+35	100 N	1,965.0	LW-71	21.7	97.0	
2381	B 28+77	87 N	1,969.0	LW-71	20.0	96.0	
2382	B 45+69	6 S	1,973.0	LW-76	26.5	95.3	
2383	B 43+10	0	1,971.0	LW-70	21.9	97.9	
2384	B 39+67	35 S	1,963.0	LW-70	21.7	95.5	
2385	B 36+47	75 S	1,968.0	LW-71	20.8	98.1	
2386	B 34+05	83 S	1,972.0	LW-70	21.3	96.0	
2387	B 32+00	15 S	1,962.5	LW-70	25.0	96.1	
2388	B 30+60	0	1,962.5	LW-71	21.2	96.1	
2389	B 29+10	70 S	1,959.5	LW-71	19.8	96.4	
2390	B 15+05	106 S	1,954.0	LW-74	17.8	98.5	
2391	B 29+20	50 N	1,966.0	LW-71	20.4	97.8	
2392	B 35+15	33 N	1,977.0	LW-70	20.6	96.8	
2393	B 40+45	40 N	1,962.0	LW-71	22.1	96.5	
2394	B 42+90	35 N	1,962.0	LW-70	17.0	91.6	2395
2395-S	B 42+90	35 N	1,962.0	LW-71	20.7	97.8	
2396	B 35+05	5 S	1,972.0	LW-71	21.8	98.7	
2397	B 31+00	20 S	1,960.5	LW-71	22.6	97.1	
2398	B 28+67	23 S	1,964.0	LW-71	20.1	100.5	
2399	B 39+70	82 S	1,963.5	LW-71	18.9	97.6	
2400-S	B 45+76	100 S	1,970.5	LW-71	20.0	97.4	

TABLE 2.5-78 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2401	B 15+85	0	1,956.5	LW-76	25.8	93.2	2404
2402	B 15+18	65 S	1,952.5	LW-76	22.2	104.9	
2403	B 14+92	10 N	1,953.0	LW-74	17.5	99.6	
2404	B 15+85	0	1,956.5	LW-76	23.2	101.9	
2405	A 75+43	50 E	1,976.5	LW-55	26.5	100.0	
2406	A 66+00	60 W	1,983.5	LW-76	21.4	96.0	
2407	A 76+00	55 W	1,978.5	LW-76	25.8	98.4	
2408	A 80+20	65 W	1,969.5	LW-55	28.7	93.6	2409
2409	A 80+20	65 W	1,969.5	LW-55	23.7	101.0	
2410	A 72+00	50 E	1,973.0	LW-55	25.3	99.7	
2411	A 78+00	45 E	1,978.0	LW-58	17.9	99.5	
2412	B 38+50	40 S	1,966.5	LW-75	20.3	102.1	
2413	B 36+00	25 S	1,969.5	LW-75	16.9	99.0	
2414	B 33+75	30 S	1,973.5	LW-70	23.2	97.7	
2415	B 31+50	55 S	1,962.0	LW-70	20.7	98.4	
2416	B 44+86	0	1,963.5	LW-70	19.3	97.3	
2417	B 41+42	78 N	1,972.0	LW-70	21.5	99.7	
2418	B 34+60	48 N	1,977.0	LW-70	20.8	99.7	
2419	B 31+06	0	1,963.5	LW-70	21.6	98.7	
2420	B 30+36	12 N	1,967.0	LW-70	20.6	102.1	
2421	B 15+67	55 N	1,959.5	LW-76	22.8	99.8	
2422	B 16+20	33 S	1,957.0	LW-76	22.1	103.5	

TABLE 2.5-78 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2423	B 28+71	97 N	1,969.5	LW-70	20.5	97.7	
2424	B 33+43	25 N	1,973.5	LW-71	20.4	99.2	
2425	B 37+60	0	1,972.0	LW-70	18.4	96.5	
2426	B 39+40	62 N	1,971.0	LW-70	23.0	98.9	
2427	B 42+59	17 N	1,969.0	LW-71	21.1	99.6	
2428	B 14+83	60 N	1,954.0	LW-74	17.5	100.3	
2429	B 17+02	75 S	1,961.0	LW-71	19.8	97.6	
2430	B 24+00	32 N	1,977.0	LW-76	19.0	95.1	
2431	B 25+93	13 N	1,976.5	LW-76	23.0	98.2	
2432	B 25+55	30 S	1,972.5	LW-71	18.9	100.6	
2433	B 23+87	42 S	1,974.0	LW-71	19.6	98.3	
2434	B 45+32	79 S	1,962.0	LW-71	19.7	100.6	
2435	B 39+73	87 S	1,963.5	LW-71	20.0	99.0	
2436	B 36+93	44 S	1,968.5	LW-71	21.2	99.0	
2437	B 34+88	75 S	1,972.5	LW-71	20.3	99.1	
2438	B 15+76	55 S	1,959.5	LW-76	25.1	95.0	
2439	B 16+78	49 N	1,961.0	LW-58	16.0	98.7	
2440	B 30+50	105 S	1,949.0	LW-76	22.4	99.1	
2441	B 29+84	95 S	1,951.5	LW-70	21.6	98.6	
2442	A 81+66	35 W	1,973.5	LW-52	23.3	102.1	
2443	A 79+99	42 W	1,970.5	LW-55	24.3	100.1	
2444	A 74+32	40 E	1,981.5	LW-55	22.4	102.9	

TABLE 2.5-78 (continued)

Test Number(a)	Location: Station(b)	Location: Offset from Centerline (feet)	Elevation(c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2445	A 78+68	45 E	1,976.5	LW-55	25.5	96.3	
2446	A 77+36	46 W	1,979.5	LW-52	19.4	101.1	
2447	A 80+10	37 W	1,972.5	LW-52	19.2	103.0	
2448	B 37+08	40 N	1,974.5	LW-70	21.5	98.0	
2949	B 42+05	25 N	1,970.0	LW-71	17.1	97.1	
2450	B 32+18	70 N	1,968.5	LW-70	18.0	95.7	
2451	B 30+85	95 N	1,966.5	LW-70	21.9	91.4	2452
2452	B 30+85	95 N	1,966.5	LW-70	19.5	99.5	
2453	B 28+50	45 N	1,976.5	LW-71	18.0	97.5	
2454	B 42+10	35 N	1,971.0	LW-71	17.9	97.1	
2455	B 37+97	4 S	1,969.0	LW-70	23.5	95.2	
2456	B 11+95	23 N	1,969.0	LW-76	21.9	103.2	
2457	B 9+47	16 N	1,976.0	LW-76	23.3	106.6	
2458	B 7+01	22 S	1,980.5	LW-73	20.1	100.7	
2459	B 5+10	26 S	1,983.0	LW-73	21.8	96.2	
2460	B 11+80	45 S	1,974.5	LW-72	19.2	95.2	
2461	B 7+67	8 S	1,979.5	LW-73	16.1	102.1	
2462	B 3+30	6 N	1,990.0	LW-76	20.3	96.5	
2463	B 45+10	15 S	1,971.0	LW-70	20.8	97.3	
2464	B 33+63	0	1,976.5	LW-71	19.8	96.6	
2465	B 31+15	12 N	1,965.5	LW-71	20.2	95.0	
2466	B 28+96	62 N	1,975.0	LW-70	23.7	97.5	

TABLE 2.5-78 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2467	B 44+65	25 S	1,967.5	LW-70	24.9	94.8	2470
2468	B 41+05	40 S	1,966.5	LW-71	18.7	95.4	
2469	B 38+18	47 S	1,970.0	LW-70	19.3	96.4	
2470	B 44+65	25 S	1,967.5	LW-70	20.1	97.9	
2471	B 10+86	43 S	1,975.0	LW-76	21.4	99.5	
2472	B 9+30	15 S	1,978.0	LW-76	22.0	101.0	
2473	B 10+04	33 N	1,974.5	LW-76	20.2	102.9	
2474	B 31+05	60 S	1,966.0	LW-71	21.0	97.8	
2475	B 29+20	50 S	1,964.0	LW-70	18.0	100.1	
2476	B 17+00	25 S	1,965.5	LW-76	21.9	99.3	
2477	B 29+60	30 N	1,975.0	LW-71	16.7	96.8	
2478	B 35+50	50 N	1,980.5	LW-70	21.0	97.3	
2479	B 38+00	20 N	1,977.5	LW-70	19.7	97.3	
2480	B 41+00	10 N	1,975.5	LW-71	19.1	97.2	
2481	B 43+85	0	1,974.5	LW-70	19.1	96.4	
2482	B 15+15	100 S	1,957.0	LW-70	19.3	97.0	
2483	B 18+20	80 S	1,966.5	LW-70	18.2	97.1	
2484	B 16+00	0	1,962.0	LW-70	22.8	99.5	
2485	B 16+75	75 N	1,960.0	LW-71	20.6	97.9	
2486	B 30+80	85 S	1,977.5	LW-70	22.1	98.0	
2487	B 29+00	80 N	1,976.0	LW-70	21.7	98.3	
2488-S	B 14+50	85 S	1,956.0	LW-71	20.7	101.6	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2489-S	B 17+20	25 S	1,963.0	LW-71	19.7	97.9	
2490-S	B 29+50	20 S	1,962.0	LW-71	18.4	95.1	
2491-S	B 31+00	60 N	1,968.5	LW-70	20.4	97.4	
2492-S	B 18+30	70 N	1,967.0	LW-71	20.4	99.0	
2993-S	B 16+00	80 N	1,962.5	LW-71	19.4	98.1	
2494	A 81+50	45 E	1,975.5	LW-58	15.0	103.7	
2495	A 72+30	35 W	1,981.5	LW-55	22.8	100.9	
2496	A 78+60	50 W	1,973.0	LW-57	20.7	97.9	
2497	A 77+25	40 E	1,985.5	LW-58	19.7	98.5	
2498	A 79+44	40 W	1,980.5	LW-55	27.4	97.7	
2499	B 15+50	55 S	1,963.0	LW-70	20.8	96.5	
2500	B 17+65	60 S	1,965.5	LW-71	21.4	99.8	
2501	B 27+70	20 S	1,975.0	LW-71	19.4	100.8	
2502	B 30+00	70 S	1,972.0	LW-71	19.4	100.1	
2503	B 18+50	50 N	1,967.0	LW-71	20.1	98.1	
2504	B 16+00	75 N	1,962.5	LW-71	20.1	97.6	
2505	B 29+30	40 N	1,974.0	LW-70	23.5	99.8	
2506	B 31+90	0	1,972.0	LW-70	21.7	95.7	
2507	B 18+25	90 S	1,968.0	LW-70	22.6	99.9	
2508	B 15+80	10 S	1,963.0	LW-71	20.7	99.8	
2509	B 27+60	80 S	1,975.0	LW-70	23.4	96.2	
2510	B 17+00	65 N	1,963.0	LW-74	19.6	100.7	

TABLE 2.5-78 (continued)

Test Number (a)	Location: Station (b)	Location: Offset from Centerline (feet)	Elevation (c) (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2511	B 14+20	50 N	1,961.0	LW-71	20.9	97.8	
2512	B 31+75	75 N	1,973.0	LW-71	20.5	100.7	
2513	B 28+50	0	1,976.0	LW-71	21.8	96.7	
2514	B 17+20	80 S	1,964.5	LW-70	21.6	96.2	
2515-S	B 30+45	90 S	1,973.0	LW-70	20.5	99.6	
2516-S	B 18+04	47 N	1,969.0	LW-70	20.4	95.3	
2517-S	B 14+98	70 N	1,962.0	LW-71	19.7	97.9	
2518	A 76+20	35 E	1,983.5	LW-56	22.5	101.2	
2519	A 79+15	45 E	1,982.0	LW-56	22.1	100.1	
2520	A 76+40	33 W	1,984.0	LW-52	21.7	100.4	
2521	A 24+90	95 E	1,955.0	LW-52	24.9	97.8	
2522	A 34+05	110 W	1,971.5	LW-52	23.3	100.6	
2523	A 28+40	104 W	1,957.0	LW-53	32.0	91.9	2524
2524	A 28+40	104 W	1,957.0	LW-53	22.2	96.1	
2525	A 25+50	85 E	1,957.5	LW-56	23.1	98.2	
2526	A 22+05	80 E	1,961.5	LW-52	23.4	96.7	
2527	B 19+05	20 N	1,971.0	LW-71	20.2	98.9	
2528	B 14+83	6 N	1,965.0	LW-71	20.3	98.0	
2529	B 16+90	15 S	1,963.5	LW-71	21.9	95.5	
2530	B 18+03	63 N	1,969.0	LW-70	21.5	95.1	
2531	B 18+50	35 S	1,970.5	LW-70	20.9	95.2	
2532	B 16+10	85 S	1,965.0	LW-71	20.6	95.8	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2533	B 28+23	72 S	1,976.5	LW-70	21.8	98.6	
2534	B 18+70	25 N	1,967.0	LW-71	20.5	99.0	
2535	B 16+60	20 N	1,967.0	LW-71	19.1	98.3	
2536	B 14+03	83 S	1,961.5	LW-71	21.9	98.1	
2537	B 15+77	67 S	1,965.5	LW-70	21.7	94.7	2538
2538	B 15+77	67 S	1,965.5	LW-70	20.0	101.4	
2539	B 28+23	72 S	1,976.5	LW-70	20.9	93.1	2533
2540	B 28+23	72 S	1,976.5	LW-70	20.6	94.5	2533
2541	B 29+57	42 S	1,975.0	LW-71	21.1	96.8	
2542	B 31+07	26 S	1,972.5	LW-70	21.2	96.8	
2543	B 27+97	14 S	1,975.5	LW-71	19.6	98.2	
2544	B 30+12	25 N	1,974.0	LW-71	19.5	99.3	
2545	B 32+00	0	1,974.0	LW-71	20.2	97.9	
2546	A 29+05	98 W	1,958.5	LW-60	16.3	95.6	
2547	A 23+50	100 W	1,956.5	LW-54	20.1	99.5	
2548	A 24+15	110 E	1,961.0	LW-60	18.0	97.1	
2549	A 19+15	50 E	1,971.5	LW-60	20.4	95.2	
2550	B 13+90	10 N	1,968.5	LW-71	19.8	97.1	
2551	B 17+45	63 N	1,966.0	LW-71	20.7	98.8	
2552	B 17+25	85 S	1,970.0	LW-70	21.1	99.2	
2553	B 14+30	0	1,960.0	LW-70	20.9	99.1	
2554	B 15+10	47 N	1,963.0	LW-70	18.8	98.5	

TABLE 2.5-78 (continued)

Test Number[(a)]	Location: Station[(b)]	Location: Offset from Centerline (feet)	Elevation[(c)] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2555	B 19+80	30 N	1,975.5	LW-71	18.9	101.8	
2556	B 16+70	15 N	1,969.0	LW-71	22.0	96.3	
2557	B 14+05	80 N	1,966.5	LW-71	19.5	95.4	
2558	B 14+12	70 S	1,963.0	LW-71	20.8	98.5	
2559	B 17+75	0	1,970.5	LW-71	21.2	97.5	
2560	B 17+34	85 N	1,972.0	LW-71	18.2	101.3	
2561	B 18+97	88 S	1,971.0	LW-58	16.0	97.5	
2562	B 16+57	72 S	1,970.5	LW-71	18.1	98.6	
2563	B 13+15	35 N	1,970.0	LW-71	20.6	98.8	
2570	A 34+05	85 W	1,974.5	LW-60	17.8	100.5	
2571	A 30+00	87 W	1,973.5	LW-60	18.0	99.7	
2572	A 20+95	80 W	1,964.5	LW-57	23.0	97.8	
2573	A 22+15	80 E	1,965.5	LW-57	23.4	96.7	
2579	B 17+05	45 S	1,973.0	LW-70	21.9	97.9	
2580	B 15+20	5 N	1,969.0	LW-71	20.5	98.3	
2581	B 19+10	30 N	1,977.0	LW-71	18.8	96.2	
2582	B 18+40	80 S	1,975.0	LW-71	19.3	99.4	
2583	B 15+05	65 S	1,971.5	LW-70	22.1	97.6	
2584	B 13+00	60 N	1,972.5	LW-70	15.6	98.3	
2585	B 14+00	40 S	1,968.5	LW-71	20.3	95.6	
2586	B 13+00	60 N	1,972.5	LW-70	18.4	95.8	
2587	B 17+05	70 N	1,972.0	LW-71	22.1	97.4	

TABLE 2.5-78 (continued)

Test Number[a]	Location: Station[b]	Location: Offset from Centerline (feet)	Elevation[c] (feet)	Material Identification Number	In-Place Moisture Content (%)	Compaction (%)	Correcting Test Number
2588	B 13+97	75 N	1,970.5	LW-70	22.1	97.5	
2589	B 7+60	25 N	1,987.0	LW-71	16.7	99.7	
2590	B 12+18	5 S	1,976.0	LW-71	15.9	104.0	

TABLE 2.5-79

LIFT THICKNESS SUMMARY FOR BAFFLE DIKES A AND B EMBANKMENT FILL

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
11/14/77	A72+00 - 76+00	0	1	8	C
11/15/77	A70+55 - 76+00	0	1-2	8	C
11/16/77	A82+00 - 88+00	0	1-3	8	C
	A71+00 - 77+00	0	1	18	R
11/17/77	A77+00 - 82+50	0	1-4	8	C
11/18/77	A77+00 - 84+00	0	1-2	8	C
	A71+00 - 77+00	0	1	18	R
11/19/77	A80+50 - 84+50	0	1	8	C
	A75+00 - 79+10	0	1	8	C
	A88+50 - 90+00	0	1-4	8	C
11/21/77	A88+50 - 91+00	0	1-3	8	C

(a) No prefix indicates a Main Dam station; Roman numeral prefix indicates a Saddle Dam station; A or B prefix indicates a Baffle Dike A or B station.

(b) Fill types: C = Cohesive embankment;
R = Rock fill embankment;
GDB = Granular drainage blanket;
GTD = Granular toe drain.

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/22/77	A88+50 - 90+00	0	1-2	8	C
	A71+00 - 77+00	0	1-3	12	R
11/23/77	A71+00 - 77+00	0	1-2	12	R
	A77+00 - 81+00	0	1	5	R
11/29/77	A82+00	100E	1	6	C
	A81+50	50W	1	6	C
	A79+00	0	1	6	C
11/30/77	A71+00 - 77+00	0	1	8	C
	A87+50 - 93+50	0	1	8	C
12/01/77	87+50 - 93+50	0	1	8	C
	100+00 - 104+00	0	1	8	C
	86+00 - 87+00	0	1-2-3-4	8	R
12/02/77	87+50 - 93+50	0	1	8	C
	100+00 - 104+00	0	1	8	C
	83+00 - 87+00	0	1-2-3-4	16	R
12/03/77	87+50 - 93+50	0	1	8	C
	100+00 - 104+00	0	1-2	8	C
	81+50 - 83+00	0	1-2	18	R
12/07/77	82+00 - 85+00	0	1	18	R
12/08/77	82+00 - 82+50	0	1	18	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/13/77	102+80	0	1	8	C
	100+40	0	1	8	C
	97+50	0	1	10	C
	99+25	0	1	8	C
12/14/77	99+00	0	1	8	C
	102+75	0	1	8	C
	88+60	0	1	8	C
	92+90	0	1	8	C
	90+50	0	1	8	C
	93+90	0	1	8	C
	99+00	0	1	8	C
	101+00	0	1	8	C
	103+50	0	1	8	C
	104+00	0	1	8	C
12/15/77	88+00 - 94+00	0	1	8	C
	98+00 - 105+32	0	1-2-3-4	8	C
12/16/77	98+00 - 105+00	0	1-2-3	8	C
	88+00 - 92+00	0	1	8	C
12/19/77	87+00 - 93+00	0	1-2-3	12	R
	100+00 - 105+00	0	1-2	8	C
	80+00 - 86+00	0	1-2	8	C
12/20/77	71+50 - 76+50	0	1-2	12	R
	87+00 - 93+00	0	1-2	12	R

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
12/21/77	87+00 - 93+00	0	1	12	R
	71+50 - 76+50	0	1	12	R
	82+00 - 86+50	0	1	8	C
	71+50 - 76+50	0	1-2	8	C
	82+00 - 93+00	0	1	8	C
	57+00 - 64+00	0	1	8	C
12/22/77	54+00 - 64+00	0	1-2	8	C
	71+00 - 76+50	0	1	18	R
	71+00 - 77+00	0	1-2	8	C
	82+00 - 86+50	0	1-2	8	C
	66+50 - 70+55	0	1	8	C
12/28/77	77+45 - 82+00	0	1	18	R
	53+00 - 66+00	0	1	8	C
	66+00 - 70+00	0	1	8	C
12/29/77	66+00 - 69+00	0	1-2-3-4	8	C
	53+00 - 66+00	0	1	8	C
	44+00 - 53+00	0	1	8	C
	44+00 - 49+00	0	1	8	C
12/30/77	44+00 - 70+00	0	1	8	C
01/03/78	86+50 - 93+00	0	1	18	R
	76+50 - 86+50	0	1	12	R
01/04/78	34+00 - 44+00	0	1	6	C
	76+00 - 93+00	0	1	12	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
01/05/78	89+00 - 90+00	0	1	12	R
	49+00 - 68+00	0	1	6	C
	33+00 - 49+00	0	1	6	C
	79+00 - 83+00	0	1	12	R
01/06/78	51+00	0	1	8	C
	57+00	30W	1	8	C
	60+00	10W	1	8	C
	63+00	55W	1	8	C
	67+50	40W	1	8	C
	54+00	70W	1	8	C
	49+00	10E	1	8	C
01/07/78	65+00	60E	1	8	C
	85+00	80W	1	8	C
	55+00	0	1	8	C
	44+00	70E	1	8	C
	82+00	0	1	12	R
01/10/78	77+50 - 79+50	0	1	18	R
01/11/78	82+00 - 83+90	0	1	18	R
01/12/78	77+00 - 82+00	0	1	12	R
01/13/78	76+50 - 77+00	0	1	12	R
	81+00 - 84+50	0	1	12	R
01/23/78	78+50	0	1	12	R
	79+50	0	1	12	R

	Location				
Date	Station[a]	Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
01/24/78		0	1	12	R
	81+50 - 83+50	0	1	12	R
01/25/78	76+00	0	1	12	R
	78+00	0	1	12	R
	80+00	0	1	12	R
01/27/78	72+50 - 75+00	0	1	12	R
01/28/78	81+00 - 85+00	0	1	18	R
01/30/78	78+00	0	1	18	R
	75+00	0	1	18	R
01/31/78	84+00	0	1	18	R
	81+00	0	1	18	R
02/01/78	79+00	0	1	18	R
	77+50	0	1	18	R
02/02/78	76+50	0	1	18	R
	75+00	0	1	18	R
02/03/78	73+00	0	1	18	R
	71+00	0	1	18	R
02/04/78	82+00	0	1	18	R
	84+00	0	1	18	R

TABLE 2.5-79 (continued)

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
02/06/78	76+00 - 81+00	0	1	18	R
02/10/78	71+00 - 74+70	0	1	18	R
02/27/78	70+55 - 71+55	0	1-2	18	R
03/01/78	78+00	0	1	12	R
	82+00	0	1	12	R
	71+00	0	1	12	R
	73+00	0	1	12	R
	94+00	80E	1	12	R
03/03/78	68+50 - 71+00	0	1-2-3	12	R
03/06/78	69+00	0	1	18	R
	69+50	0	2	12	R
	68+75	0	3	18	R
	93+00	150E	1	18	R
	95+00	160E	1	18	R
	94+00	140E	1	18	R
	95+00	150E	1	18	R
	94+50	50E	1	18	R
	91+00	50E	1	12	R
	96+00	50E	1	18	R

WOLF CREEK

	Location				
Date	Station(a)	Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
03/08/78	95+25	40W	1	12	R
	95+00	0	1	12	R
	95+10	25E	2	12	R
	94+80	70E	2	12	R
	95+00	100W	3	12	R
	95+00	50E	3	12	R
	69+00	20E	1	12	R
	70+00	0	2	12	R
03/09/78	97+00	100W	1	18	R
	95+50	120E	1	18	R
	96+50	0	1	18	R
	96+50	50W	2	18	R
	95+00	20E	2	18	R
	96+80	100W	2	18	R
	95+40	30E	3	18	R
	96+00	0	3	18	R
	96+90	100W	3	18	R
	95+50	0	4	18	R
	96+00	100E	4	18	R
	96+50	100W	4	18	R
03/10/78	94+45 - 96+45	0	1-2-3	18	R
03/11/78	94+00	50E	1-2	18	R
	96+00	50W	1-2	18	R
	97+00	50W	1-2	18	R
	96+50	0	1-2	18	R
	95+00	50E	1-2	18	R

TABLE 2.5-79 (continued)

Date	Location: Station[(a)]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[(b)]
03-13-78	94+00 - 96+00	0	1-2	18	R
03/14/78	95+00	0	1	18	R
	96+00	0	1	18	R
	97+00	50W	1	18	R
	95+50	75E	1	18	R
	96+75	50W	1	18	R
	96+00	100E	2	18	R
	95+25	0	2	18	R
	97+30	150W	2	18	R
	96+20	0	2	18	R
03/15/78	97+00	0	1	18	R
	97+30	0	1	18	R
	95+50	75E	1	18	R
	96+00	100W	1	18	R
	97+75	150W	1	18	R
	94+90	0	1	18	R
	94+00	175E	2	18	R
	95+00	0	2	18	R
	95+50	100W	2	18	R
	96+00	0	2	18	R
	97+00	150W	2	18	R
03/16/78	94+50	150E	1	18	R
	97+00	100E	1	18	R
03/17/78	96+00	50E	1	18	R
	97+00	40E	1	18	R

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
03/17/78	96+50	100E	2	18	R
	96+30	130E	1	8	C
	94+40	145E	2	8	C
	94+00	140E	3	8	C
	95+00	145E	4	8	C
03/18/78	98+00	50W	1	18	R
	98+00	50E	1	18	R
03/20/78	95+50	0	1	18	R
	95+75	30E	2	18	R
	96+00	50W	2	18	R
	48+00	60W	1	8	C
	53+00	75W	1	8	C
	45+00	0	1	8	C
	46+25	40W	2	8	C
	35+00	65W	2	8	C
	40+00	75W	2	8	C
03/21/78	46+00	0	1	8	C
	47+00	30E	1	8	C
	45+25	0	2	8	C
	46+50	60W	2	8	C
	97+00	0	1	18	R
	96+50	30E	1	18	R
	97+50	50W	1	18	R
03/22/78	38+00	0	1	8	C
	35+00	20W	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
03/22/78	41+00	50W	1	8	C
	39+00	30W	1	8	C
	46+00	0	1	8	C
	45+00	40E	1	8	C
	95+00	0	1	18	R
	95+50	0	1	18	R
	95+00	70E	1	18	R
03/28/78	96+00	0	1	12	R
	94+50	50E	1	12	R
	93+50	10W	1	12	R
03/29/78	49+00	0	1	12	R
	51+00	0	1	12	R
	53+00	0	1	12	R
	57+00	20E	1	12	R
	59+00	20W	1	12	R
	63+00	0	1	12	R
	65+00	10W	1	12	R
	97+00	50E	1	12	R
	96+00	0	1	12	R
	97+50	50W	1	12	R
03/30/78	62+00	0	1	18	R
	63+50	20W	1	18	R
	65+00	30W	1	18	R
	67+00	0	1	18	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
03/30/78	98+50	0	1	18	R
	97+50	60E	1	18	R
	98+25	40W	1	18	R
03/31/78	67+50	0	1	18	R
	67+00	30E	1	18	R
04/01/78	44+00	0	1	8	C
	66+00	0	1	8	C
	67+00	0	1	12	R
04/05/78	44+00	50E	1	8	C
	42+50	60E	1	8	C
	69+50	0	1	18	R
	67+50	20E	1	18	R
04/07/78	70+30	0	1	18	R
	96+80	0	1	12	R
	41+00	0	1	8	C
04/08/78	47+80	0	1	8	C
	45+30	0	1	8	C
	95+70	0	1	18	R
04/12/78	51+40	0	1	18	R
	54+00	0	1	18	R
	94+50	0	1	18	R

TABLE 2.5-79 (continued)

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
04/12/78	96+00	0	1	18	R
	96+80	0	1	18	R
	99+05	0	1	18	R
	100+40	0	1	18	R
	98+35	0	1	18	R
	97+00	0	1	18	R
04/13/78	92+50	0	1	18	R
	93+25	0	1	18	R
	94+70	0	1	18	R
	97+60	0	1	18	R
	98+10	0	1	18	R
	99+00	0	1	18	R
	100+00	0	1	18	R
	102+50	0	1	18	R
	56+00	0	1	18	R
	58+00	0	1	18	R
04/14/78	84+00	0	1	12	R
04/15/78	94+00	80E	1	18	R
	95+50	90E	1	18	R
05/10/78	84+00	0	1	8	C
	96+00	0	1	8	C
06/10/78	94+00	100E	1	8	C
	74+00	90E	1	8	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
06/12/78	70+00	80W	1	8	C
	90+00	100W	1	8	C
	80+00	95W	2	8	C
	77+00	90E	1	8	C
	93+00	150E	1	8	C
06/13/78	70+00	70E	1	8	C
	89+00	90E	1	8	C
06/14/78	75+00	0	1	8	C
	80+50	0	2	8	C
	99+00	0	1	12	R
	93+00	0	1	12	R
	92+50	0	1	12	R
	96+00	0	1	12	R
	97+20	0	1	12	R
	100+00	0	1	12	R
06/16/78	99+00	0	1	8	C
	90+00	0	1	8	C
	87+00	0	1	8	C
06/17/78	89+00	0	1	12	R
06/19/78	90+00	60E	1	6	R
06/21/78	93+00	0	1	12	R
	94+00	0	1	12	R

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/21/78	97+00	0	1	12	R
	99+00	0	1	12	R
	100+00	0	1	12	R
	94+00	0	1	8	C
	85+00	0	1	8	C
06/22/78	75+00	0	1	8	C
	70+00	0	1	8	C
	90+50	0	1	8	C
	68+00	0	1	8	C
	80+00	0	2	8	C
06/26/78	90+00	155E	1	8	C
	100+00	0	1	8	R
	102+00	100W	1	8	R
	95+00	100E	1	8	R
	93+00	0	1	8	R
	94+50	70W	1	8	R
06/27/78	86+60	43W	1	8	C
	100+05	135W	1	8	C
	88+00	60E	1	8	C
06/28/78	99+90	110W	1	8	C
	84+80	53W	1	7	C
	93+60	107E	1	8	C
	84+00	60E	1	8	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
06/29/78	99+30	123W	1	8	C
06/30/78	96+00	120W	1	8	C
	84+00	100E	1	8	C
07/15/78	93+00	0	1	8	R
	98+00	0	1	8	R
	103+00	0	1	8	R
	95+00	0	1	8	R
	97+00	0	1	12	R
07/17/78	92+00	0	1	8	R
	100+00	100E	1	8	R
	95+00	60W	1	8	R
	102+00	0	1	8	R
07/18/78	94+50	10E	1	18	R
	100+80	50E	1	9	R
	97+10	20E	1	8	R
	93+00	0	1	8	R
07/28/78	102+00	0	1	12	R
	99+00	0	1	12	R
	95+00	0	1	12	R
	92+00	0	1	12	R
07/29/78	92+20	0	1	12	R
	94+50	0	1	12	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
07/29/78	93+30	0	1	12	R
	95+40	0	1	12	R
	96+80	0	1	12	R
	98+00	0	2	12	R
	99+10	0	2	12	R
	100+00	0	2	12	R
	100+25	0	3	12	R
	100+80	0	3	12	R
	102+00	0	3	12	R
07/31/78	95+00	40E	1	18	R
	99+50	0	1	18	R
	101+00	20W	1	18	R
	92+50	0	1	18	R
	97+00	25E	1	18	R
	98+00	0	1	18	R
08/09/78	95+70	0	1	8	C
08/10/78	95+00	0	1	8	C
08/14/78	95+00	0	1	8	C
	97+00	0	1	8	C
08/16/78	95+00	0	1	12	R
	99+00	0	1	12	R
	100+50	0	1	12	R
08/18/78	96+80	0	1	6	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/21/78	91+50	0	1	18	R
	93+00	0	1	18	R
	94+25	0	1	18	R
	95+00	0	1	18	R
	96+75	0	1	18	R
	98+00	0	1	18	R
	101+50	0	1	18	R
08/23/78	92+00	0	1	18	R
	95+25	50E	1	18	R
	97+00	20W	1	18	R
	100+00	30W	1	18	R
	101+50	35E	1	18	R
	94+50	40W	1	18	R
	93+00	0	1	18	R
08/25/78	98+00	0	1	12	R
	97+00	0	1	12	R
	94+50	0	1	12	R
	91+50	0	1	12	R
	100+90	0	1	12	R
08/28/78	93+00	0	1	18	R
	94+25	30E	1	18	R
	100+50	0	1	18	R
	97+00	10W	1	18	R
	90+75	20E	1	18	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
08/30/78	88+00	0	1	18	R
	66+00	0	1	18	R
	68+00	0	1	18	R
	71+00	0	1	18	R
	5+00	0	1	8	C
08/31/78	63+00	0	1	18	R
	64+00	0	1	18	R
	5+60	0	2	8	C
	3+70	0	2	8	C
09/02/78	99+00	0	1	18	R
	101+00	0	1	18	R
09/05/78	101+80	125W	1	8	C
09/28/78	10+00	0	1	6	C
09/29/78	37+00	0	1	6	C
	37+50	25E	3	6	C
	40+00	25W	3	6	C
09/30/78	12+80	40E	1	8	C
	16+10	80W	1	8	C
	19+30	0	1	8	C
10/02/78	52+25	0	1	6	C
	44+75	50E	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/03/78	45+00	60W	1	6	C
10/04/78	45+40	32W	1	8	C
	44+50	30W	1	8	C
	48+60	24W	1	8	C
	49+40	18W	1	8	C
10/05/78	16+50	40W	1	6	C
	17+70	20W	1	6	C
	18+50	0	1	6	C
	10+00	30E	1	6	C
	7+00	0	1	6	C
10/06/78	15+00	40E	1	6	C
	16+70	20W	1	6	C
	75+50	20W	1	6	C
	80+00	20E	1	6	C
	49+80	30E	1	6	C
	48+80	40E	1	6	C
	46+60	30E	1	6	C
	45+10	25E	1	6	C
	44+40	20E	1	6	C
10/07/78	38+00	25E	1	6	C
	40+10	25W	1	6	C
	42+50	30W	1	6	C
	46+75	30E	1	6	C
	49+50	25W	1	6	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/09/78	48+00	25W	1	6	C
	46+00	25W	1	6	C
	56+00	25E	1	6	C
	50+00	0	1	6	C
	52+00	25E	1	6	C
10/10/78	49+00	25W	1	6	C
	52+00	50E	1	6	C
	55+00	20W	1	6	C
	59+00	20E	1	6	C
10/11/78	60+00	15E	1	8	C
	57+50	10E	1	8	C
10/12/78	54+00	40E	1	8	C
	58+25	5E	1	8	C
	72+00	5W	1	8	C
	62+00	30E	1	8	C
10/13/78	61+75	50E	1	8	C
	66+50	15E	1	8	C
	64+00	10E	2	8	C
	70+00	45E	1	8	C
	66+00	45E	1	8	C
10/14/78	54+50	45W	1	8	C
	70+40	5E	1	8	C
	59+29	50W	1	8	C
	56+75	45E	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/14/78	70+00	0	2	8	C
10/16/78	71+00	60E	1	6	C
	68+00	0	1	6	C
	67+50	50E	1	6	C
10/17/78	46+50	30E	1	6	C
	49+50	35E	1	6	C
	55+00	20E	1	6	C
10/18/78	68+00	60E	1	6	C
	70+50	50E	1	6	C
10/19/78	28+50	50E	1	6	C
	28+00	0	1	6	C
	47+50	20E	1	6	C
	63+00	25E	1	6	C
	71+50	50E	1	6	C
10/20/78	24+00	50E	1	6	C
	28+50	70E	1	6	C
	27+50	20W	1	6	C
	25+00	120E	2	6	C
	24+10	120E	2	6	C
	30+00	150W	2	6	C
	30+50	155W	2	6	C
	30+20	20W	2	6	C
	28+00	0	2	6	C
	27+00	0	2	6	C

Date	Location		Lift Number	Lift Thickness (inches)	Fill Type[b]
	Station[a]	Offset from Centerline (feet)			
10/21/78	24+00	0	1	6	C
	23+10	100W	1	6	C
	29+00	70W	1	6	C
	30+50	100E	1	6	C
	28+30	80E	1	6	C
	27+00	110E	1	6	C
	54+00	50W	1	6	C
	67+00	55W	1	6	C
10/23/78	30+20	40E	1	6	C
	28+50	45E	1	6	C
	27+00	60E	1	6	C
	24+00	0	1	6	C
	25+00	50W	1	6	C
	27+80	100W	1	6	C
	23+20	120E	2	6	C
	26+50	30E	2	6	C
	23+50	70W	2	6	C
	24+00	140W	2	6	C
	29+00	140W	2	6	C
10/24/78	27+00	130E	1	6	C
	29+00	100E	1	6	C
	29+00	120E	1	6	C
	23+00	50W	1	6	C
	24+00	110W	1	6	C
	26+00	130W	1	6	C
	28+50	120W	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/25/78	26+00	150E	1	6	C
	29+00	100E	1	6	C
	27+50	80W	1	6	C
	25+00	0	1	6	C
	25+50	150W	1	6	C
	23+20	50E	1	6	C
	24+00	80W	2	6	C
	27+20	160W	1	6	C
	26+50	150W	3	6	C
10/26/78	27+00	100W	1	6	C
	24+50	120W	1	6	C
	23+50	30W	1	6	C
	26+30	165E	1	6	C
	28+00	100E	1	6	C
	29+00	0	1	6	C
	27+50	150E	1	6	C
	25+00	120W	1	6	C
10/28/78	30+00	145W	1	8	C
	28+00	120W	1	8	C
	25+00	0	1	8	C
	23+50	50E	1	8	C
	31+50	30W	1	8	C
	33+25	25W	1	8	C
	24+50	100W	1	8	C
	26+00	110W	1	8	C
	28+00	100W	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
10/28/78	29+00	50W	1	8	C
	30+00	15E	1	8	C
	27+50	40E	1	8	C
	25+00	100E	1	8	C
10/30/78	28+80	160W	1	6	C
	29+00	0	1	6	C
	29+00	0	1	6	C
	26+70	130W	1	6	C
	24+02	170W	5	6	C
	24+01	0	9	6	C
	24+00	50W	1	6	C
	23+50	50E	1	6	C
	24+05	80E	9	6	C
	29+60	120E	1	6	C
	25+00	90E	1	6	C
	27+20	20E	1	6	C
	30+00	40E	1	6	C
	33+25	25W	1	6	C
	23+50	90E	1	6	C
	26+00	10E	2	6	C
	29+60	100E	2	6	C
	26+50	80E	1	6	C
	24+50	20E	1	6	C
	23+50	120E	1	6	C
10/31/78	25+50	110W	2	6	C
	26+00	80W	1	15	R
	30+00	70W	1	15	R
	31+00	120W	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/01/78	33+50	125W	1	6	C
	29+00	120W	3	6	C
	24+50	110W	3	6	C
	31+50	115W	3	6	C
	37+00	40W	1	6	C
	38+50	20W	1	6	C
	41+00	35W	1	6	C
	23+20	0	1	15	R
	24+00	30E	1	15	R
	25+00	30E	1	15	R
	26+50	100E	1	15	R
	28+00	60E	1	15	R
	29+00	140E	1	15	R
	30+00	120E	1	15	R
	30+80	80E	1	15	R
	32+30	10E	1	15	R
	34+50	90E	1	15	R
11/02/78	54+00	10E	1	6	C
	16+10	30E	1	15	R
	17+00	0	1	15	R
	18+00	50W	1	15	R
	20+50	20W	1	15	R
	16+50	45W	2	15	R
	17+30	40W	2	15	R
	19+00	15E	2	15	R
	20+00	0	2	15	R
	17+00	30E	3	15	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/02/78	18+50	20W	3	15	R
	19+10	0	3	15	R
	16+50	0	4	15	R
	18+70	50E	4	15	R
	20+20	20W	4	15	R
	31+50	115W	1	6	C
	29+00	120W	1	6	C
	56+20	15E	1	6	C
	59+00	10W	1	6	C
	57+00	60W	2	6	C
	66+70	70W	1	6	C
11/03/78	41+00	40W	1	6	C
	44+80	30W	1	6	C
	26+20	170E	2	6	C
	29+00	160E	1	6	C
	72+00	60W	1	6	C
	60+50	70W	1	6	C
	47+50	25E	1	6	C
11/04/78	54+00	10W	1	6	C
	60+35	25E	1	6	C
	23+20	130E	1	15	R
	23+50	40W	1	15	R
	24+00	60W	1	15	R
	24+50	25E	1	15	R
	26+00	140E	1	15	R
	26+30	0	1	15	R
	26+80	50W	1	15	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/04/78	27+50	100W	1	15	R
	28+00	50E	1	15	R
	29+00	135E	1	15	R
	29+00	20W	1	15	R
	29+50	0	1	15	R
	30+00	15E	1	15	R
	31+00	90E	1	15	R
	31+85	45W	1	15	R
	32+40	100W	1	15	R
	33+00	0	1	15	R
	33+70	50E	1	15	R
	34+00	20E	1	15	R
	34+50	60W	1	15	R
	71+60	65W	1	6	C
	62+70	80W	1	6	C
	39+50	30W	1	6	C
	45+00	35E	1	6	C
	49+30	5E	1	6	C
11/08/78	39+10	30E	1	6	C
11/09/78	23+85	130E	2	6	C
	23+50	20E	5	6	C
	77+00	65E	1	6	C
	70+55	70E	1	6	C
	23+70	0	12	6	C
	75+00	60W	1	6	C
	65+00	75W	1	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/10/78	23+10	40W	4	6	C
	68+00	60E	1	6	C
	78+20	70E	1	6	C
	21+40	60W	1	6	C
	23+90	10E	4	6	C
	21+60	0	1	6	C
	22+00	40W	1	6	C
	23+70	150W	7	6	C
	67+20	50W	1	6	C
	80+00	60E	2	6	C
	73+10	75E	2	6	C
	60+00	65W	1	6	C
11/11/78	44+08	20W	1	8	C
	50+95	24E	1	8	C
	54+10	10E	1	8	C
	67+00	60E	1	8	C
	58+50	40W	1	8	C
11/14/78	24+10	20E	1	15	R
	24+75	40W	1	15	R
	25+00	120W	1	15	R
	25+50	0	1	15	R
	25+90	100E	1	15	R
	26+20	140E	1	15	R
	26+80	30W	1	15	R
	27+00	0	1	15	R
	27+30	25E	1	15	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/14/78	27+50	40E	1	15	R
	27+90	145W	1	15	R
	28+00	130W	1	15	R
	28+00	50W	1	15	R
	28+40	20E	1	15	R
	29+00	100E	1	15	R
	30+00	120E	1	15	R
	31+00	0	1	15	R
	32+00	50E	1	15	R
	33+50	0	1	15	R
	38+00	30W	1	6	C
	45+00	25W	1	6	C
	49+80	15E	1	6	C
	56+00	10E	1	6	C
11/20/78	4+30	10S	1	6	C
	2+70	15S	1	6	C
11/21/78	1+15	10S	1	6	C
	2+10	20N	1	6	C
	6+00	45N	2	6	C
	6+00	40S	1	6	C
	23+10	20E	1	15	R
	23+50	70E	1	15	R
	23+90	120E	1	15	R
	24+20	50E	1	15	R
	24+70	0	1	15	R
	25+00	30W	1	15	R
	25+40	80W	1	15	R
	25+70	110W	1	15	R

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/21/78	26+00	130W	1	15	R
	26+30	145W	1	15	R
	27+00	60W	1	15	R
	27+50	0	1	15	R
	27+90	80E	1	15	R
	28+10	115E	1	15	R
	28+60	120E	1	15	R
	29+00	30E	1	15	R
	29+80	0	1	15	R
	30+20	10W	1	15	R
	31+30	70W	1	15	R
	32+00	120W	1	15	R
	34+00	0	1	15	R
	35+50	20E	1	15	R
11/28/78	22+10	50W	1	15	R
	23+00	100W	1	15	R
	23+50	0	1	15	R
	24+05	40E	1	15	R
	24+80	130E	1	15	R
	25+20	40E	1	15	R
	25+70	25W	1	15	R
	26+00	90W	1	15	R
	27+15	0	1	15	R
	27+70	50E	1	15	R
	28+10	120W	1	15	R
	28+60	70W	1	15	R
	29+00	30W	1	15	R

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/28/78	29+40	20E	1	15	R
	29+90	80E	1	15	R
	30+20	140E	1	15	R
	31+00	30E	1	15	R
	31+70	0	1	15	R
	32+10	25W	1	15	R
	32+50	90W	1	15	R
	33+20	130W	1	15	R
	34+00	20W	1	15	R
	35+00	35E	1	15	R
	35+75	60E	1	15	R
11/29/78	10+80	40N	1	6	C
	6+50	10N	1	6	C
	7+00	20S	1	6	C
	10+80	40N	1	6	C
	8+20	10S	1	6	C
11/30/78	8+60	45S	1	6	C
	10+30	50S	1	6	C
	12+00	70S	2	6	C
	12+50	0	3	6	C
	44+88	25S	2	6	C
	46+00	15S	2	6	C
	46+80	10S	2	6	C
	14+40	20N	2	6	C
	14+15	40S	3	6	C
	43+40	50N	4	6	C
	44+90	75N	5	6	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
11/30/78	46+30	60N	5	6	C
	6+20	40N	1	6	C
	9+00	30N	1	6	C
	10+00	60S	1	6	C
	11+00	55S	1	6	C
12/01/78	40+00	30S	1	6	C
	42+60	40N	1	6	C
	43+80	20N	1	6	C
	45+00	20N	1	6	C
	44+50	100S	1	6	C
12/04/78	66+50	55W	1	6	C
	23+50	10E	1	15	R
	23+80	70E	1	15	R
	24+20	30E	1	15	R
	24+60	0	1	15	R
	25+00	20W	1	15	R
	25+75	100W	1	15	R
	26+15	130W	1	15	R
	26+50	80W	1	15	R
	27+00	25W	1	15	R
	27+40	0	1	15	R
	27+75	20E	1	15	R
	28+40	100E	1	15	R
	29+00	120E	1	15	R
	29+30	140E	1	15	R
	29+90	40E	1	15	R

TABLE 2.5-79 (continued)

Date	Location		Lift Number	Lift Thickness (inches)	Fill Type(b)
	Station(a)	Offset from Centerline (feet)			
12/04/78	30+30	0	1	15	R
	30+80	110W	1	15	R
	31+30	130W	1	15	R
	32+00	20W	1	15	R
	32+45	10W	1	15	R
	32+90	50E	1	15	R
	33+50	120E	1	15	R
	34+00	40E	1	15	R
	52+00	40W	1	6	C
	49+10	25E	1	6	C
	41+80	30E	1	6	C
	39+50	20E	1	6	C
	58+00	0	1	6	C
12/05/78	66+30	60E	1	6	C
	71+30	50E	1	6	C
	38+80	10W	1	6	C
	42+90	20E	1	6	C
	66+50	65W	1	6	C
12/05/78	38+80	70N	1	6	C
	42+00	45N	1	6	C
	43+50	20N	1	6	C
	42+70	30S	1	6	C
	41+20	30S	1	6	C
	39+55	40S	1	6	C
	15+20	120S	1	6	C
	16+00	100S	1	6	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/06/78	26+50	20E	1	18	R
	27+10	0	1	18	R
	27+75	10W	1	18	R
	28+40	20E	1	18	R
	32+00	5W	1	18	R
	34+35	35W	1	18	R
	35+85	40E	1	18	R
	66+50	65W	1	8	C
	77+10	50W	1	8	C
	42+90	20E	1	8	C
	47+60	7W	1	8	C
	56+00	20W	1	8	C
12/06/78	15+20	100S	4	6	C
	16+00	20N	6	6	C
	34+70	20S	2	6	C
	35+00	10S	2	6	C
	36+70	40S	2	6	C
	37+50	70S	2	6	C
	38+25	90S	2	6	C
	16+50	40S	2	6	C
	15+30	80N	2	6	C
	16+20	100N	2	6	C
	15+30	70S	2	6	C
	15+10	90N	3	6	C
	16+90	30N	3	6	C
	17+00	0	3	6	C
	16+00	40S	4	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/07/78	23+10	0	1	18	R
	22+60	20W	1	18	R
	28+00	50E	1	18	R
	29+25	40W	1	18	R
	30+25	0	1	18	R
	32+40	25E	1	18	R
12/08/78	23+30	0	1	18	R
	24+50	40E	1	18	R
	25+00	100W	1	18	R
	26+00	100W	1	18	R
	27+00	0	1	18	R
	27+30	10E	1	18	R
12/11/78	29+60	0	1	18	R
	29+00	40E	1	18	R
	28+50	60E	1	18	R
	27+00	0	1	18	R
	26+00	30W	1	18	R
	24+00	50W	1	18	R
	23+00	10W	1	18	R
	22+80	0	1	18	R
	22+50	20E	1	18	R
	22+10	40E	1	18	R
12/12/78	15+80	40N	1	6	C
	15+40	80N	1	6	C
	16+70	0	1	6	C
	17+00	30S	2	6	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/12/78	15+30	90S	2	6	C
	69+00	50E	1	6	C
	78+00	70E	1	6	C
	30+00	0	1	18	R
	29+00	0	1	18	R
	27+10	0	1	18	R
	25+70	0	1	18	R
	24+35	0	1	18	R
	23+90	0	1	18	R
	23+70	0	1	18	R
	22+40	0	1	18	R
12/13/78	17+00	70N	1	8	C
	15+40	93S	1	8	C
	16+00	0	1	8	C
	45+10	65N	1	8	C
	42+45	40N	1	8	C
	36+80	27N	1	8	C
	35+05	65S	1	8	C
	38+35	45S	1	8	C
	42+75	15S	1	8	C
	68+50	60E	1	8	C
	73+70	70E	1	8	C
	78+00	65E	1	8	C
	81+90	65W	1	8	C
12/14/78	17+25	85N	1	8	C
	15+67	12S	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/14/78	37+18	27S	1	8	C
	44+06	47N	1	8	C
	16+76	35N	2	8	C
	34+86	35N	1	8	C
	38+41	28N	1	8	C
	16+85	48S	2	8	C
	70+75	55E	1	8	C
	79+84	48E	1	8	C
	67+50	50W	1	8	C
	70+00	39W	1	8	C
	75+60	65W	1	8	C
12/15/78	72+18	69E	1	8	C
	75+74	52E	1	8	C
	76+00	49W	1	8	C
	67+80	60W	1	8	C
	82+00	65W	1	8	C
	29+00	0	1	18	R
	27+00	40W	1	18	R
	25+50	20E	1	18	R
	39+67	35S	1	8	C
	36+47	75S	1	8	C
	34+05	83S	1	8	C
	32+00	15S	1	8	C
	30+60	0	1	8	C
	29+10	70S	1	8	C
	34+95	70S	1	8	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/15/78	38+99	60S	1	8	C
	15+45	30N	1	8	C
	33+00	17N	1	8	C
	31+35	100N	1	8	C
	28+77	87N	1	8	C
	45+69	6S	1	8	C
	43+10	0	2	8	C
	39+67	35S	2	8	C
	36+47	75S	2	8	C
	34+05	83S	2	8	C
	32+00	15S	2	8	C
	30+60	0	2	8	C
	29+10	70S	2	8	C
	15+05	106S	2	8	C
	29+20	50W	2	8	C
	28+67	23S	2	8	C
	39+70	82S	2	8	C
	45+76	100S	2	8	C
	30+10	20S	2	8	C
12/16/78	75+43	50E	1	8	C
	66+00	60W	1	8	C
	76+00	55W	1	8	C
	80+20	65W	1	8	C
	72+00	50E	1	8	C
	78+00	45E	1	8	C
	31+00	40E	1	18	R
	32+00	0	1	18	R
	26+00	0	1	18	R
	27+50	45E	1	18	R

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/16/78	44+86	0	1	8	C
	41+42	78N	1	8	C
	34+60	48N	1	8	C
	31+06	0	1	8	C
	30+36	12N	1	8	C
	38+50	40S	1	8	C
	36+00	25S	1	8	C
	33+75	30S	1	8	C
	31+50	55S	1	8	C
	15+67	55N	1	8	C
	16+20	33S	1	8	C
	28+71	97N	2	8	C
	33+43	25N	2	8	C
	37+60	0	2	8	C
	39+40	62N	2	8	C
	42+59	17N	2	8	C
	14+83	60N	2	8	C
	17+02	75S	2	8	C
	24+00	32N	1	8	C
	25+93	13N	1	8	C
	25+55	30S	1	8	C
	45+32	79S	2	8	C
	39+73	87S	2	8	C
	36+93	44S	2	8	C
	34+88	75S	2	8	C
	15+76	55S	3	8	C
	16+78	49S	3	8	C
	30+50	105S	1	8	C
	29+84	95S	1	8	C
	23+87	42S	1	8	C

TABLE 2.5-79 (continued)

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/17/78	81+66	35W	1	8	C
	79+94	42W	1	8	C
	74+32	40E	1	8	C
	78+68	45E	1	8	C
	77+36	46W	2	8	C
	80+10	37W	2	8	C
	22+30	0	1	18	R
	24+50	35E	1	18	R
	25+40	15W	1	18	R
	7+67	8S	2	8	C
	3+30	6N	2	8	C
	45+10	15S	2	8	C
	33+63	0	2	8	C
	31+15	12N	2	8	C
	28+96	62N	2	8	C
	44+65	25S	2	8	C
	41+05	40S	2	8	C
	38+18	47S	2	8	C
	10+86	43S	2	8	C
	9+30	15S	2	8	C
	10+04	33N	2	8	C
	37+08	40N	1	8	C
	42+05	25N	1	8	C
	32+18	70N	1	8	C
	30+85	95N	1	8	C
	39+85	85N	1	8	C
	28+50	45N	1	8	C
	42+10	35N	1	8	C
	37+97	4S	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/17/78	11+95	23N	1	8	C
	9+47	16N	1	8	C
	7+10	22S	1	8	C
	5+10	26S	1	8	C
	11+80	45S	1	8	C
12/18/78	31+05	60S	1	8	C
	29+20	50S	1	8	C
	17+00	25S	1	8	C
	29+60	30N	1	8	C
	35+50	50N	1	8	C
	38+00	20N	1	8	C
	41+00	10N	1	8	C
	43+85	0	1	8	C
	15+15	100S	1	8	C
	18+20	80S	1	8	C
	16+00	0	1	8	C
	16+75	75N	1	8	C
	30+80	85S	1	8	C
	29+00	80N	1	8	C
	14+50	85S	2	8	C
	17+20	25S	2	8	C
	29+50	20S	1	8	C
	31+00	60N	2	8	C
	18+30	70N	2	8	C
	16+00	80N	2	8	C
	31+50	45E	1	8	C
	72+30	35W	1	8	C
	78+60	50W	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/18/78	77+25	40E	2	8	C
	79+44	40W	2	8	C
	23+50	25E	1	18	R
	24+50	25W	1	18	R
12/19/78	15+50	55S	1	8	C
	17+65	60S	1	8	C
	27+70	20S	1	8	C
	30+00	70S	1	8	C
	18+50	50N	1	8	C
	16+00	75N	1	8	C
	29+30	40N	1	8	C
	31+90	0	1	8	C
	18+25	90S	1	8	C
	15+80	10S	1	8	C
	27+60	80S	1	8	C
	17+00	65N	1	8	C
	14+20	50N	2	8	C
	31+75	75N	2	8	C
	28+50	0	2	8	C
	17+20	80S	2	8	C
	30+45	90S	2	8	C
	18+04	47N	2	8	C
	14+98	70N	2	8	C
	76+20	35E	1	8	C
	79+15	45E	1	8	C
	76+40	33W	1	8	C

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/20/78	20+50	10E	1	18	R
	22+00	0	1	18	R
	24+50	20W	1	18	R
	26+00	0	1	18	R
	24+90	95E	1	8	C
	34+05	110W	1	8	C
	28+40	104W	2	8	C
	25+50	85E	2	8	C
	22+05	80E	3	8	C
	19+05	20N	1	8	C
	14+83	6N	1	8	C
	16+90	15S	1	8	C
	18+03	63N	1	8	C
	18+50	35S	2	8	C
	16+10	85S	2	8	C
	18+70	25N	2	8	C
	15+77	67S	2	8	C
	14+03	83S	3	8	C
	16+60	20N	3	8	C
	29+57	42S	1	8	C
	30+12	25N	1	8	C
12/21/78	29+05	98W	1	8	C
	23+50	100W	2	8	C
	24+15	110E	1	8	C
	19+15	50E	2	8	C
	33+00	95W	3	8	C
	35+00	10E	1	18	R
	29+50	25W	1	18	R
	27+00	0	1	18	R

Date	Location: Station(a)	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type(b)
12/21/78	26+00	20E	1	18	R
	13+90	10N	1	8	C
	17+45	63N	1	8	C
	17+25	85S	1	8	C
	14+30	0	1	8	C
	15+10	47N	1	8	C
	19+80	30N	2	8	C
	16+70	15N	2	8	C
	14+05	80N	2	8	C
	14+12	20S	3	8	C
	17+75	0	3	8	C
	17+34	85N	3	8	C
	18+97	88S	4	8	C
	16+57	72S	4	8	C
	28+50	20S	1	8	C
	29+25	70S	1	8	C
	32+74	40N	1	8	C
12/22/78	34+05	85W	1	8	C
	30+00	87W	1	8	C
	20+95	80W	2	8	C
	22+15	80E	1	8	C
	20+00	15E	1	18	R
	22+00	20W	1	18	R
	25+50	0	1	18	R
	17+05	45S	1	8	C
	15+20	5N	1	8	C
	19+10	30N	1	8	C
	18+40	80S	2	8	C

Date	Location: Station[a]	Location: Offset from Centerline (feet)	Lift Number	Lift Thickness (inches)	Fill Type[b]
12/22/78	15+05	65S	2	8	C
	13+00	60N	2	8	C
	14+00	40S	3	8	C
	13+00	60N	3	8	C
	17+05	70N	3	8	C
	13+97	75N	3	8	C
	7+60	25N	1	8	C
	12+18	5S	1	8	C
	15+20	30N	4	8	C
	19+10	0	4	8	C
	14+70	10N	4	8	C
	17+80	20N	4	8	C

TABLE 2.5-80

SUMMARY OF COMPACTION DATA FOR BAFFLE DIKES A AND B

Material Identification Number	Location[a]	Depth (feet)	Compaction Data: Optimum Moisture Content (%)	Compaction Data: Maximum Dry Density (pcf)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain Size Distribution: Percent Passing #4	Grain Size Distribution: Percent Passing #200	Grain Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
LW-1	MD Excavation 67+00 50 N	2.0	20.0	104.0	52	32	100	95.2	48.5	CH
LW-2	MD Excavation 67+00 5 N	5.0	19.3	106.5	46	26	100	96.0	44.2	CL
LW-6	BDA Excavation 83+00	--	17.5	106.5	37	15	100	85.9	26.5	CL
LW-7	BDA Excavation 72+00	--	26.0	94.7	80	55	95.1	88.6	55.5	CH
LW-8	BDA Fill 73+45 62 W	1,964.0 (EL)[b]	21.6	102.5	61	41	100	94.4	62.9	CH
LW-9	BDA Excavation 99+00	--	33.4	87.6	65	33	100	96.8	63.4	CH
LW-10	BDA Excavation 82+23 107 W	--	18.8	105.5	45	25	100	95.6	47.3	CL
LW-11	BDA Fill 64+99	--	27.0	94.8	72	45	100	96.3	59.9	CH
LW-12	BDA Fill 48+00	--	25.2	97.3	65	43	100	96.5	55.7	CH
LW-13	BDA Fill 46+50	--	22.3	99.6	51	24	100	89.7	65.9	CH
LW-14	MD Fill 29+60	1,976.0 (EL)	17.7	108.6	43	20	100	98.0	43.0	CL
LW-16	BDA Fill 67+00 20 E	1,960.0 (EL)	23.7	99.0	57	30	99.8	88.4	65.9	CH
LW-25	BDA Fill 94-50 10 E	1,957.5 (EL)	20.0	104.5	52	31	100	82.3	56.2	CH
LW-28	Stringtown Cemetery Road Borrow Area	--	22.0	100.6	50	26	100	92.2	46.0	CH

[a] MD indicates Main Dam; BA indicates Borrow Area; BD indicates Baffle Dike; UHS indicates Ultimate Heat Sink; 00+00 indicates station; 107 N indicates 107 feet north of centerline (offset); 0 indicates on the centerline, SNUPPS coordinates.

[b] Elevation in SNUPPS datum.

TABLE 2.5-80 (continued)

Material Identification Number	Location(a)	Depth (feet)	Compaction Data: Optimum Moisture Content (%)	Compaction Data: Maximum Dry Density (pcf)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain Size Distribution: Percent Passing #4	Grain Size Distribution: Percent Passing #200	Grain Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
LW-51	UHS N 98,300, E 104,600	0.0-2.0	29.7	89.6	87	62	100	94.9	61.8	CH
LW-52	UHS N 97,700, E 103,200	0.0-3.0	21.7	102.4	54	32	100	88.2	47.5	CH
LW-53	UHSD 2+00 250 NE	2.0-4.0	24.4	98.8	65	42	100	91.1	56.9	CH
LW-54	UHS N 98,200, E 104,000	5.0	20.8	105.2	45	26	100	87.1	45.3	CL
LW-55	UHS N 98,300, E 104,600	2.0-5.0	25.1	97.0	63	38	100	90.5	49.4	CH
LW-56	BDA Fill 7+00	--	20.0	106.0	55	34	100	90.7	50.0	CH
LW-57	BDA Fill 50+00 75 E	--	20.5	105.9	50	30	100	94.4	52.8	CH
LW-58	S Side UHS	--	18.2	110.1	44	21	100	88.4	54.0	CL
LW-60	BDA Fill 25+50 150 W	--	16.0	113.2	47	26	100	60.5	39.0	CL
LW-61	NE Corner BAD	6.0	20.4	103.2	44	24	100	85.4	41.9	CL
LW-63	SE Corner BAD	1.0-6.0	20.0	103.2	47	27	100	96.8	50.1	CL
LW-64	NW Corner BAD	1.0-6.0	22.0	99.9	52	31	100	95.8	51.4	CH
LW-66	Center BAE	5.0-6.0	19.8	100.3	45	22	100	95.8	53.0	CL
LW-69	SW Corner BAC	--	19.9	105.4	49	29	100	94.5	47.4	CL
LW-70	S Side BAA	1.0-7.0	20.7	102.9	54	35	100	97.3	49.3	CH
LW-71	Center BAA	3.0-8.0	19.6	106.2	46	24	100	93.7	43.0	CL
LW-72	N Side BAC	1.0-8.0	18.8	105.2	45	28	100	96.2	40.4	CL
LW-73	BAC	1.0-5.0	19.0	106.9	42	22	100	91.8	39.3	CL

Material Identification Number	Location(a)	Depth (feet)	Compaction Data: Optimum Moisture Content (%)	Compaction Data: Maximum Dry Density (pcf)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	Grain Size Distribution: Percent Passing #4	Grain Size Distribution: Percent Passing #200	Grain Size Distribution: Percent Passing 0.005 mm	Unified Soil Classification
LW-74	E Side BAB	2.0-6.0	17.1	107.9	34	14	100	97.1	30.0	CL
LW-75	W Side BAB	2.0-8.0	20.2	103.2	51	29	100	98.3	49.1	CH
LW-76	BDB Excavation 40+00 30 S	1.0	23.0	98.6	57	33	100	95.6	46.8	CH
S-12	N 100,070, E 100,856	--	14.8	114.2	34	17	100	88.1	42.7	CL
S-14	N 100,150, E 100,275	--	16.0	112.0	42	17	100	93.6	47.7	CL

TABLE 2.5-81

REMOLDED STRENGTH TESTS

Test Pit Number	Depth (feet)	Moisture Content (%)	Dry Density (pcf)	Percent Compaction (Standard Proctor)	Triaxial (CU) Compression: Confining Pressure (psf)	Triaxial (CU) Compression: Maximum Shear Stress[a] (psf)	Unconfined Compression: Undrained Shear Strength (psf)
TPL-1A	5.0-6.0	15.7	114	103[b]	2,000	2,300	
TPL-1A	5.0-6.0	12.5	116	104[b]			6,200
TPL-1B	5.0-6.0	17.4	106	99			2,020
TPL-3A	5.0-6.0	16.0	112	101[b]	600	1,600	
TPL-3A	5.0-6.0	10.9	116	104[b]			5,700
TPL-3C	10.5-12.0	21.2	100	93[c]	6,000	2,650	
TPL-3C	11.0-12.0	13.5	113	107[d]			6,110
TPL-4A	4.0-6.0	14.6	113	102[b]	6,000	3,870	
TPL-4A	4.0-6.0	9.1	111	100[b]			5,640
TPL-4B	8.0-10.0	17.3	111	103	500	810	
TPL-4B	8.0-10.0	20.3	103	95			4,160
TPL-4B	8.0-10.0	11.8	108	100			6,180
TPL-4B[e]	10.0-11.5	20.0	102	95	9,500	3,520	
TPL-4B[e]	10.0-11.5	19.3	101	94			1,560

[a]Maximum shear stress or shear stress at 10% strain, whichever occurs first.

[b]Based on maximum dry density for TPL-1A, -3A and -4A mixture. (Ref. Figure 2.5-87)

[c]Based on average maximum dry density for TPL-1B, -4B and -4D. (Ref. Figure 2.5-87)

[d]Based on maximum dry density for TPL-4C at 11.0 to 12.0 feet. (Ref. Figure 2.5-87)

[e]Residual soils.

TABLE 2.5-82

SOIL PARAMETERS USED IN STABILITY ANALYSIS OF MAIN DAM

Soil	End of Construction			Steady State and Rapid Drawdown		
	Cohesion (psf)	PHI $\phi°$	Density (pcf)	Cohesion (psf)	PHI $\phi°$	Density (pcf)
Embankment	1,800	0	120	280	25	127
Sand Drain	0	32	130	0	32	130
Residual Soil	1,800	0	110	200	24	110
Rock (Assumed)	5,000	35	150	5,000	35	150
Riprap					32	115

TABLE 2.5-83

RESULTS OF SLOPE STABILITY ANALYSIS FOR MAIN DAM

Condition	Computed Factor of Safety	Minimum Required Factor of Safety
End of construction	1.52	1.4
Steady state flow, cooling lake at El. 1,087 ft	1.70	1.5
Sudden drawdown, El. 1,087 ft to El. 1,030 ft	1.20	1.2
End of construction plus horizontal earthquake force (0.06 g)	1.21	1.0
Steady seepage with cooling lake at El. 1,087 with horizontal earthquake force (0.06 g)	1.38	1.0

TABLE 2.5-84

RESULTS OF SLOPE STABILITY ANALYSIS
FOR UHS DAM SLOPES

Analysis	Factor of Safety	
	Static	Pseudo-Static
End of construction	2.45	1.48
Rapid drawdown from lake water elevation (1,087) to El. 1,050	2.18	-
Steady state seepage, cooling lake at El. 1,050	2.50	1.57
Fully submerged in water	4.67	2.09

TABLE 2.5-85

SOIL PARAMETERS FOR STATIC STRESS ANALYSIS OF SUBMERGED UHS DAM

Total Weight (pcf)	=	118.0
Submerged Weight (pcf)	=	55.6
Effective Cohesion, c' (psf)	=	265.0
Effective Angle of Internal Friction, ϕ' (deg)	=	20.0
Poisson's Ratio, μ	=	0.4
Modulus of Elasticity, E (psf)	=	50,000

TABLE 2.5-86

INITIAL STRESS AND FAILURE CONDITIONS

No.	Sample	Initial Stress Condition K_c	σ_{3c} (tsf)	σ_1 (tsf)	Failure Condition σ_3 (tsf)	Cyclic Axial Load Δ_{dp} (tsf) For 5 Cycles
1	TP-3	1.25	0.6	0.75	0.6	0.780
2	TP-3	1.25	0.9	1.125	0.9	0.850
3	TP-13	1.75	0.2	0.35	0.2	0.615
4	TP-13	1.75	0.6	1.05	0.6	0.830

TABLE 2.5-87

CYCLIC SHEAR STENGTH, τ_f, AND NORMAL STRESS, σ_{fc}, FROM STRESS-CONTROLLED DYNAMIC TRIAXIAL TEST

No.	Sample	K_c	σ_{3c} (tsf)	Cyclic Shear Strength τ_f (tsf)	Normal Stress σ_{fc} (tsf)	$\alpha = \frac{\tau_{fc}}{\sigma_{fc}}$
1	TP-3	1.25	0.6	0.360	0.650	0.108
2	TP-3	1.25	0.9	0.400	0.975	0.108
3	TP-13	1.75	0.2	0.293	0.250	0.288
4	TP-13	1.75	0.6	0.387	0.742	0.288

TABLE 2.5-88

COMPUTED FACTOR OF SAFETY, τ_f/τ_d
FOR THE FINITE ELEMENT MODEL OF SUBMERGED UHS DAM

Element No.	Initial Vertical Normal Stress σ_o' (psf)	Initial Shear Stress τ_o (psf)	$\frac{\tau_o}{\sigma_o'}$	Cyclic Shear Strength τ_f (psf)	Induced Shear Stress τ_d (psf)	$F.S = \frac{\tau_f}{\tau_d}$
2	82.61	21.52	0.261	125.0	40.6	3.08
3	187.01	38.75	0.207	205.0	72.7	2.82
4	293.85	57.85	0.197	295.0	117.4	2.51
5	403.42	76.58	0.190	370.0	163.5	2.26
6	517.00	83.34	0.161	430.0	211.3	2.04
7	622.00	90.62	0.146	480.0	255.2	1.88
8	730.26	90.11	0.123	525.0	293.4	1.79
9	830.84	79.52	0.096	535.0	325.2	1.65
10	912.40	56.27	0.062	560.0	350.1	1.60
11	955.98	29.33	0.031	565.0	364.9	1.55
12	969.67	8.43	0.009	560.0	369.8	1.51
18	622.32	90.62	0.146	480.0	245.5	1.96
26	89.73	25.60	0.285	150.0	66.5	2.26
27	184.50	40.67	0.220	230.0	104.7	2.20
28	289.85	48.74	0.168	295.0	155.5	1.90
29	396.79	63.03	0.159	350.0	202.9	1.72
30	509.84	60.48	0.119	400.0	241.8	1.65
31	615.58	56.85	0.092	440.0	273.0	1.61
32	701.52	40.47	0.058	480.0	296.9	1.62
33	747.62	20.29	0.027	490.0	311.9	1.57
34	761.39	5.63	0.007	490.0	317.0	1.55
39	509.84	60.48	0.119	400.0	237.0	1.69
46	89.19	22.43	0.252	135.0	99.9	1.35
47	180.15	32.95	0.183	205.0	135.6	1.51
48	288.32	34.86	0.121	275.0	176.6	1.56
49	394.67	43.90	0.111	330.0	205.9	1.60
50	489.18	28.16	0.058	370.0	226.1	1.64
51	535.12	12.39	0.023	390.0	239.7	1.63
52	547.84	3.28	0.006	400.0	244.5	1.64
56	394.64	43.90	0.111	330.0	202.7	1.63
63	182.06	25.86	0.142	200.0	126.0	1.59
64	275.60	18.12	0.066	245.0	142.5	1.72
65	318.72	9.28	0.029	265.0	153.0	1.73
66	330.77	1.77	0.005	270.0	158.1	1.71
69	275.60	18.12	0.066	250.0	142.1	1.76
74	83.40	10.11	0.121	102.0	64.0	1.59

TABLE 2.5-89

UNDRAINED STATIC STRENGTH AFTER DYNAMICALLY LOADING THE SAMPLE

Sample	Test No.	σ_{3c} (psf)	K_c	No. of Cycles N	Cyclic Axial Load Δdp (psf)	c* (psf)	Undrained c(static) (psf)	$\frac{c^*}{c(static)}$ (%)
TP-13	1	600	1.0	11	400	390	580	67.2
TP-13	2	400	1.75	11	400	519	580	89.5
TP-13	3	1,200	1.75	11	940	800	1,030	78

*Undrained shear strength after dynamic loading.

TABLE 2.5-90 (Sheet 1 of 4)

FURNISHING AND INSTALLATION OF INSTRUMENTATION

303.6 Measurements will be taken by Purchaser not by Contractor as follows:

a. Piezometers: The non electric piezometers shall be read as indicated in U.S. Bureau and referenced to the top of the piezometer tube. The elevations of the tops of the piezometer tubes shall be periodically checked because they may be subject to settlements within the dam. The electric piezometers shall be read with the use of a digital readout calibration - shall be per manufacturer's standards.

b. Vertical Settlement: The vertical movements of the settlement points shall be determined by measuring their elevation by a closed level loop using second order accuracy. (Error of closure must be less than 0.035 M where M is the length of the level loop in miles.)

c. Horizontal Movement: The horizontal movements of the settlement points shall be determined by computing their displacements from their initial position. The coordinates of their position will be computed from a triangulation network using electronic distance measuring devices. The network shall consist of the triangulation reference points and selected monitoring points on the dam. The lateral movements perpendicular to the dam axis of the intermediate monitoring points shall be determined by the offsets measured by sighting between the monitoring points used in the network. The location of each monitoring point shall initially be established. On subsequent surveys the position of the intermediate points parallel to the dam axis shall be determined if the monitoring points used in the network show movements perpendicular to the dam axis in excess of six inches. Inclinometers added in 1987 will supplement the horizontal monument readings.

d. Sedimentation: Prior to 2003 sedimentation was checked annually by visual inspection and measurements by divers of the sediment pads located on the bottom of the reservoir and channel. Between the years 2003 to 2009 the sedimentation levels were not measured. After 2009 sedimentation levels are checked annually by hydrographic methods when the water level is greater than 1975-foot elevation (SNUPPS). An initial sounding shall be conducted after the initial filling of the UHS Reservoir to correlate the sounding data with the surveyed reservoir bottom data and provide a baseline so that future soundings can be interpreted and evaluated.

TABLE 2.5-90 (Sheet 2 of 4)

e. Schedule of Measurements

e1. Main Dam, Saddle Dams and Baffle Dikes:

	Phase	Piezometers	Vertical Movement	Horizontal Movement	Inclinometers Added in 1987
e1.1	Main Dam and Saddle Dams:				
e1.1.1	During construction	Monthly	Monthly	Initial	
e1.1.2	During lake filling	Monthly	Monthly	El. 1930 1950 1970 1987	
e1.1.3	During operation	Monthly**	Monthly+	Yearly***	Monthly*
e1.1.4	Drawdown or filling in excess of 5 ft. during operation	At occurrence	At occurrence	__	At occurrence
e1.2	Baffle Dikes				
e1.2.1	During construction	NA	Monthly**	NA	
e1.2.2	During lake filling	NA	Monthly**	NA	
e1.2.3	During operation	NA	Monthly+	NA	
e1.2.4	Drawdown or filling in excess of 5 ft. during opertion	NA	At occurrence	NA	

** Until steady state is recorded; quarterly thereafter and yearly beginning in 1995.

* Until steady state is recorded; quarterly thereafter and semi-annually beginning in 1993 and yearly beginning in 1995.

+ Until steady state is recorded; quarterly thereafter and yearly beginning in 1993 and every 5 years beginning in 1994 (1999, 2004...etc).

*** Every 5 years beginning in 1994 (1999, 2004...etc).

TABLE 2.5-90 (Sheet 3 of 4)

e2. UHS Dam and UHS

	Phase	Vertical Movement (Note 3)	Horizontal Movement (Note 4)	Sediments Pads (Note 5)	UHS Profile (Note 6)
e2.1	During filling of UHS 1969.5	Monthly	Initial	Spot Visual Inspec.	--
e2.2	UHS at 1969.5	At occurrence	At occurrence	Visual Inspec.	--
e2.3	Filling of area downstream of UHS dam to 1969.5	Monthly	At start of filling down-stream area	--	--
e2.4	UHS at 1970	At occurrence	At occurrence	--	Initial survey after filling when level is at approxi-mately 1970
e2.5	UHS filling to 1975	Monthly	At occurrence	--	--
e2.6	UHS at 1975	At occurrence	At occurrence	Inspec.	--
e2.7	Water level >1975	Note 3	Note 7	Inspec. Yearly	When required, based on sediment inspection
e2.8	Drawdown below 1975	At occurrence	At occurrence	Inspec. At occurrence	--

** Until steady state is recorded - quarterly thereafter.

Notes:

1. The above schedule will be subject to change based on the evaluation of the records and behavior of the dam or dike.

2. Good documentation is required because impact of results will depend upon change from one observation to the next. Frequent initial data as called for in this schedule required to establish reliable baseline data.

TABLE 2.5-90 (Sheet 4 of 4)

Notes: 3. Monthly until submerged. If no movement is noted, then yearly through 2002 and every five years thereafter.

4. Sight along horizontal movement hubs and measure offsets.

5. Visual inspection to measure sedimentation thickness 6 months and 12 months after filling of UHS. Diver can measure accumulated thickness of sediment on pads. Sedimentation was inspected and trended annually from 1984 through 2002. Between 2003 and 2009 sedimentation levels were not inspected. Annual sedimentation inspections were resumed in 2010 using hydrographic methods.

6. Initial survey after filling must be taken by the method planned to be used in the future and to make a comparison to the survey data taken before filling.

7. No horizontal measurement will be taken of UHS dam after it is submerged.

8. In 1987 new settlement markers, piezometers, and inclinometers were added to the Main Dam. Also new settlement markers and piezometers were added to Saddle Dam IV.

TABLE 2.5-91

SCHEDULE OF MEASUREMENTS FOR
MAIN DAM, SADDLE DAMS, AND BAFFLE DIKES

Table Deleted

Table 2.5-92

VERTICAL MOVEMENT MONUMENT DATA
MAIN DAM

Monument Number	Location (ft) Station	Offset	Date of Survey and Elevation 10/31/80	12/02/80	01/08/81	02/06/81	03/06/81	04/03/81	05/08/81	06/05/81	07/10/81	08/05/81	09/04/81
1	2+00	10 Lakeside	2000.555	2000.550	2000.548	2000.550	2000.547	2000.545	2000.541	2000.541	2000.543	2000.543	2000.543
2	4+00	10 Lakeside	2000.523	2000.518	2000.514	2000.515	2000.511	2000.508	2000.506	2000.503	2000.506	2000.505	2000.506
3	6+00	10 Lakeside	2000.771	2000.765	2000.762	2000.765	2000.760	2000.755	2000.753	2000.747	2000.748	2000.748	2000.748
4	8+00	10 Lakeside	2000.706	2000.700	2000.696	2000.686	2000.692	2000.684	2000.683	2000.676	2000.677	2000.678	2000.677
5	10+00	10 Lakeside	2000.913	2000.908	2000.905	2000.906	2000.902	2000.894	2000.893	2000.883	2000.883	2000.886	2000.884
6	12+00	10 Lakeside	2000.635	2000.633	2000.626	2000.628	2000.625	2000.616	2000.615	2000.602	2000.605	2000.607	2000.604
7	14+00	10 Lakeside	2000.886	2000.884	2000.875	2000.877	2000.875	2000.867	2000.865	2000.851	2000.851	2000.856	2000.853
8	16+00	10 Lakeside	2000.929	2000.927	2000.917	2000.920	2000.916	2000.911	2000.909	2000.894	2000.891	2000.897	2000.896
9	18+00	10 Lakeside	2001.169	2001.166	2001.158	2001.160	2001.160	2001.155	2001.157	2001.140	2001.136	2001.142	2001.140
10	20+00	10 Lakeside	2000.422	2000.421	2000.413	2000.414	2000.416	2000.412	2000.414	2000.396	2000.394	2000.401	2001.400
11	34+00	10 Landside	1999.843	1999.844	1999.841	1999.839	1999.841	1999.841	1999.839	1999.843	1999.843	1999.844	1999.846
12	36+00	10 Landside	2000.116	2000.120	2000.118	2000.120	2000.119	2000.120	2000.119	2000.122	2000.123	2000.123	2000.125
13	38+00	14 Landside	2000.520	2000.524	2000.519	2000.522	2000.521	2000.521	2000.522	2000.522	2000.525	2000.523	2000.525
14	40+00	14 Landside	2001.150	2001.149	2001.143	2001.147	2001.144	2001.143	2001.144	2001.144	2001.144	2001.143	2001.147
15	42+00	14 Landside	2000.879	2000.873	2000.865	2000.867	2000.864	2000.862	2000.860	2000.859	2000.859	2000.857	2000.862
16	44+00	14 Landside	2000.703	2000.691	2000.678	2000.678	2000.673	2000.669	2000.667	2000.662	2000.662	2000.659	2000.657
17	46+00	14 Landside	2001.002	2000.981	2000.964	2000.961	2000.953	2000.947	2000.942	2000.936	2000.935	2000.931	2000.929
18	48+00	14 Landside	2001.563	2001.546	2001.606	2001.598	2001.589	2001.587	2001.593	2001.597	2001.593	2001.570	2001.559
19	50+00	14 Landside	2001.587	2001.534	2001.495	2001.481	2001.464	2001.453	2001.441	2001.433	2001.421	2001.416	2001.411

Note: Elevations refer to SNUPPS reference datum. Subtract 900.0 from values given to obtain MSL equivlent.

[a]Date of survey was 12/11/80.

[b]Date of survey was 8/26/81.

[c]Probably survey error. Elevation should be 1921.774

See WCNOC-55 for Subsequent years

Table 2.5-92 (continued)

Monument Number	Location (ft) Station	Location (ft) Offset	Date of Survey and Elevation 10/02/81	11/06/81	12/04/81	01/20/82	02/12/82	03/09/82	04/13/82	05/12/82	06/16/82	07/06/82	08/06/82
1	2+00	10 Lakeside	2000.545	2000.544	2000.541	2000.542	2000.539	2000.535	2000.537	2000.536	2000.539	2000.537	2000.540
2	4+00	10 Lakeside	2000.507	2000.503	2000.501	2000.500	2000.499	2000.495	2000.494	2000.493	2000.495	2000.497	2000.499
3	6+00	10 Lakeside	2000.749	2000.743	2000.741	2000.741	2000.739	2000.734	2000.732	2000.734	2000.734	2000.735	2000.738
4	8+00	10 Lakeside	2000.677	2000.671	2000.667	2000.662	2000.657	2000.648	2000.649	2000.649	2000.649	2000.650	2000.653
5	10+00	10 Lakeside	2000.886	2000.880	2000.876	2000.873	2000.868	2000.859	2000.863	2000.861	2000.860	2000.865	2000.867
6	12+00	10 Lakeside	2000.607	2000.599	2000.594	2000.595	2000.592	2000.579	2000.583	2000.584	2000.583	2000.588	2000.591
7	14+00	10 Lakeside	2000.857	2000.849	2000.842	2000.844	2000.838	2000.824	2000.828	2000.832	2000.829	2000.833	2000.834
8	16+00	10 Lakeside	2000.897	2000.890	2000.880	2000.885	2000.875	2000.864	2000.868	2000.870	2000.870	2000.874	2000.873
9	18+00	10 Lakeside	2001.140	2001.133	2001.124	2001.128	2001.121	2001.109	2001.112	2001.117	2001.117	2001.122	2001.121
10	20+00	10 Lakeside	2000.400	2000.394	2000.389	2000.395	2000.389	2000.379	2000.381	2000.389	2000.390	2000.397	2000.399
11	34+00	10 Landside	1999.846	1999.846	1999.845	1999.843	1999.843	1999.817	1999.807	1999.810	1999.813	1999.819	1999.818
12	36+00	10 Landside	2000.125	2000.126	2000.127	2000.125	2000.124	2000.097	2000.089	2000.090	2000.093	2000.098	2000.098
13	38+00	14 Landside	2000.526	2000.528	2000.530	2000.527	2000.527	2000.499	2000.492	2000.494	2000.497	2000.503	2000.504
14	40+00	14 Landside	2001.145	2001.146	2001.147	2001.141	2001.147	2001.116	2001.109	2001.110	2001.114	2001.118	2001.118
15	42+00	14 Landside	2000.860	2000.859	2000.859	2000.852	2000.855	2000.827	2000.818	2000.819	2000.825	2000.828	2000.830
16	44+00	14 Landside	2000.650	2000.644	2000.644	2000.634	2000.639	2000.613	2000.598	2000.598	2000.602	2000.607	2000.605
17	46+00	14 Landside	2000.924	2000.920	2000.920	2000.913	2000.913	2000.888	2000.872	2000.874	2000.876	2000.883	2000.881
18	48+00	14 Landside	2001.546	2001.560	2001.564	2001.558	2001.558	2001.541	2001.527	2001.525	2001.530	2001.533	2001.527
19	50+00	14 Landside	2001.401	2001.396	2001.386	2001.372	2001.372	2001.350	2001.328	2001.331	2001.328	2001.332	2001.324

Table 2.5-92 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Elevation 10/31/80	12/02/80	01/08/81	02/06/81	03/06/81	04/03/81	05/08/81	06/05/81	07/10/81	08/05/81	09/04/81
20	52+00	14 Landside	2001.937	2001.844	2001.780	2001.755	2001.726	2001.709	2001.687	2001.673	2001.655	2001.648	2001.636
21	54+00	14 Landside	2001.130	2001.040	2000.979	2000.957	2000.928	2000.913	2000.889	2000.880	2000.859	2000.855	2000.846
22	56+00	14 Landside	2000.888	2000.800	2000.741	2000.719	2000.694	2000.680	2000.657	2000.648	2000.627	2000.623	2000.615
23	58+00	14 Landside	2001.139	2001.318	2001.266	2001.246	2001.223	2001.210	2001.190	2001.182	2001.162	2001.158	2001.151
24	60+00	14 Landside	2001.950	2001.897	2001.855	2001.844	2001.823	2001.813	2001.797	2001.788	2001.770	2001.767	2001.759
25	62+00	14 Landside	2001.512	2001.479	2001.449	2001.442	2001.426	2001.420	2001.408	2001.404	2001.389	2001.387	2001.381
26	64+00	14 Landside	2001.621	2001.593	2001.567	2001.563	2001.547	2001.541	2001.529	2001.526	2001.513	2001.509	2001.505
27	66+00	14 Landside	2001.991	2001.971	2001.946	2001.941	2001.927	2001.924	2001.915	2001.909	2001.898	2001.892	2001.887
28	68+00	14 Landside	2002.112	2002.088	2002.077	2002.069	2002.057	2002.055	2002.047	2002.043	2002.032	2002.025	2002.022
29	70+00	14 Landside	2001.637	2001.620	2001.603	2001.598	2001.585	2001.579	2001.575	2001.569	2001.561	2001.551	2001.547
30	72+00	14 Landside	2001.428	2001.413	2001.397	2001.391	2001.381	2001.376	2001.373	2001.365	2001.361	2001.351	2001.350
31	74+00	14 Landside	2000.822	2000.808	2000.790	2000.782	2000.772	2000.767	2000.765	2000.755	2000.752	2000.744	2000.742
32	76+00	14 Landside	2000.194	2000.177	2000.163	2000.156	2000.148	2000.142	2000.137	2000.130	2000.126	2000.120	2000.118
33	78+00	14 Landside	2000.568	2000.558	2000.549	2000.544	2000.542	2000.538	2000.540	2000.535	2000.535	2000.533	2000.533
34	80+00	14 Landside	2000.602	2000.594	2000.587	2000.584	2000.582	2000.579	2000.582	2000.579	2000.578	2000.578	2000.578
35	82+00	14 Landside	2000.981	2000.971	2000.968	2000.967	2000.965	2000.961	2000.966	2000.960	2000.960	2000.963	2000.961
36	84+00	14 Landside	2000.548	2000.539	2000.536	2000.537	2000.535	2000.534	2000.539	2000.533	2000.535	2000.535	2000.537
37	86+00	10 Landside	2000.906	2000.902	2000.897	2000.897	2000.897	2000.898	2000.901	2000.899	2000.900	2000.901	2000.901
38	88+00	10 Landside	2000.455	2000.451	2000.446	2000.446	2000.445	2000.444	2000.448	2000.446	2000.445	2000.446	2000.448
39	90+00	10 Landside	2000.638	2000.638	2000.635	2000.636	2000.637	2000.637	2000.638	2000.638	2000.637	2000.638	2000.638
40	44+00	Landside Toe	1961.565	1961.551	1961.561	1961.560	1961.574	1961.589	1961.576	1961.603	1961.592	1961.604[b]	-
41	48+00	134 Landside	1961.733	1961.748	1961.754	1961.761	1961.756	1961.778	1961.763	1961.791	1961.782	1961.799[b]	-

Table 2.5-92 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Elevation 10/02/81	11/06/81	12/04/81	01/20/82	02/12/82	03/09/82	04/13/82	05/12/82	06/16/82	07/06/82	08/06/82
20	52+00	14 Landside	2001.623	2001.612	2001.600	2001.581	2001.578	2001.555	2001.530	2001.530	2001.526	2001.529	2001.517
21	54+00	14 Landside	2000.834	2000.824	2000.813	2000.795	2000.794	2000.771	2000.750	2000.746	2000.742	2000.746	2000.734
22	56+00	14 Landside	2000.602	2000.593	2000.582	2000.562	2000.563	2000.537	2000.520	2000.514	2000.508	2000.516	2000.505
23	58+00	14 Landside	2001.137	2001.132	2001.122	2001.102	2001.102	2001.079	2001.062	2001.058	2001.053	2001.063	2001.051
24	60+00	14 Landside	2001.746	2001.742	2001.734	2001.715	2001.715	2001.694	2001.674	2001.673	2001.668	2001.679	2001.684
25	62+00	14 Landside	2001.371	2001.370	2001.362	2001.345	2001.345	2001.327	2001.309	2001.310	2001.305	2001.312	2001.302
26	64+00	14 Landside	2001.492	2001.495	2001.489	2001.472	2001.470	2001.454	2001.433	2001.435	2001.427	2001.434	2001.428
27	66+00	14 Landside	2001.874	2001.882	2001.878	2001.859	2001.855	2001.841	2001.821	2001.821	2001.814	2001.820	2001.814
28	68+00	14 Landside	2002.007	2002.014	2002.012	2001.992	2001.989	2001.975	2001.953	2001.954	2001.949	2001.952	2001.946
29	70+00	14 Landside	2001.534	2001.539	2001.537	2001.520	2001.521	2001.504	2001.483	2001.484	2001.479	2001.483	2001.477
30	72+00	14 Landside	2001.338	2001.344	2001.342	2001.328	2001.327	2001.314	2001.295	2001.297	2001.294	2001.299	2001.294
31	74+00	14 Landside	2000.731	2000.734	2000.732	2000.716	2000.713	2000.701	2000.682	2000.685	2000.683	2000.692	2000.690
32	76+00	14 Landside	2000.106	2000.109	2000.108	2000.089	2000.087	2000.072	2000.055	2000.060	2000.055	2000.059	2000.056
33	78+00	14 Landside	2000.527	2000.533	2000.534	2000.519	2000.521	2000.509	2000.497	2000.503	2000.501	2000.502	2000.499
34	80+00	14 Landside	2000.575	2000.579	2000.578	2000.565	2000.567	2000.558	2000.548	2000.553	2000.553	2000.555	2000.555
35	82+00	14 Landside	2000.961	2000.962	2000.967	2000.954	2000.957	2000.953	2000.946	2000.951	2000.953	2000.955	2000.957
36	84+00	14 Landside	2000.536	2000.534	2000.538	2000.527	2000.529	2000.524	2000.519	2000.522	2000.523	2000.522	2000.523
37	86+00	10 Landside	2000.902	2000.900	2000.903	2000.894	2000.897	2000.894	2000.885	2000.889	2000.892	2000.892	2000.891
38	88+00	10 Landside	2000.445	2000.446	2000.446	2000.434	2000.436	2000.432	2000.424	2000.429	2000.428	2000.427	2000.426
39	90+00	10 Landside	2000.637	2000.636	2000.637	2000.631	2000.628	2000.626	2000.623	2000.624	2000.624	2000.623	2000.621
40	44+00	Landside Toe	1961.580	1961.586	1961.604	1961.555	1961.614	1961.591	1961.598	1961.606	-	1961.608	1961.610
41	48+00	134 Landside	1961.762	1961.769	1961.782	1961.724	1961.782	1961.757	1961.776	1961.776	-	1961.772	1961.771

Table 2.5-92 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Elevation 10/31/80	12/02/80	01/08/81	02/06/81	03/06/81	04/03/81	05/08/81	06/05/81	07/10/81	08/05/81	09/04/81
42	52+00	134 Landside	1961.095	1961.055	1961.042	1961.041	1961.030	1961.039	1961.021	1961.039	1961.026	1961.038[b]	-
43	56+00	134 Landside	1961.364	1961.331	1961.317	1961.314	1961.305	1961.312	1961.293	1961.311	1961.298	1961.314[b]	-
44	60+00	134 Landside	1960.900	1960.879	1960.882	1960.879	1960.879	1960.887	1960.871	1960.889	1960.876	1960.906[b]	-
45	64+00	134 Landside	1961.797	1961.775	1961.781	1961.778	1961.782	1961.790	1961.775	1961.791	1961.779	1961.812[b]	-
46	68+00	134 Landside	1961.947	1961.924	1961.938	1961.931	1961.930	1961.940	1961.925	1961.938	1961.931	1961.967[b]	-
47	72+00	134 Landside	1961.818	1961.798	1961.806	1961.799	1961.804	1961.814	1961.799	1961.809	1961.802	1961.844[b]	-
48	76+00	134 Landside	1961.926	1961.907	1961.911	1961.913	1961.914	1961.926	1961.908	1961.918	1961.913	1961.959[b]	-
49	80+00	Landside Toe	1963.731	1963.718	1963.732	1963.732	1963.732	1963.749	1963.736	1963.742	1963.741	1963.790[b]	-
50	49+00	Landside Toe	-	1942.156[a]	1942.156	1942.155	1942.151	1942.149	1942.147	1942.146	1942.148	1942.146[b]	-
51	52+00	Landside Toe	1930.766	1930.755	1930.750	1930.748	1930.747	1930.734	1930.743	1930.744	1930.746	1930.738[b]	-
52	56+00	Landside Toe	1920.774[c]	1921.780	1921.772	1921.779	1921.779	1921.765	1921.770	1921.781	1921.782	1921.771[b]	-
53	60+00	Landside Toe	1919.624	1919.611	1919.608	1919.614	1919.612	1919.603	1919.603	1919.613	1919.615	1919.607[b]	-
54	64+00	Landside Toe	1922.966	1922.953	1922.949	1922.957	1922.954	1922.948	1922.944	1922.959	1922.961	1922.943[b]	-
55	68+00	Landside Toe	1927.551	1927.540	1927.534	1927.542	1927.539	1927.532	1927.525	1927.541	1927.545	1927.526[b]	-
56	72+00	Landside Toe	1932.906	1932.889	1932.887	1932.893	1932.891	1932.886	1932.877	1932.894	1932.895	1932.881[b]	-
57	76+00	Landside Toe	1941.235	1941.218	1941.217	1941.224	1941.222	1941.216	1941.206	1941.230	1941.228	1941.220[b]	-
70	46+00	Landside Toe	-	1955.784[a]	1955.786	1955.787	1955.776	1955.795	1955.783	1955.811	1955.800	1955.816[b]	-

Table 2.5-92 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Elevation 10/02/81	11/06/81	12/04/81	01/20/82	02/12/82	03/09/82	04/13/82	05/12/82	06/16/82	07/09/82	08/05/82
42	52+00	134 Landside	1960.995	1960.996	1961.003	1960.941	1960.992	1960.971	1960.981	1960.982	-	1960.971	1960.969
43	56+00	134 Landside	1961.270	1961.267	1961.274	1961.211	1961.263	1961.245	1961.258	1961.262	-	1961.249	1961.250
44	60+00	134 Landside	1960.862	1960.861	1960.871	1960.806	1960.863	1960.840	1960.842	1960.853	-	1960.841	1960.836
45	64+00	134 Landside	1961.764	1961.768	1961.774	1961.721	1961.771	1961.775	1961.760	1961.768	-	1961.764	1961.760
46	68+00	134 Landside	1961.917	1961.921	1961.924	1961.870	1961.926	1961.899	1961.905	1961.910	-	1961.904	1961.901
47	72+00	134 Landside	1961.792	1961.796	1961.799	1961.743	1961.796	1961.774	1961.783	1961.788	-	1961.789	1961.788
48	76+00	134 Landside	1961.904	1961.905	1961.905	1961.855	1961.901	1961.884	1961.889	1961.891	-	1961.887	1961.887
49	80+00	Landside Toe	1963.732	1963.737	1963.740	1963.696	1963.746	1963.728	1963.730	1963.732	-	1963.731	1963.728
50	49+00	Landside Toe	1942.148	1942.150	1942.151	1942.149	1942.147	1942.149	1942.147	1942.144	1942.144	1942.145	1942.143
51	52+00	Landside Toe	1930.743	1930.739	1930.746	1930.733	1930.733	1930.739	1930.742	1930.736	1930.746	1930.738	1930.739
52	56+00	Landside Toe	1921.779	1921.780	1921.783	1921.766	1921.762	1921.783	1921.777	1921.781	1921.799	1921.786	1921.787
53	60+00	Landside Toe	1919.617	1919.618	1919.620	1919.619	1919.611	1919.629	1919.628	1919.628	1919.630	1919.641	1919.645
54	64+00	Landside Toe	1922.955	1922.955	1922.954	1922.954	1922.946	1922.961	1922.963	1922.969	1922.984	1922.997	1922.999
55	68+00	Landside Toe	1927.533	1927.530	1927.528	1927.518	1927.523	1927.531	1927.533	1927.533	1927.526	1927.537	1927.536
56	72+00	Landside Toe	1932.887	1932.885	1932.883	1932.878	1932.881	1932.887	1932.888	1932.891	1932.878	1932.885	1932.886
57	76+00	Landside Toe	1941.228	1941.222	1941.218	1941.220	1941.229	1941.227	1941.230	1941.229	1941.214	1941.219	1941.221
70	46+00	Landside Toe	1955.784	1955.793	1955.813	1955.756	1955.828	1955.803	1955.828	1955.830	-	1955.842	1955.843

Table 2.5-93

VERTICAL MOVEMENT
MAIN DAM

Monument Number	Location (ft) Station	Offset	Date of Survey and Cumulative Movement 12/02/80	01/08/81	02/06/81	03/06/81	04/03/81	05/08/81	06/05/81	07/10/81	08/05/81	09/04/81	10/02/81
1	2+00	10 Lakeside	0.06	0.08	0.06	0.10	0.12	0.17	0.17	0.14	0.14	0.14	0.12
2	4+00	10 Lakeside	0.06	0.11	0.10	0.14	0.18	0.20	0.24	0.20	0.22	0.20	0.19
3	6+00	10 Lakeside	0.07	0.11	0.07	0.13	0.19	0.22	0.29	0.28	0.28	0.28	0.26
4	8+00	10 Lakeside	0.07	0.12	0.24	0.17	0.26	0.27	0.36	0.35	0.34	0.35	0.35
5	10+00	10 Lakeside	0.06	0.10	0.08	0.13	0.23	0.24	0.36	0.36	0.32	0.35	0.32
6	12+00	10 Lakeside	0.02	0.11	0.08	0.12	0.23	0.24	0.40	0.36	0.34	0.37	0.34
7	14+00	10 Lakeside	0.02	0.13	0.11	0.13	0.23	0.25	0.42	0.42	0.36	0.40	0.35
8	16+00	10 Lakeside	0.02	0.14	0.11	0.16	0.22	0.24	0.42	0.46	0.38	0.38	0.38
9	18+00	10 Lakeside	0.04	0.13	0.11	0.11	0.17	0.14	0.35	0.40	0.32	0.35	0.35
10	20+00	10 Lakeside	0.01	0.11	0.11	0.07	0.12	0.10	0.31	0.34	0.25	0.26	0.26
11	34+00	10 Landside	-0.01	0.02	0.05	0.02	0.02	0.05	0.0	0.0	-0.01	-0.04	-0.04
12	36+00	10 Landside	-0.05	-0.02	-0.05	-0.04	-0.05	-0.04	-0.07	-0.08	-0.08	-0.11	-0.11
13	38+00	14 Landside	-0.05	0.01	-0.02	-0.01	-0.01	0.02	-0.02	-0.06	-0.04	-0.06	-0.06
14	40+00	14 Landside	0.01	0.08	0.04	0.07	0.08	0.07	0.07	0.07	0.08	0.04	0.06
15	42+00	14 Landside	0.07	0.17	0.14	0.18	0.20	0.23	0.24	0.24	0.26	0.20	0.23
16	44+00	14 Landside	0.14	0.30	0.30	0.36	0.41	0.43	0.49	0.49	0.53	0.55	0.64
17	46+00	14 Landside	0.25	0.46	0.49	0.59	0.66	0.72	0.79	0.80	0.85	0.88	0.94
18	48+00	14 Landside	0.20	-0.52	-0.42	-0.31	-0.29	-0.36	-0.41	-0.36	-0.08	0.05	0.20
19	50+00	14 Landside	0.64	1.10	1.27	1.48	1.61	1.75	1.85	1.99	2.05	2.11	2.23

Notes: All movements are in inches.
Positive number indicates settlement.

See WCNOC-55 for Subsequent years

Table 2.5-93 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Cumulative Movement 11/06/81	12/04/81	01/20/82	02/12/82	03/09/82	04/13/82	05/12/82	06/16/82	07/06/82	08/06/82
1	2+00	10 Lakeside	0.13	0.17	0.16	0.19	0.24	0.22	0.23	0.19	0.22	0.18
2	4+00	10 Lakeside	0.24	0.26	0.28	0.29	0.34	0.35	0.36	0.34	0.31	0.29
3	6+00	10 Lakeside	0.34	0.36	0.36	0.38	0.44	0.47	0.44	0.44	0.43	0.40
4	8+00	10 Lakeside	0.42	0.47	0.53	0.59	0.70	0.68	0.68	0.68	0.67	0.64
5	10+00	10 Lakeside	0.40	0.44	0.48	0.54	0.65	0.60	0.62	0.64	0.58	0.55
6	12+00	10 Lakeside	0.43	0.49	0.48	0.52	0.67	0.62	0.61	0.62	0.56	0.53
7	14+00	10 Lakeside	0.44	0.53	0.50	0.58	0.74	0.70	0.65	0.68	0.64	0.62
8	16+00	10 Lakeside	0.47	0.59	0.53	0.65	0.78	0.73	0.71	0.71	0.66	0.67
9	18+00	10 Lakeside	0.43	0.54	0.49	0.58	0.72	0.68	0.62	0.62	0.56	0.58
10	20+00	10 Lakeside	0.34	0.40	0.32	0.40	0.52	0.49	0.40	0.38	0.30	0.28
11	34+00	10 Landside	-0.04	-0.02	0.00	0.00	0.31	0.43	0.40	0.36	0.29	0.30
12	36+00	10 Landside	-0.12	-0.13	-0.11	-0.10	0.23	0.32	0.31	0.28	0.22	0.22
13	38+00	14 Landside	-0.10	-0.12	-0.08	-0.08	0.25	0.34	0.31	0.28	0.20	0.19
14	40+00	14 Landside	0.05	0.04	0.11	0.04	0.41	0.49	0.48	0.43	0.38	0.38
15	42+00	14 Landside	0.24	0.24	0.32	0.29	0.62	0.73	0.72	0.65	0.61	0.60
16	44+00	14 Landside	0.71	0.71	0.83	0.77	1.08	1.26	1.26	1.21	1.15	1.18
17	46+00	14 Landside	0.98	0.98	1.07	1.07	1.37	1.56	1.54	1.51	1.43	1.45
18	48+00	14 Landside	0.04	-0.01	0.06	0.06	0.26	0.43	0.46	0.40	0.36	0.43
19	50+00	14 Landside	2.29	2.41	2.58	2.58	2.84	3.108	3.072	3.108	3.06	3.16

Table 2.5-93 (continued)

Monument Number	Location (ft) Station	Location (ft) Offset	Date of Survey and Cumulative Movement 12/02/80	01/08/81	02/06/81	03/06/81	04/03/81	05/08/81	06/05/81	07/10/81	08/05/81	09/04/81	10/02/81
20	52+00	14 Landside	1.12	1.88	2.18	2.53	2.74	3.00	3.17	3.38	3.47	3.61	3.77
21	54+00	14 Landside	1.08	1.81	2.08	2.42	2.60	2.89	3.00	3.25	3.30	3.41	3.55
22	56+00	14 Landside	1.06	1.76	2.03	2.33	2.50	2.77	2.88	3.13	3.18	3.27	3.43
23	58+00	14 Landside	-	0.62	0.86	1.14	1.30	1.54	1.63	1.87	1.92	2.00	2.17
24	60+00	14 Landside	0.64	1.14	1.27	1.52	1.64	1.84	1.94	2.16	2.20	2.29	2.45
25	62+00	14 Landside	0.40	0.76	0.84	1.03	1.10	1.25	1.30	1.48	1.50	1.57	1.69
26	64+00	14 Landside	0.34	0.65	0.70	0.89	0.96	1.10	1.14	1.30	1.34	1.39	1.55
27	66+00	14 Landside	0.24	0.54	0.60	0.77	0.80	0.91	0.98	1.12	1.19	1.25	1.40
28	68+00	14 Landside	0.29	0.42	0.52	0.66	0.68	0.78	0.83	0.96	1.04	1.08	1.26
29	70+00	14 Landside	0.20	0.41	0.47	0.62	0.70	0.74	0.82	0.91	1.03	1.08	1.24
30	72+00	14 Landside	0.18	0.37	0.44	0.56	0.62	0.66	0.76	0.80	0.92	0.94	1.08
31	74+00	14 Landside	0.17	0.38	0.48	0.60	0.66	0.68	0.80	0.84	0.94	0.96	1.09
32	76+00	14 Landside	0.20	0.37	0.46	0.55	0.62	0.68	0.77	0.82	0.89	0.91	1.06
33	78+00	14 Landside	0.12	0.23	0.29	0.31	0.36	0.34	0.40	0.40	0.42	0.42	0.49
34	80+00	14 Landside	0.10	0.18	0.22	0.24	0.28	0.46	0.28	0.29	0.29	0.29	0.32
35	82+00	14 Landside	0.12	0.16	0.17	0.19	0.24	0.18	0.25	0.25	0.22	0.24	0.24
36	84+00	14 Landside	0.11	0.14	0.13	0.16	0.12	0.11	0.18	0.16	0.16	0.13	0.14
37	86+00	10 Landside	0.05	0.11	0.11	0.11	0.10	0.06	0.08	0.07	0.06	0.06	0.05
38	88+00	10 Landside	0.05	0.11	0.11	0.11	0.13	0.08	0.11	0.12	0.11	0.08	0.12
39	90+00	10 Landside	0.0	0.04	0.03	0.02	0.01	0.00	0.00	0.01	0.0	0.0	0.01
40	44+00	Landside Toe	0.17	0.05	0.06	-0.11	-0.29	-0.13	-0.46	-0.32	-0.47	-	-0.18
41	48+00	134 Landside	-0.18	-0.25	-0.34	-0.28	-0.54	-0.36	-0.70	-0.59	-0.79	-	-0.35

Table 2.5-93 (continued)

Monument Number	Location (ft) Station	Location (ft) Offset	Date of Survey and Cumulative Movement 11/06/81	12/04/81	01/20/82	02/12/82	03/09/82	04/13/82	05/12/82	06/16/82	07/06/82	08/06/82
20	52+00	14 Landside	3.90	4.04	4.27	4.31	4.58	4.88	4.88	4.93	4.90	5.04
21	54+00	14 Landside	3.67	3.80	4.02	4.03	4.31	4.56	4.61	4.66	4.61	4.75
22	56+00	14 Landside	3.54	3.67	3.91	3.90	4.21	4.42	4.49	4.56	4.46	4.60
23	58+00	14 Landside	2.23	2.35	2.59	2.59	2.87	3.07	3.12	3.18	3.06	3.20
24	60+00	14 Landside	2.50	2.59	2.82	2.82	3.07	3.31	3.32	3.38	3.25	3.19
25	62+00	14 Landside	1.70	1.80	2.00	2.00	2.22	2.44	2.42	2.48	2.40	2.52
26	64+00	14 Landside	1.51	1.58	1.79	1.81	2.00	2.26	2.23	2.33	2.24	2.32
27	66+00	14 Landside	1.31	1.36	1.58	1.63	1.80	2.04	2.04	2.12	2.05	2.12
28	68+00	14 Landside	1.18	1.20	1.44	1.48	1.64	1.91	1.90	1.96	1.92	1.99
29	70+00	14 Landside	1.18	1.20	1.40	1.39	1.60	1.85	1.84	1.90	1.85	1.92
30	72+00	14 Landside	1.01	1.03	1.20	1.21	1.37	1.60	1.57	1.61	1.55	1.61
31	74+00	14 Landside	1.06	1.08	1.27	1.31	1.45	1.68	1.64	1.67	1.56	1.58
32	76+00	14 Landside	1.02	1.03	1.26	1.28	1.46	1.67	1.61	1.67	1.62	1.66
33	78+00	14 Landside	0.42	0.41	0.59	0.56	0.71	0.85	0.78	0.80	0.79	0.83
34	80+00	14 Landside	0.28	0.29	0.44	0.42	0.53	0.65	0.59	0.59	0.56	0.56
35	82+00	14 Landside	0.23	0.17	0.32	0.29	0.34	0.42	0.36	0.34	0.31	0.29
36	84+00	14 Landside	0.17	0.12	0.25	0.23	0.29	0.35	0.31	0.30	0.31	0.30
37	86+00	10 Landside	0.07	0.04	0.14	0.11	0.14	0.25	0.20	0.17	0.17	0.18
38	88+00	10 Lanside	0.11	0.10	0.25	0.23	0.28	0.37	0.31	0.32	0.34	0.35
39	90+00	10 Landside	0.02	0.02	0.08	0.12	0.14	0.18	0.17	0.17	0.18	0.20
40	44+00	Landside Toe	-0.25	-0.47	0.12	-0.59	-0.31	-0.40	-0.49	-	-0.52	-0.54
41	48+00	134 Landside	-0.43	-0.59	0.11	-0.59	-0.29	-0.52	-0.52	-	-0.47	-0.46

Table 2.5-93 (continued)

Monument Number	Location (ft) Station	Offset	12/02/80	01/08/81	02/06/81	03/06/81	04/03/81	05/08/81	06/05/81	07/10/81	08/05/81	09/04/81	10/02/81
42	52+00	134 Landside	0.48	0.64	0.64	0.78	0.67	0.89	0.67	0.83	0.68	-	1.20
43	56+00	134 Landside	0.40	0.56	0.60	0.71	0.62	0.85	0.64	0.79	0.60	-	1.13
44	60+00	134 Landside	0.25	0.22	0.25	0.25	0.16	0.35	0.13	0.29	-0.07	-	0.46
45	64+00	134 Landside	0.26	0.19	0.29	0.18	0.08	0.26	0.07	0.22	-0.18	-	0.40
46	68+00	134 Landside	0.28	0.11	0.19	0.19	0.08	0.26	0.11	0.19	-0.24	-	0.36
47	72+00	134 Landside	0.24	0.14	0.23	0.17	0.05	0.23	0.11	0.19	-0.31	-	0.31
48	76+00	134 Landside	0.29	0.18	0.16	0.15	0.00	0.22	0.10	0.16	-0.40	-	0.26
49	80+00	Landside Toe	0.16	-0.01	-0.01	-0.01	-0.22	-0.06	-0.13	-0.13	-0.71	-	-0.01
50	49+00	Landside Toe	-	0.00	0.01	0.06	0.08	0.11	0.11	0.10	0.12	-	0.10
51	52+00	Landside Toe	0.13	0.19	0.22	0.23	0.38	0.28	0.26	0.24	0.34	-	0.28
52	56+00	Landside Toe	-0.07	-0.02	-0.06	-0.06	0.11	0.05	-0.08	0.08	0.04	-	-0.06
53	60+00	Landside Toe	0.16	0.19	0.12	0.14	0.25	0.25	-0.02	-0.05	0.20	-	0.08
54	64+00	Landside Toe	0.16	0.20	0.11	0.14	0.22	0.26	0.08	0.06	0.28	-	0.13
55	68+00	Landside Toe	0.13	0.20	0.11	0.14	0.23	0.31	0.12	0.07	0.30	-	0.22
56	72+00	Landside Toe	0.20	0.23	0.16	0.18	0.24	0.35	0.14	0.13	0.30	-	0.23
57	76+00	Landside Toe	0.20	0.22	0.13	0.16	0.23	0.35	0.06	0.08	0.18	-	0.08
70	46+00	Landside Toe	-	-0.02	-0.04	0.10	-0.13	0.01	-0.32	-0.19	-0.38	-	0.0

Note: the date columns (12/02/80 to 10/02/81) sit under the spanning heading "Date of Survey and Cumulative Movement".

Table 2.5-93 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Cumulative Movement 11/06/81	12/04/81	01/20/82	02/12/82	03/09/82	04/13/82	05/16/82	06/16/82	07/09/82	08/05/82
42	52+00	134 Landside	1.19	1.10	1.85	1.24	1.49	1.37	1.36	-	1.49	1.51
43	56+00	134 Landside	1.16	1.08	1.84	1.21	1.43	1.27	1.22	-	1.38	1.37
44	60+00	134 Landside	0.47	0.35	1.13	0.44	0.72	0.70	0.56	-	0.71	0.77
45	64+00	134 Landside	0.35	0.28	0.91	0.31	0.26	0.44	0.35	-	0.40	0.44
46	68+00	134 Landside	0.31	0.28	0.92	0.25	0.70	0.50	0.44	-	0.52	0.55
47	72+00	134 Landside	0.26	0.23	0.90	0.26	0.53	0.42	0.36	-	0.35	0.36
48	76+00	134 Landside	0.25	0.25	0.85	0.30	0.50	0.44	0.42	-	0.47	0.47
49	80+00	Landside Toe	-0.07	-0.11	0.42	-0.18	0.04	0.01	-0.01	-	0.00	0.04
50	49+00	Landside Toe	0.07	0.06	0.08	0.11	0.08	0.11	0.14	0.14	0.13	0.16
51	52+00	Landside Toe	0.32	0.24	0.40	0.40	0.32	0.29	0.36	0.24	0.34	0.32
52	56+00	Landside Toe	-0.07	-0.11	0.10	0.14	-0.11	-0.04	-0.08	-0.30	-0.14	-0.16
53	60+00	Landside Toe	0.07	0.05	0.06	0.16	-0.06	-0.05	-0.05	-0.07	-0.20	-0.25
54	64+00	Landside Toe	0.13	0.14	0.14	0.24	0.06	0.04	-0.04	-0.22	-0.37	-0.40
55	68+00	Landside Toe	0.25	0.28	0.40	0.34	0.24	0.22	0.22	0.30	0.17	0.18
56	72+00	Landside Toe	0.25	0.28	0.34	0.30	0.23	0.22	0.18	0.34	0.25	0.24
57	76+00	Landside Toe	0.16	0.20	0.18	0.07	0.10	0.06	0.07	0.25	0.19	0.17
70	46+00	Landside Toe	-0.11	-0.35	0.34	-0.53	-0.23	-0.53	-0.55	-	-0.70	-0.71

WOLF CREEK

Table 2.5-94

HORIZONTAL MOVEMENT MONUMENT DATA
MAIN DAM

Monument Number	Location (ft)		Date of Survey and Cordinates									
			10/31/80		11/24/80		01/15/81		02/25/81		12/10/81	
	Station	Offset	North	East	North	East	North	East	North	East	North	East
1	2+00	10 Lakeside	86677.169	96638.293	86677.146	96638.284			86677.143	96638.278	86677.142	96638.282
2	4+00	10 Lakeside	86506.883	96743.954	86506.862	96743.994			86506.873	96743.929	86506.872	96743.936
3	6+00	10 Lakeside	86337.092	96848.954	86337.080	96848.946			86337.103	96848.934	86337.093	96848.940
4	8+00	10 Lakeside	86166.943	96953.074	86166.926	96953.064			86166.957	96953.068	86166.944	96953.065
5	10+00	10 Lakeside	85997.287	97059.225	85997.271	97059.208			85997.301	97059.212	85997.288	97059.202
6	12+00	10 Lakeside	85827.090	97164.580	85827.074	97164.555			85827.106	97164.564	85827.092	97164.548
7	14+00	10 Lakeside	85656.856	97270.144	85656.843	97270.113			85656.862	97270.111	85656.849	97270.103
8	16+00	10 Lakeside	85486.874	97374.939	85486.857	97374.918			85486.882	97374.900	85486.880	97374.894
9	18+00	10 Lakeside	85316.827	97480.359	85316.823	97480.359			85316.842	97480.331	85316.854	97480.334
10	20+00	10 Lakeside	85146.893	97586.028	85146.908	97586.053			85146.913	97586.020	85146.927	97586.019
11	34+00	10 Landside	83945.071	98305.553	83945.184	98305.482	83945.229	98305.424	83945.148	98305.502	83945.188	98305.472
12	36+00	10 Landside	83794.547	98440.816	83794.688	98440.686	83794.708	98440.677	83794.650	98440.729	83794.688	98440.699
13	38+00	14 Landside	83704.228	98622.204	83704.346	98622.110	83704.396	98622.077	83704.311	98622.159	83704.349	98622.114
14	40+00	14 Landside	83646.380	98814.111	83646.507	98814.001	83646.554	98813.991	83646.472	98814.038	83646.508	98813.998
15	42+00	14 Landside	83589.112	99005.306	83589.250	99005.195	83589.300	99005.180	83589.221	99005.245	83589.219	99005.178
16	44+00	14 Landside	83531.002	99197.277	83531.157	99197.154	83531.202	99197.140	83531.140	99197.210	83531.126	99197.130
17	46+00	14 Landside	83473.224	99388.477	83473.384	99388.333	83473.422	99388.325	83473.401	99388.318	83473.351	99388.323
18	48+00	14 Landside	83416.160	99579.954	Destroyed	-	83416.187	99579.861	83416.171	99579.851	83416.089	99579.849
19	50+00	14 Landside	83357.919	99771.535	83358.056	99771.391	83358.109	99771.379	83358.098	99771.382	83358.037	99771.397

Note: Coordinates refer to SNUPPS reference grid.

See WCNOC-55 for Subsequent years

Table 2.5-94 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Cordinates 06/16/82 North	East	07/09/82 North	East
1	2+00	10 Lakeside	86677.067	96638.286	-----	-----
2	4+00	10 Lakeside	86506.810	96743.933	-----	-----
3	6+00	10 Lakeside	86337.051	96848.927	-----	-----
4	8+00	10 Lakeside	86166.899	96953.066	-----	-----
5	10+00	10 Lakeside	85997.253	97059.210	-----	-----
6	12+00	10 Lakeside	85827.082	97164.572	-----	-----
7	14+00	10 Lakeside	85656.852	97270.118	-----	-----
8	16+00	10 Lakeside	85486.889	97374.907	-----	-----
9	18+00	10 Lakeside	85316.883	97480.322	-----	-----
10	20+00	10 Lakeside	85146.962	97585.988	-----	-----
11	34+00	10 Landside	83945.197	98305.522	-----	-----
12	36+00	10 Landside	83794.691	98440.733	-----	-----
13	38+00	14 Landside	83704.357	98622.157	-----	-----
14	40+00	14 Landside	83646.513	98814.044	-----	-----
15	42+00	14 Landside	83589.213	99005.203	-----	-----
16	44+00	14 Landside	83531.117	99197.163	-----	-----
17	46+00	14 Landside	83473.344	99388.345	-----	-----
18	48+00	14 Landside	83416.070	99579.871	-----	-----
19	50+00	14 Landside	83358.017	99771.410	-----	-----

Note: Coordinates refer to SNUPPS reference grid.

Table 2.5-94 (continued)

Monument Number	Location (ft)		Date of Survey and Cordinates									
			10/31/80		11/24/80		01/15/81		02/25/81		12/10/81	
	Station	Offset	North	East	North	East	North	East	North	East	North	East
20	52+00	14 Landside	83300.779	99963.105	83300.907	99962.950	83300.956	99962.950	83300.950	99962.950	83300.897	99962.943
21	54+00	14 Landside	83242.865	100154.536	83242.982	100154.350	83243.014	100154.368	83243.019	100154.357	83242.998	100154.347
22	56+00	14 Landside	83188.191	100348.050	83188.191	100348.008	83188.213	100348.037	83188.220	100348.017	83188.209	100347.980
23	58+00	14 Landside	83183.020	100550.729	83183.249	100550.593	83183.107	100550.557	83183.004	100550.651	83183.064	100550.608
24	60+00	14 Landside	83190.896	100750.894	83191.130	100750.742	83190.967	100750.701	83190.867	100750.787	83190.926	100750.752
25	62+00	14 Landside	83199.588	100950.464	83199.826	100950.312	83199.662	100950.274	83199.556	100950.353	83199.589	100950.323
26	64+00	14 Landside	83207.848	101150.097	83208.090	101149.960	83207.925	101149.911	83207.823	101150.001	83207.839	101149.981
27	66+00	14 Landside	83216.127	101349.906	83216.372	101349.766	83216.212	101349.753	83216.118	101349.804	83216.112	101349.793
28	68+00	14 Landside	83225.237	101549.621	83225.462	101549.492	83225.318	101549.471	83225.238	101549.524	83225.213	101549.536
29	70+00	14 Landside	83233.416	101749.557	83233.594	101749.452	83233.469	101749.414	83233.404	101749.458	83233.377	101749.485
30	72+00	14 Landside	83241.871	101948.583	83242.007	101948.491	83241.906	101948.471	83241.852	101948.476	83241.821	101948.506
31	74+00	14 Landside	83249.778	102149.227	83249.874	102149.144	83249.797	102149.139	83249.758	102149.114	83249.716	102149.164
32	76+00	14 Landside	83258.253	102348.472	83258.293	102348.382	83258.239	102348.378	83258.223	102348.349	83258.172	102348.391
33	78+00	14 Landside	83267.225	102548.731	83267.257	102548.729	83267.221	102548.725	83267.232	102548.671	83267.194	102548.731
34	80+00	14 Landside	83274.681	102748.425	83274.677	102748.408	83274.654	102748.402	83274.887	102748.344	83274.641	102748.428
35	82+00	14 Landside	83283.250	102948.372	83283.205	102948.355	83283.208	102948.347	83283.248	102948.285	83283.209	102948.368
36	84+00	14 Landside	83291.767	103147.942	83291.688	103147.914	83291.716	103147.911	83291.763	103147.850	83291.741	103147.928
37	86+00	10 Landside	83304.566	103347.536	83304.462	103347.494	83304.511	103347.489	83304.560	103347.434	83304.535	103347.512
38	88+00	10 Landside	83312.459	103548.052	83312.338	103548.004	83312.421	103548.001	83312.463	103547.944	83312.444	103548.014
39	90+00	10 Landside	83320.619	103747.113	83320.476	103747.055	83320.595	103747.066	83320.627	103746.990	83320.610	103747.059
40	44+00	Landside Toe	83412.220	99167.878	83412.141	99167.837	83412.146	99167.837	83412.130	99167.825	83412.133	99167.819
41	48+00	134 Landside	83300.883	99545.244	83300.823	99545.553	83300.820	99545.543	83300.800	99545.536	83300.815	99545.529

Table 2.5-94 (continued)

Monument Number	Location (ft)		Date of Survey and Cordinates			
			06/16/82		07/09/82	
	Station	Offset	North	East	North	East
20	52+00	14 Landside	83300.881	99962.945	-----	-----
21	54+00	14 Landside	83242.986	100154.345	-----	-----
22	56+00	14 Landside	83188.192	100347.980	-----	-----
23	58+00	14 Landside	-----	-----	83183.176	100550.706
24	60+00	14 Landside	-----	-----	83191.020	100750.843
25	62+00	14 Landside	-----	-----	83199.680	100950.386
26	64+00	14 Landside	-----	-----	83207.921	101150.020
27	66+00	14 Landside	-----	-----	83216.187	101349.814
28	68+00	14 Landside	-----	-----	83225.279	101549.525
29	70+00	14 Landside	-----	-----	83233.427	101749.466
30	72+00	14 Landside	-----	-----	83241.847	101948.450
31	74+00	14 Landside	-----	-----	83249.708	102149.099
32	76+00	14 Landside	-----	-----	83258.137	102348.311
33	78+00	14 Landside	-----	-----	83267.144	102548.643
34	80+00	14 Landside	-----	-----	83274.564	102748.334
35	82+00	14 Landside	-----	-----	83283.118	102948.276
36	84+00	14 Landside	-----	-----	83291.647	103147.828
37	86+00	10 Landside	-----	-----	83304.421	103347.410
38	88+00	10 Landside	-----	-----	83312.321	103547.909
39	90+00	10 Landside	-----	-----	83320.479	103746.942
40	44+00	Landside Toe	-----	-----	83412.077	99167.819
41	48+00	134 Landside	-----	-----	83300.804	99545.534

Table 2.5-94 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Cordinates 10/31/80 North	East	11/24/80 North	East	01/15/81 North	East	02/25/81 North	East	12/10/81 North	East
42	52+00	134 Landside	83185.085	99928.482	83185.046	99928.457	83185.032	99928.456	83185.009	99928.446	83185.010	99928.450
43	56+00	134 Landside	83069.344	100326.265	83069.308	100326.246	83069.298	100326.258	83069.273	100326.223	83069.276	100326.228
44	60+00	134 Landside	83070.945	100754.401	83070.887	100754.400	83070.868	100754.396	83070.893	100754.466	83070.874	100754.429
45	64+00	134 Landside	83088.102	101155.691	83088.067	101155.681	83088.049	101155.683	83088.064	101155.741	83088.051	101155.703
46	68+00	134 Landside	83104.586	101554.745	83104.577	101554.728	83104.566	101554.724	83104.572	101554.773	83104.527	101554.764
47	72+00	134 Landside	83121.107	101954.939	83121.121	101954.944	83121.117	101954.928	83121.109	101954.967	83121.087	101954.962
48	76+00	134 Landside	83138.103	102354.097	83138.125	102354.109	83138.124	102354.084	83138.102	102354.113	83138.083	102354.106
49	80+00	Landside Toe	83159.566	102753.230	83159.594	102753.250	83159.599	102753.240	83159.566	102753.252	83159.573	102753.243
50	49+00	Landside Toe	-	-	83208.206	99622.462[a]	83208.209	99622.474	83208.196	99622.464	83208.214	99622.468
51	52+00	Landside Toe	83084.508	99898.621	83084.494	99898.595	83084.491	99898.603	83084.489	99898.579	83084.513	99898.588
52	56+00	Landside Toe	82936.055	100306.702	82936.604	100306.716	82936.057	100306.734	82936.057	100306.676	82936.067	100306.695
53	60+00	Landside Toe	82924.836	100759.410	82924.788	100759.403	82924.829	100759.378	82924.797	99759.428	82924.802	100759.364
54	64+00	Landside Toe	82950.384	101160.864	82950.352	101160.855	82950.378	101160.849	82950.355	101160.888	82950.351	101160.810
55	68+00	Landside Toe	82987.203	101560.467	82987.184	101560.468	82987.195	101560.466	82987.180	101560.486	82987.188	101560.432
56	72+00	Landside Toe	83025.208	101958.596	83025.214	101958.614	83025.217	101958.603	83025.206	101958.623	83025.206	101958.587
57	76+00	Landside Toe	83066.380	102357.043	83066.392	102357.076	83066.390	102357.062	83066.370	102357.072	83066.360	102357.049
70	46+00	Landside Toe	-	-	83340.754	99348.821[a]	83340.754	99348.796	83340.734	99348.814	83340.739	99348.803

[a]Date of survey was 12/05/80.

Table 2.5-94 (continued)

Monument Number	Location (ft) Station	Offset	Date of Survey and Cordinates 06/16/82 North	East	07/09/82 North	East
42	52+00	134 Landside	-----	-----	83185.007	99928.449
43	56+00	134 Landside	-----	-----	83069.240	100326.210
44	60+00	134 Landside	83070.890	100754.449	-----	-----
45	64+00	134 Landside	83088.063	101155.724	-----	-----
46	68+00	134 Landside	83104.537	101554.778	-----	-----
47	72+00	134 Landside	83121.083	101954.967	-----	-----
48	76+00	134 Lnadside	83138.084	102354.103	-----	-----
49	80+00	Landside Toe	83159.567	102753.247	83159.563	102753.259
50	49+00	Landside Toe	83208.173	99622.444	-----	-----
51	52+00	Landside Toe	83084.508	99898.547	-----	-----
52	56+00	Landside Toe	82936.102	100306.665	-----	-----
53	60+00	Landside Toe	-----	-----	82924.813	100759.455
54	64+00	Landside Toe	-----	-----	82950.355	101160.888
55	68+00	Landside Toe	-----	-----	82987.202	101560.485
56	72+00	Landside Toe	-----	-----	83025.216	101958.619
57	76+00	Landside Toe	-----	-----	83066.362	102357.062
70	46+00	Landside Toe	83340.661	99348.777	-----	-----

[a]Date of survey wa 12/05/80

Table 2.5-95

HORIZONTAL MOVEMENT
MAIN DAM

Monument Number	Location (ft) Station	Offset	11/24/80 South	11/24/80 West	01/15/81 South	01/15/81 West	02/05/81 South	02/05/81 West	12/10/81 South	12/10/81 West	06/16/82 South	06/16/82 West	07/09/82 South	07/09/82 West
1	2+00	10 Lakeside	0.28	0.11	-	-	0.31	0.18	0.32	0.13	1.22	0.08	-	-
2	4+00	10 Lakeside	0.25	-0.48	-	-	0.12	0.30	0.13	0.22	0.88	0.25	-	-
3	6+00	10 Lakeside	0.14	0.10	-	-	-0.13	0.24	-0.01	0.12	0.49	0.32	-	-
4	8+00	10 Lakeside	0.20	0.12	-	-	-0.17	0.07	-0.01	0.11	0.59	0.10	-	-
5	10+00	10 Lakeside	0.19	0.20	-	-	-0.17	0.16	-0.01	0.28	0.41	0.18	-	-
6	12+00	10 Lakeside	0.19	0.30	-	-	-0.19	0.19	-0.02	0.38	0.10	0.10	-	-
7	14+00	10 Lakeside	0.16	0.37	-	-	-0.07	0.40	0.08	0.49	0.05	0.31	-	-
8	16+00	10 Lakeside	0.20	0.25	-	-	-0.10	0.47	-0.07	0.54	-0.18	0.38	-	-
9	18+00	10 Lakeside	0.05	0.0	-	-	-0.18	0.34	-0.32	0.30	-0.67	0.44	-	-
10	20+00	10 Lakeside	-0.18	-0.30	-	-	-0.24	0.10	-0.41	0.11	-0.83	0.48	-	-
11	34+00	10 Landside	-1.36	0.85	-1.90	1.55	-0.92	0.61	-1.40	0.97	-1.51	0.37	-	-
12	36+00	10 Landside	-1.69	1.56	-1.93	1.67	-1.24	1.04	-1.69	1.40	-1.73	1.00	-	-
13	38+00	14 Landside	-1.42	1.13	-2.02	1.52	-1.00	0.54	-1.45	1.08	-1.55	0.56	-	-
14	40+00	14 Landside	-1.52	1.32	-2.09	1.44	-1.10	0.88	-1.54	1.36	-1.60	0.80	-	-
15	42+00	14 Landside	-1.66	1.33	-2.26	1.51	-1.31	0.73	-1.28	1.54	-1.21	1.24	-	-
16	44+00	14 Landside	-1.86	1.48	-2.40	1.63	-1.66	0.80	-1.49	1.76	-1.38	1.37	-	-
17	46+00	14 Landside	-1.92	1.73	-2.38	1.82	-2.12	1.91	-1.52	1.85	-1.44	1.58	-	-
18	48+00	14 Landside	-	-	-0.32	1.12	-0.13	1.24	0.85	1.26	1.08	1.00	-	-
19	50+00	14 Landside	-1.64	1.73	-2.28	1.87	-2.15	1.84	-1.42	1.66	-1.18	1.50	-	-

Date of Survey and Cumulative Movement

Notes: + indicates movement towards south or west.
- indicates movement towards north or east.

All movements are in inches.

See WCNOC-55 for Subsequent years

Table 2.5-95 (continued)

Monument Number	Location (ft)		Date of Survey and Cumulative Movement											
			11/24/80		01/15/81		02/05/81		12/10/81		06/16/82		07/09/82	
	Station	Offset	South	West	South	West	South	West	South	West	South	West	South	West
20	52+00	14 Landside	-1.54	1.86	-2.12	1.86	-2.05	1.86	-1.42	1.94	-1.22	1.92	-	-
21	54+00	14 Landside	-1.40	2.23	-1.79	2.02	-1.85	2.15	-1.60	2.27	-1.45	2.29	-	-
22	56+00	14 Landside	0.0	0.50	-0.26	0.16	-0.35	0.40	-0.22	0.84	-0.01	0.84	-	-
23	58+00	14 Landside	-2.75	1.63	-1.04	2.06	0.19	0.94	-0.53	1.45	-	-	-1.87	0.28
24	60+00	14 Landside	-2.81	1.82	-0.85	2.32	0.35	1.28	-0.36	1.70	-	-	-1.49	0.61
25	62+00	14 Landside	-2.86	1.82	-0.89	2.28	0.38	1.33	-0.01	1.70	-	-	-1.10	0.94
26	64+00	14 Landside	-2.90	1.64	-0.92	2.23	0.30	1.15	0.11	1.39	-	-	-0.88	0.92
27	66+00	14 Landside	-2.94	1.68	-1.02	1.84	0.11	1.22	0.18	1.36	-	-	-0.72	1.10
28	68+00	14 Landside	-2.70	1.55	-0.97	1.80	-0.01	1.16	0.29	1.02	-	-	-0.50	1.15
29	70+00	14 Landside	-2.14	1.26	-0.64	1.72	0.14	1.19	0.47	0.86	-	-	-0.13	1.09
30	72+00	14 Landside	-1.63	1.10	-0.42	1.34	0.23	1.28	0.60	0.92	-	-	0.29	1.60
31	74+00	14 Landside	-1.15	1.00	-0.23	1.06	0.24	1.36	0.74	0.76	-	-	0.84	1.54
32	76+00	14 Landside	-0.48	1.08	0.17	1.13	0.36	1.48	0.97	0.97	-	-	1.39	1.93
33	78+00	14 Landside	-0.38	0.02	0.05	0.07	-0.08	0.72	0.37	0.0	-	-	0.97	1.06
34	80+00	14 Landside	0.05	0.20	0.32	0.28	-2.47	0.97	0.48	-0.04	-	-	1.40	1.09
35	82+00	14 Landside	0.54	0.20	0.24	0.30	0.02	1.04	0.49	0.05	-	-	1.58	1.15
36	84+00	14 Landside	0.95	0.34	0.61	0.37	0.05	1.10	0.31	0.17	-	-	1.44	1.37
37	86+00	10 Landside	1.25	0.50	0.66	0.56	0.07	1.22	0.37	0.29	-	-	1.74	1.51
38	88+00	10 Landside	1.45	0.58	0.47	0.61	-0.05	1.30	0.18	0.46	-	-	1.66	1.72
39	90+00	10 Landside	1.72	0.70	0.29	0.56	-0.10	1.48	0.11	0.65	-	-	1.68	2.05
40	44+00	Landside Toe	0.95	0.49	0.89	0.49	0.11	0.64	1.04	0.71	-	-	1.72	0.71
41	48+00	134 Landside	0.72	-3.71	0.76	-3.59	1.0	-3.50	0.82	-3.42	-	-	0.95	-3.48

Table 2.5-95 (continued)

Monument Number	Location (ft) Station	Offset	11/24/80 South	11/24/80 West	01/15/81 South	01/15/81 West	02/05/81 South	02/05/81 West	12/10/81 South	12/10/81 West	06/16/82 South	06/16/82 West	07/09/82 South	07/09/82 West
42	52+00	134 Landside	0.47	0.30	0.64	0.31	0.91	0.43	0.9	0.38	-	-	0.94	0.40
43	56+00	134 Landside	0.43	0.23	0.55	0.08	0.85	0.50	0.82	0.44	-	-	1.25	0.66
44	60+00	134 Landside	0.70	0.01	0.92	0.06	0.62	-0.78	0.85	-0.34	0.66	-0.58	-	-
45	64+00	134 Landside	0.42	0.12	0.64	0.10	0.46	-0.60	0.61	-0.14	0.47	-0.40	-	-
46	68+00	134 Landside	0.11	0.20	0.24	0.25	0.17	-0.34	0.71	-0.23	0.59	-0.40	-	-
47	72+00	134 Landside	-0.17	-0.06	-0.12	0.13	-0.02	-0.34	0.24	-0.28	0.29	-0.34	-	-
48	76+00	134 Landside	-0.26	-0.14	-0.25	0.16	0.01	-0.19	0.24	-0.11	0.23	-0.07	-	-
49	80+00	Landside Toe	-0.34	-0.24	-0.40	-0.12	0.0	-0.26	-0.08	-0.16	-0.01	-0.20	0.04	-0.35
50	49+00	Landside Toe	-	-	-0.04	-0.14	0.12	-0.02	-0.10	-0.07	0.40	0.22	-	-
51	52+00	Landside Toe	0.17	0.31	0.20	0.22	0.23	-0.50	-0.06	0.40	0.00	0.89	-	-
52	56+00	Landside Toe	-6.59	-0.17	-0.02	-0.38	-0.02	0.31	-0.14	0.08	-0.56	0.44	-	-
53	60+00	Landside Toe	0.58	0.08	0.08	0.38	0.47	-0.22	0.41	0.55	-	-	0.28	-0.54
54	64+00	Landside Toe	0.38	0.11	0.07	0.18	0.35	-0.29	0.40	0.65	-	-	0.35	-0.29
55	68+00	Landside Toe	0.23	-0.01	0.10	0.01	0.28	-0.23	0.18	0.42	-	-	0.01	-0.22
56	72+00	Landside Toe	-0.07	-0.22	-0.11	-0.08	0.02	-0.32	0.02	0.11	-	-	-0.10	-0.28
57	76+00	Landside Toe	-0.14	-0.40	-0.12	-0.23	0.12	-0.35	0.24	-0.07	-	-	0.22	-0.23
70	46+00	Landside Toe	-	-	0.0	0.30	0.24	0.08	0.18	0.22	1.12	0.53	-	-

Table 2.5-96

PIEZOMETER WATER LEVEL ELEVATIONS
MAIN DAM

Number	Location (ft) Station	Offset[a]	Screen Interval	Date of Survey 11/26/80	12/05/80	12/12/80	12/19/80	01/02/81	01/09/81	02/06/81	03/05/81	04/02/81	05/06/81
1	12+60	10 LK	1958.3 - 1964.2	1968.22	1967.40	1966.79	1966.17	1965.61	1965.37	1964.66	1964.34	1963.92	1963.48
2	12+60	10 LD	1959.8 - 1966.3	1973.52	1972.00	1970.53	1969.58	1967.65	1966.97	1965.20	1964.07	1963.75	1962.31
3	12+60	40 LD	1957.8 - 1962.9	1962.71	1962.61	1962.24	1961.91	1961.89	1961.84	1961.60	1961.63	1961.36	1960.73
4	12+60	130 LD	1955.5 - 1960.6	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
5	36+50	40 LD	1958.1 - 1963.6	1974.29	1973.66	1973.16	1972.53	1971.99	1971.55	1970.05	1968.88	1967.88	1967.38
6	36+75	40 LD	1953.2 - 1958.2	1966.75	1965.61	1964.79	1964.21	1963.50	1963.23	1962.18	1961.27	1960.61	1959.98
7	41+60	40 LD	1937.5 - 1944.5	1950.97	1951.00	1950.85	1950.63	1950.60	1950.45	1949.97	1950.40	1950.55	1951.62
8	47+00	14 LK	1947.0 - 1952.5	1950.48	1950.51	1950.14	Dry	1949.64	Dry	1949.02	1949.85	1952.23	1954.65
9	47+00	14 LD	1947.0 - 1952.0	1950.06	1950.39	1950.27	Dry	1950.13	1949.97	1949.95	1950.12	1949.82	Dry
10	47+00	39 LD	1946.7 - 1952.7	1954.42	1954.61	1954.37	1953.70	1954.03	1953.92	1953.64	1953.62	1953.42	1953.11
11	47+00	173 LD	1943.7 - 1949.2	1946.19	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
12	49+00	40 LD	1925.7 - 1929.7	1933.60	1933.30	1932.83	1931.98	1931.75	1931.44	1930.35	1929.99	1929.88	1930.17
13	51+00	75 LD	1910.0 - 1915.5	1943.79	1943.21	1942.79	1942.19	1941.37	1941.01	1939.55	1933.33	1937.51	1936.50
14	52+50	14 LK	1924.5 - 1930.6	1940.56	1938.32	1937.03	1935.68	1935.13	1934.68	1934.07	1934.03	1946.87	1936.52
15	52+50	14 LD	1925.2 - 1931.4	1993.21	1970.69	1965.26	1962.05	1958.67	1957.65	1955.60	1954.61	1954.12	1953.36
16	52+50	74 LD	1925.0 - 1930.0	1927.21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
17	52+50	338 LD	1919.9 - 1925.0	1923.59	1922.60	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
18	59+00	14 LK	1917.0 - 1922.3	1929.81	1920.11	1919.80	1920.05	1919.49	1919.35	Dry	Dry	Dry	Dry
19	59+00	14 LD	1916.6 - 1921.8	1935.82	1922.93	1921.25	1920.45	1920.67	1920.13	1919.65	1918.96	Dry	1917.99

Note: Elevations refer to SNUPPS reference datum.

[a]LK-Lakeside, LD-Landside.

See WCNOC-55 for Subsequent years

WOLF CREEK

Table 2.5-96 (continued)

Sheet 2 of 10

Number	Location (ft) Station	Location (ft) Offset[a]	Screen Interval	Date of Survey 06/01/81	07/01/81	08/04/81	09/10/81	10/05/81	11/06/81	12/02/81	01/04/82	02/10/82	03/03/82
1	12+60	10 LK	1958.3 - 1964.2	1964.48	1963.38	1962.40	Dry	1961.74	1961.47	1961.47	1960.84	1960.50	Dry
2	12+60	10 LD	1959.8 - 1966.3	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
3	12+60	40 LD	1957.8 - 1962.9	1960.83	1961.19	Dry	Dry	1960.08	1960.03	1960.88	1960.72	1960.00	Dry
4	12+60	130 LD	1955.5 - 1960.6	Dry	1957.30	Dry	Dry	1957.07	1959.49	1959.79	1957.92	Dry	Dry
5	36+50	40 LD	1958.1 - 1963.6	1967.99	1967.99	1968.21	Dry	1969.88	1970.42	1970.64	1968.50	1968.78	1967.57
6	36+75	40 LD	1953.2 - 1958.2	1960.08	1952.08	1959.25	Dry	1959.84	1960.01	1961.22	1962.00	1961.97	1962.56
7	41+60	40 LD	1937.5 - 1944.5	Dry	Dry	1957.72	1961.51	1964.56	1967.86	1970.03	1970.62	1971.02	1972.13
8	47+00	14 LK	1947.0 - 1952.5	1956.24	1959.44	1964.63	1967.44	1970.19	1973.19	1975.63	1975.80	1975.98	1976.69
9	47+00	14 LD	1947.0 - 1952.0	1949.51	1952.01	1949.18	1950.77	1953.90	1959.03	1963.15	1965.32	1965.25	1966.26
10	47+00	39 LD	1946.7 - 1952.7	1953.12	1953.22	1952.28	1952.85	1953.61	1955.69	1960.07	1963.08	1963.56	1965.27
11	47+00	173 LD	1943.7 - 1949.2	1949.91	Dry	Dry	Dry	1945.87	1949.68	1948.76	Dry	1948.03	1950.29
12	49+00	40 LD	1925.7 - 1929.7	1930.99	1931.49	1932.90	1933.91	1934.68	1934.98	1934.79	1933.39	1932.39	1932.13
13	51+00	75 LD	1910.0 - 1915.5	1936.11	1936.01	1934.38	1934.50	1934.30	1933.78	1933.99	1933.57	1933.00	1932.83
14	52+50	14 LK	1924.5 - 1930.6	1936.23	1935.73	1934.15	1934.72	1934.41	1933.81	1934.07	1933.36	1933.28	1933.33
15	52+50	14 LD	1925.2 - 1931.4	1952.97	1952.67	1951.74	1951.06	1950.77	1949.94	1949.70	1949.12	1948.42	1948.07
16	52+50	74 LD	1925.0 - 1930.0	Dry	Dry	1934.32	1947.65	1930.52	1953.72	1951.94	1932.23	1946.97	1936.10
17	52+50	338 LD	1919.9 - 1925.0	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
18	59+00	14 LK	1917.0 - 1922.3	Dry	1918.68	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
19	59+00	14 LD	1916.6 - 1921.8	Dry	1918.23	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Table 2.5-96 (continued)

Number	Location (ft) Station	Offset[a]	Screen Interval	Date of Survey 04/01/82	05/05/82	06/01/82	07/02/82	08/02/82	09/03/82	10/07/82	11/08/82	12/01/82
1	12+60	10 LK	1958.3 - 1964.2	Dry	1960.88	1961.18	1961.08	1961.70	1952.04	1952.70	1952.86	1954.53
2	12+60	10 LD	1959.8 - 1966.3	Dry	Dry	Dry	Dry	Dry	Dry	Dry	1950.63	1952.05
3	12+60	40 LD	1957.8 - 1962.9	Dry	1960.29	1961.08	1961.08	1961.11	1963.02	1963.35	1963.51	1964.59
4	12+60	130 LD	1955.5 - 1960.6	1957.47	1956.96	1960.20	1958.65	1957.12	Dry	Dry	1995.76	1998.68
5	36+50	40 LD	1958.1 - 1963.6	1967.06	1966.75	1967.59	1969.34	1971.98	1985.41	Dry	1989.49	1989.99
6	36+75	40 LD	1953.2 - 1958.2	1962.85	1963.27	1965.23	1966.83	1968.58	1973.22	1973.63	Dry	1974.54
7	41+60	40 LD	1937.5 - 1944.5	1972.10	1974.20	1976.74	1977.59	1978.03	1936.20	1935.95	1935.35	1935.94
8	47+00	14 LK	1947.0 - 1952.5	1977.28	1979.12	1982.51	1983.66	1983.89	1977.35	1977.34	1976.59	1977.01
9	47+00	14 LD	1947.0 - 1952.0	1966.75	1967.48	1969.03	1970.73	1971.43	1950.08	1950.25	1949.89	1950.80
10	47+00	39 LD	1946.7 - 1952.7	1965.55	1965.70	1967.78	1968.73	1969.75	1976.78	1976.77	1976.62	1977.58
11	47+00	173 LD	1943.7 - 1949.2	1947.97	1947.29	1949.58	1948.28	1947.07	1996.78	1995.86	1997.57	1999.74
12	49+00	40 LD	1925.7 - 1929.7	1933.31	1934.04	1935.38	1936.98	1937.93	1924.94	1925.69	1925.24	1925.49
13	51+00	75 LD	1910.0 - 1915.5	1933.22	1933.14	1933.88	1933.38	1933.18	1883.25	1884.51	1883.41	Dry
14	52+50	14 LK	1924.5 - 1930.6	1938.82	1935.27	1933.93	1932.86	1932.28	1933.45	1934.03	1933.68	Dry
15	52+50	14 LD	1925.2 - 1931.4	1947.75	1947.11	1946.84	1946.29	1946.19	1949.73	Dry	1943.97	Dry
16	52+50	74 LD	1925.0 - 1930.0	1938.78	1926.70	1967.63	1934.13	1936.52	1931.95	1930.52	1928.74	Dry
17	52+50	338 LD	1919.9 - 1925.0	Dry	Dry	1920.97	Dry	Dry	Dry	Dry	Dry	Dry
18	59+00	14 LK	1917.0 - 1922.3	Dry	Dry	1918.35	Dry	Dry	1838.31	Dry	Dry	Dry
19	59+00	14 LD	1916.6 - 1921.8	Dry	Dry	1917.80	Dry	Dry	Dry	Dry	Dry	Dry

Table 2.5-96 (continued)

	Location (ft)		Screen	Date of Survey								
Number	Station	Offset[a]	Interval	01/05/83	02/07/83	03/01/83	05/12/83	06/02/83	08/03/83	10/04/83	12/07/83	01/06/84
1	12+60	10 LK	1958.3 - 1964.2	1954.75	1955.68	1955.85	1967.48	1967.89	1968.18	1969.10	1969.68	Dry
2	12+60	10 LD	1959.8 - 1966.3	1952.81	1954.77	1954.89	1967.82	1968.34	1968.83	1969.10	1969.73	1966.33
3	12+60	40 LD	1957.8 - 1962.9	1966.25	1967.34	1967.30	1966.28	1966.90	1967.00	1967.98	1969.39	1968.89
4	12+60	130 LD	1955.5 - 1960.6	1998.48	1998.77	1997.39	1958.11	1958.58	1957.00	Dry	1959.97	1959.76
5	36+50	40 LD	1958.1 - 1963.6	1989.08	1988.32	1986.69	1974.15	1974.43	1977.57	1982.12	1982.56	1981.06
6	36+75	40 LD	1953.2 - 1958.2	1976.28	1976.71	1976.54	1973.24	1973.83	1973.17	1973.05	1975.56	1975.05
7	41+60	40 LD	1937.5 - 1944.5	1936.69	1936.35	1936.27	1978.72	1979.00	1977.97	1977.19	1977.41	1975.62
8	47+00	14 LK	1947.0 - 1952.5	1977.18	1976.98	1977.28	1984.78	1984.97	1984.20	1983.04	1983.00	1982.96
9	47+00	14 LD	1947.0 - 1952.0	1950.91	1950.97	1950.72	1972.47	1972.57	1972.78	1972.47	1972.98	1968.75
10	47+00	39 LD	1946.7 - 1952.7	1998.24	1978.40	1978.40	1971.63	1971.71	1970.52	1970.54	1972.23	1971.09
11	47+00	173 LD	1943.7 - 1949.2	2000.57	Dry	1999.55	1948.98	1948.58	1945.38	Dry	1947.01	1949.80
12	49+00	40 LD	1925.7 - 1929.7	1924.48	1923.81	1923.48	1938.58	1939.05	1940.32	1940.76	1940.28	1937.33
13	51+00	75 LD	1910.0 - 1915.5	1883.92	1883.74	1883.49	1933.37	1933.53	1931.63	1933.70	1933.97	1933.42
14	52+50	14 LK	1924.5 - 1930.6	1935.73	1936.08	1936.78	1936.03	1936.81	1937.21	1940.25	1946.42	1944.17
15	52+50	14 LD	1925.2 - 1931.4	1943.55	1943.61	1943.11	1933.89	1943.71	1942.91	1938.53	1941.53	1940.11
16	52+50	74 LD	1925.0 - 1930.0	1944.38	1948.65	1950.86	1944.48	1948.19	1935.19	1926.82	1947.62	1978.60
17	52+50	338 LD	1919.9 - 1925.0	1963.92	Dry	Dry	1921.01	Dry	Dry	Dry	Dry	Dry
18	59+00	14 LK	1917.0 - 1922.3	1836.45	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
19	59+00	14 LD	1916.6 - 1921.8	1918.21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Table 2.5-96 (continued)

	Location (ft)		Screen	Date of Survey		
Number	Station	Offset[a]	Interval	02/03/84	03/06/84	04/03/84
1	12+60	10 LK	1958.3 - 1964.2	1970.29	1970.19	1970.23
2	12+60	10 LD	1959.8 - 1966.3	1970.33	1970.23	1969.83
3	12+60	40 LD	1957.8 - 1962.9	1969.19	1968.59	1969.30
4	12+60	130 LD	1955.5 - 1960.6	1959.46	1959.96	1960.51
5	36+50	40 LD	1958.1 - 1963.6	1978.76	1976.46	1975.85
6	36+75	40 LD	1953.2 - 1958.2	1974.65	1973.85	1974.55
7	41+60	40 LD	1937.5 - 1944.5	1977.62	1977.72	1978.52
8	47+00	14 LK	1947.0 - 1952.5	1983.06	1983.06	1984.21
9	47+00	14 LD	1947.0 - 1952.0	1973.25	1972.75	1973.08
10	47+00	39 LD	1946.7 - 1952.7	1974.69	1974.89	1975.61
11	47+00	173 LD	1943.7 - 1949.2	Dry	1949.80	1950.60
12	49+00	40 LD	1925.7 - 1929.7	1936.83	1937.03	1937.54
13	51+00	75 LD	1910.0 - 1915.5	1933.82	1932.92	1933.41
14	52+50	14 LK	1924.5 - 1930.6	1943.67	1943.97	1944.16
15	52+50	14 LD	1925.2 - 1931.4	1940.31	1939.11	1940.18
16	52+50	74 LD	1925.0 - 1930.0	1951.70	1970.80	1978.16
17	52+50	338 LD	1919.9 - 1925.0	Dry	Dry	Dry
18	59+00	14 LK	1917.0 - 1922.3	Dry	Dry	Dry
19	59+00	14 LD	1916.6 - 1921.8	Dry	Dry	Dry

Table 2.5-96 (continued)

Number	Location (ft) Station	Offset[a]	Screen Interval	Date of Survey 11/26/80	12/05/80	12/12/80	12/19/80	01/02/81	01/09/81	02/06/81	03/05/81	04/02/81	05/06/81
20	59+00	75 LD	1894.6 - 1901.1	1898.55	1898.94	1898.88	1898.41	1898.95	1898.97	1899.42	1900.10	1900.96	1901.90
21	59+00	80 LD	1916.4 - 1921.9	1934.65	1925.92	1922.44	1920.24	1919.07	1918.93	Dry	Dry	Dry	1918.13
22	59+00	270 LD	1911.4 - 1916.6	1914.26	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
23	75+50	14 LK	1931.9 - 1937.1	1950.14	1946.21	1944.47	1945.17	1944.86	1943.48	1939.63	137.81	1937.09	1936.82
24	75+50	14 LD	1932.1 - 1937.0	1986.83	1964.56	1958.93	1955.44	1951.63	1950.37	1947.48	1945.89	1944.68	1945.55
25	75+50	64 LD	1929.5 - 1936.0	1936.92	1935.63	1934.59	Dry	Dry	Dry	Dry	Dry	Dry	Dry
26	75+50	213 LD	1930.3 - 1935.4	1935.70	1934.46	1933.85	1933.47	1932.93	1932.66	1932.09	Dry	Dry	Dry
27	78+50	60 LD	1917.0 - 1922.5	1935.70	1935.84	1935.97	1935.95	1936.35	1936.51	1937.37	1938.67	1941.89	1945.23
28	78+60	60 LD	1925.0 - 1931.0	1936.63	1936.76	1936.62	1936.27	1936.39	1936.33	1936.32	1937.51	1942.22	1944.70
29	80+50	60 LD	1944.9 - 1951.2	1958.51	1959.86	1960.09	1959.93	1959.69	1959.56	1959.06	1958.74	1958.83	1958.55

Table 2.5-96 (continued)

	Location (ft)		Screen	Date of Survey									
Number	Station	Offset[a]	Interval	01/01/81	07/01/81	08/04/81	09/10/81	10/05/81	11/06/81	12/02/81	01/04/82	02/10/82	03/03/82
20	59+00	75 LD	1894.6 - 1901.1	1902.39	1902.79	1903.17	1904.06	1904.77	1905.36	1906.48	1907.57	1908.14	1908.71
21	59+00	80 LD	1916.4 - 1921.9	1917.82	1919.02	1918.42	1918.01	Dry	Dry	1906.48	Dry	Dry	Dry
22	59+00	270 LD	1911.4 - 1916.6	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
23	75+50	14 LK	1931.9 - 1937.1	1936.52	1936.02	1935.72	1935.35	1935.12	1935.01	1934.54	1934.25	Dry	Dry
24	75+50	14 LD	1932.1 - 1937.0	1945.40	1945.30	1943.76	1944.48	1944.44	1942.87	1943.68	1942.02	1937.16	1948.18
25	75+50	64 LD	1929.5 - 1936.0	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
26	75+50	213 LD	1930.3 - 1935.4	Dry	1942.08	1935.78	1936.24	1933.68	1937.10	1937.81	Dry	1936.66	1937.07
27	78+50	60 LD	1917.0 - 1922.5	1946.92	1948.52	1953.11	1958.83	1957.35	1960.81	1962.27	1962.36	1963.61	1963.62
28	78+60	60 LD	1925.0 - 1931.0	Dry	1948.64	1949.75	1952.13	1952.87	Dry	Dry	1955.89	1956.43	1957.03
29	80+50	60 LD	1944.9 - 1951.2	1958.66	1960.26	1959.85	1960.95	1966.31	1963.86	1963.98	1963.04	1963.54	1963.25

Table 2.5-96 (continued)

	Location (ft)		Screen	Date of Survey								
Number	Station	Offset[a]	Interval	04/01/82	05/05/82	06/01/82	07/02/82	08/02/82	09/03/82	10/07/82	11/08/82	12/01/82
20	59+00	75 LD	1894.6 - 1901.1	1909.54	1910.92	1911.60	1912.40	1913.09	1933.66	1934.91	1934.94	Dry
21	59+00	80 LD	1916.4 - 1921.9	Dry	Dry	1917.93	Dry	Dry	Dry	Dry	Dry	1926.85
22	59+00	270 LD	1911.4 - 1916.6	Dry	Dry	1913.44	Dry	Dry	Dry	Dry	Dry	1933.91
23	75+50	14 LK	1931.9 - 1937.1	Dry	1933.66	1933.74	1933.44	Dry	Dry	Dry	Dry	1916.47
24	75+50	14 LD	1932.1 - 1937.0	1935.74	1934.74	1935.08	1933.83	Dry	Dry	1918.15	1918.09	1917.59
25	75+50	64 LD	1929.5 - 1936.0	Dry	Dry	1933.62	Dry	Dry	Dry	Dry	Dry	1936.02
26	75+50	213 LD	1930.3 - 1935.4	1936.57	1935.17	1938.58	1937.48	1935.82	1995.16	1991.91	1995.91	1997.99
27	78+50	60 LD	1917.0 - 1922.5	1964.51	1966.20	1977.91	1968.71	1973.52	1984.09	1983.17	1983.32	1982.98
28	78+60	60 LD	1925.0 - 1931.0	1957.92	1958.02	1962.07	1961.02	1960.64	1968.25	1968.16	1969.32	1969.73
29	80+50	60 LD	1944.9 - 1951.2	1964.23	1965.14	1967.84	1967.54	1967.91	1953.68	1954.35	1954.19	1954.69

Table 2.5-96 (continued)

	Location (ft)		Screen	Date of Survey								
Number	Station	Offset[a]	Interval	01/05/83	02/07/83	03/01/83	05/12/83	06/02/83	08/03/83	10/04/83	12/07/83	01/06/84
20	59+00	75 LD	1894.6 - 1901.1	1936.11	1936.78	1936.90	1917.89	1917.84	1918.58	1918.55	1918.28	1919.25
21	59+00	80 LD	1916.4 - 1921.9	1920.93	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
22	59+00	270 LD	1911.4 - 1916.6	1933.96	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
23	75+50	14 LK	1931.9 - 1937.1	1916.50	Dry	1916.51	Dry	Dry	Dry	Dry	Dry	Dry
24	75+50	14 LD	1932.1 - 1937.0	1917.86	Dry	1917.11	Dry	Dry	Dry	Dry	Dry	Dry
25	75+50	64 LD	1929.5 - 1936.0	1935.53	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
26	75+50	213 LD	1930.3 - 1935.4	1998.15	1998.98	1997.82	1937.06	1937.05	1935.37	1933.06	1934.46	1934.85
27	78+50	60 LD	1917.0 - 1922.5	1988.15	1998.14	1988.56	1974.00	1974.61	1968.90	1967.73	1970.11	1970.78
28	78+60	60 LD	1925.0 - 1931.0	1972.15	1972.31	1973.04	1964.71	1965.11	1962.20	1967.86	1964.11	1963.89
29	80+50	60 LD	1944.9 - 1951.2	1954.54	1954.86	1954.89	1968.28	1969.63	1968.92	1968.29	1968.93	1967.90

Table 2.5-96 (continued)

Number	Location (ft) Station	Offset[a]	Screen Interval	Date of Survey 02/03/84	03/06/84	04/03/84
20	59+00	75 LD	1894.6 - 1901.1	1920.15	1919.25	1919.67
21	59+00	80 LD	1916.4 - 1921.9	Dry	Dry	Dry
22	59+00	270 LD	1911.4 - 1916.6	Dry	1912.98	1913.73
23	75+50	14 LK	1931.9 - 1937.1	Dry	Dry	Dry
24	75+50	14 LD	1932.1 - 1937.0	Dry	Dry	Dry
25	75+50	64 LD	1929.5 - 1936.0	Dry	Dry	Dry
26	75+50	213 LD	1930.3 - 1935.4	1937.45	1938.15	1939.38
27	78+50	60 LD	1917.0 - 1922.5	1972.48	1976.98	1980.38
28	78+60	60 LD	1925.0 - 1931.0	1963.59	1965.09	1966.82
29	80+50	60 LD	1944.9 - 1951.2	1968.00	1968.70	1969.11

TABLE 2.5-97 (Sheet 1 of 4)

OBSERVED SEEPAGE RATES
MAIN DAM STATION 58+50

Inspection Date	Observed Seepage Rate (ml/sec)	Cooling Lake Elevation (feet)
4-24-81	40	--
4-30-81	20	--
5-08-81	18	--
5-15-81	30	1958.9
5-21-81	200	--
5-29-81	100	1960.7
6-04-81	80	1961.3
6-12-81	80	1962.8
6-19-81	150	1963.7
6-24-81	125	1964.6
7-02-81	125	1965.6
7-09-81	20	1966.6
7-17-81	20	1967.0
7-24-81	15	1968.3
7-30-81	10	1969.2
8-06-81	5	1970.0
8-14-81	30	1970.8
8-21-81	5	1970.8
8-28-81	15	1971.0
9-03-81	100	1972.0
9-10-81	95	1972.5
9-16-81	75	1973.4
9-24-81	75	1974.1
10-02-81	50	1974.5
10-08-81	50	1975.3
10-16-81	400	1976.1
10-23-81	110	1976.8
10-29-81	50	1977.2

NOTES:

1. Elevations refer to SNUPPS reference datum.
2. Observed seepage rates are plotted on Figure 2.5-144.
3. Seepage observations were made on downstream toe of Main Dam at Station 58+50. Location is shown on Figure 2.5-143.
4. Unobservable due to ice cover.
5. 1 ml/sec = 0.0000353 cubic feet per second.
6. Unobservable due to construction of flow measuring weir.

TABLE 2.5-97 (Sheet 2 of 4)

Inspection Date	Observed Seepage Rate (ml/sec)	Cooling Lake Elevation (feet)
11-06-81	500	1977.9
11-12-81	50	1978.7
11-19-81	10	1979.2
11-25-81	10	1979.3
12-03-81	40	1979.5
12-10-81	50	1979.5
12-18-81	10	1979.5
12-23-81	10	1979.5
12-31-81	10	1979.5
1-08-82	(See Note 4)	1979.5
1-15-82	(See Note 4)	1979.5
1-22-82	(See Note 4)	1979.5
1-28-82	(See Note 4)	1979.5
2-04-82	(See Note 4)	1980.3
2-12-82	100	1980.3
2-18-82	1000	1980.4
3-05-82	40	1980.4
3-11-82	40	1980.6
3-18-82	1500	1980.8
3-25-82	85	1980.9
4-02-82	40	1981.0
4-08-82	20	1981.3
4-16-82	10	1982.0
4-23-82	10	1982.4
4-29-82	20	1982.7
5-06-82	250	1983.6
5-14-82	250	1984.8
5-20-82	200	1985.9
6-02-82	1500	1987.5
6-11-82	800	1987.6
6-18-82	250	1987.6
6-25-82	1500	1987.4
7-02-82	100	1987.5
7-09-82	25	1987.5
7-19-82	300	1988.0
7-22-82	200	1987.9
7-30-82	25	1987.8
8-05-82	25	1987.8
8-12-82	25	1987.5
8-20-82	15	1987.5
8-26-86	10	1987.5
9-03-82	10	1987.5
9-09-82	25	1987.5
9-16-82	15	1987.5
9-22-82	5	1987.2

TABLE 2.5-97 (Sheet 3 of 4)

Inspection Date	Observed Seepage Rate (ml/sec)	Cooling Lake Elevation (feet)
9-30-82	5	1987.2
10-07-82	5	1987.0
10-14-82	5	1987.3
10-22-82	5	1987.0
11-01-82	10	1987.0
11-05-82	10	1987.1
11-12-82	150	1987.1
11-18-82	75	1987.0
11-24-82	40	1986.8
12-02-82	400	1982.0
12-13-82	200	1986.8
12-17-82	200	1986.7
12-22-82	200	1987.0
12-30-82	300	1987.0
1-07-83	25	1987.0
1-14-83	275	1987.0
1-21-83	200	1987.0
1-28-83	290	1987.0
2-04-83	290	1987.0
2-10-83	400	1987.3
2-18-83	275	1987.5
2-25-83	250	1987.8
3-04-83	250	1987.8
3-11-83	250	1987.1
3-18-83	225	1987.5
3-25-83	200	1987.8
3-31-83	225	1987.8
4-08-83	500	1988.5
4-14-83	300	1988.4
4-22-83	300	1988.1
4-29-83	500	1988.3
5-05-83	30	1988.6
5-13-83	250	1988.3
5-20-83	200	1988.0
5-31-83	200	1988.4
6-03-83	1250	1988.5
6-09-83	625	1983.5
6-16-83	250	1988.5
6-24-83	50	1988.3
7-01-83	40	1988.2
7-08-83	30	1988.1
7-15-83	(See Note 6)	1988.3
7-22-83	(See Note 6)	1987.7
7-28-83	(See Note 6)	1987.4
8-05-83	(See Note 6)	1987.4
8-12-83	(See Note 6)	1987.1

TABLE 2.5-97 (Sheet 4 of 4)

Inspection Date	Observed Seepage Rate (ml/sec)	Cooling Lake Elevation (feet)
8-19-83	(See Note 6)	1987.3
8-26-83	(See Note 6)	1987.1
9-02-83	(See Note 6)	1987.0
9-09-83	(See Note 6)	1987.0

TABLE 2.5-98

1,700 lbs RIPRAP GRADATIONS

Sample Date	Rock Type	Percent Greater Than 1,700 lb	Size Weight (lb) 85%	50%	15%	Percent Smaller Than 100 lb	Total Weight of Sample (lb)
10/16/79	Toronto	6.6	1,000	330	125	10.1	25,757
10/23/79	Toronto	0	1,250	600	125	9.5	26,855
10/26/79	Toronto	0	1,100	320	125	10.0	30,114
10/29/79	Toronto	0	940	430	120	11.0	31,621
11/14/79	Toronto	11.6	1,350	490	135	9.8	31,843
11/15/79	Toronto	0	840	320	115	10.8	37,800
11/26/79	Toronto	0	1,150	460	165	7.9	27,969
12/27/79	Toronto	0	1,000	545	145	8.5	36,177
12/27/79	Toronto	0	1,100	500	165	7.0	40,728
2/05/80	Toronto	0	1,100	500	105	13.0	41,078
2/07/80	Toronto	0	1,200	400	140	9.0	73,673
2/11/80	Toronto	20.0	—	670	115	5.0	43,294
4/17/80	Toronto	10.0	1,650	450	190	8.5	44,950

TABLE 2.5-99

755 lbs RIPRAP GRADATIONS

Sample Date	Rock Type	Percent Greater Than 755 lb	Size Weight (lb) 85%	50%	15%	Percent Smaller Than 45 lb	Total Weight of Sample (lb)
3/16/79	Plattsmouth	0	275	110	—	22.0	10,477
4/12/79	Plattsmouth	0	545	250	70	5.0	29,682
8/07/79	Toronto	15.3	750	125	—	25.0	11,507
8/14/79	Toronto	10.4	600	150	--	22.1	33,572
8/16/79	Toronto	10.7	560	175	—	15.7	9,932
9/10/79	Toronto	3.0	355	195	93	5.2	25,532
9/10/79	Toronto	3.0	530	210	86	6.6	27,657
1/12/80	Toronto	5.0	400	180	50	0	17,088

TABLE 2.5-100 (Sheet 1 of 2)

MEASURED FLOW RATES
FROM WEIR AT MAIN DAM
STATION 56+96

Inspection Date	Flow Rate (ft^3/sec)	Cooling Lake Elevation (feet)
9-16-83	0.00069	1986.6
9-20-83	0.0016	1987.0
9-23-83	0.0004	1987.0
10-07-83	0.00007	1986.5
10-11-83	0.028	1986.6
10-12-83	0.0039	1986.6
10-14-83	0.0011	1986.6
10-19-83	0.022	1986.6
10-20-83	0.24	1986.6
10-26-83	0.0039	1986.7
11-01-83	0.35	1986.8
11-04-83	0.022	1986.8
11-10-83	0.039	1986.6
11-18-83	0.0039	1986.8
11-25-83	0.0039	1987.0
12-09-83	0.010	1986.0
12-16-83	0.0128 (See Note 5)	1987.0
12-23-83	0 (See Note 5)	1986.5
12-30-83	0.126 (See Note 5)	1986.7
1-06-84	0.0972 (See Note 5)	1987.0
1-13-84	0.0197 (See Note 5)	1987.0
1-20-84	0.022 (See Note 5)	1987.0
1-27-84	0.022 (See Note 5)	1987.0
2-03-84	0.009	1987.0
2-10-84	0.011	1987.0
2-17-84	0.009	1987.0
2-24-84	0.0039	1987.0
3-09-84	0.0128	1987.0
3-16-84	0.0108	1987.0
3-23-84	0.043	1987.6
3-30-84	0.022	1988.0
4-06-84	0.0224	1988.0
4-13-84	0.052	1988.0
4-27-84	0.032	1988.4
5-04-84	0.0284	1988.0
5-11-84	0.0076	1988.0
5-18-84	0.0023	1988.0
5-22-84	0.0016	1988.0
5-25-84	0.001	1988.0
6-01-84	0.0004	1988.0
6-07-84	0.0002	1988.0
6-15-84	0.013	1988.6
6-18-84	0.0062	(No Data)

TABLE 2.5-100 (Sheet 2 of 2)

Inspection Date	Flow Rate (ft^3/sec)	Cooling Lake Elevation (feet)
6-22-84	0.0092	1988.0
6-27-84	0.011	(No Data)
6-28-84	0.011	1988.0

NOTES:

1. Elevations refer to SNUPPS reference datum.
2. Flow rates were determined using a V notch weir. The theoretical discharge over the weir is given by the following equation: $Q = 1.25H^{2.5}$ where Q is in ft^3/sec and H is in feet.
3. Location of weir is shown on Figure 2.5-143.
4. Measured flow rates are plotted on Figure 2.5-145.
5. Unreliable data, since water in the weir was frozen over.
6. 1 ft^3/sec = 28320 ml/sec.