APPENDIX G

REMP 1989 ANNUAL REPORT

TELEDYNE ISOTOPES

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

1989 ANNUAL REPORT

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INTRODUCTION

I. INTRODUCTION

The Radiological Environmental Monitoring Program for the Comanche Peak Steam Electric Station was conducted under contract with T U Electric. This report covers the period from January 1, 1989 through December 31, 1989 and summarizes the results of measurements and analyses of data obtained from samples collected during this interval.

A. Site and Station Description

Comanche Peak Steam Electric Station consists of two PWR units, each designed to operate at a power level of about 1150 megawatts (electrical). The station is located on Squaw Creek Reservoir in Somervell County about 40 miles southwest of Fort Worth, Texas. Unit 1 received a low power operating license February 8, 1990. Initial criticality of Unit 1 is expected in April, 1990.

B. Objectives and Overview of the CPSES Monitoring Program

United States Nuclear Regulatory Commission (USNRC) regulations require that nuclear power plants be designed, constructed, and operated to keep levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable (ALARA) (10 CFR 50.34). To assure that these criteria are met, each license authorizing reactor operation includes technical specifications (10 CFR 50.36a) governing the release of radioactive effluents.

In-plant monitoring will be used to assure that these predetermined release limits are not exceeded. However, as a precaution against unexpected and undefined processes which might allow undue accumulation of radioactivity in any sector of man's environment, a program for monitoring the plant environs is also included.

Sampling locations were selected on the basis of local ecology, meteorology, physical characteristics of the region, and demographic and land use features of the site vicinity. The preoperational program was designed on the basis of the USNRC Branch Technical Position on radiological environmental monitoring issued by the Radiological Assessment Branch, Revision 1 (November 1979)[1], the CPSES Technical Specifications, and the CPSES Offsite Dose Calculation Manual (ODCM).

In 1989 the radiological monitoring program included the measurement of ambient gamma radiation by thermoluminescent dosimetry; the determination of gamma emitters in vegetation, sediment and fish; the determination of airborne gross beta, gamma emitters, and iodine-131; the measurement of tritium and gamma emitters in surface water; the measurement of gross beta, tritium and gamma emitters in ground water; the measurement of gross beta, tritium, I-131 and gamma emitters in drinking water; and the determination of gamma emitters and I-131 in milk.

Samples were collected by CPSES Environmental Personnel. Sample analyses were performed by Teledyne Isotopes under contract.

The regulations governing the quantities of radioactivity in reactor effluents allow nuclear power plants to contribute, at most, only a few percent increase above normal background radioactivity. Background levels at any one location are not constant but vary with time as they are influenced by external events such as cosmic ray bombardment, weapons test fallout, and seasonal variations. These levels also can vary spatially within relatively short distances reflecting variations in geological composition. Because of these spatial and temporal variations, the radiological surveys of the plant environs are divided into preoperational and operational phases. The preoperational phase of the program of sampling and measuring radioactivity in various media permits a general characterization of the radiation levels and concentrations prevailing prior to plant operation along with an indication of the degree of natural variation to be expected. The operational phase of the program obtains data which, when considered along with the data obtained in the preoperational phase, assist in the evaluation of the radiological impact of plant operation.

Implementation of the preoperational monitoring program fulfills the following objectives:

1. Evaluation of procedures, equipment and techniques.
2. Identification of potentially important pathways to be monitored after the plant is in operation.
3. Measurement of background levels and their variations along potentially important pathways in the area surrounding the plant.
4. Provision of baseline data for statistical comparison with future operational analytical results.

PROGRAM DESCRIPTIONS

II. PROGRAM DESCRIPTION

Seventy-four (74) locations within a radius of 15 miles from the CPSES site were included in the monitoring program for 1989. The number and location of monitoring points were determined by considering the locations where the highest off-site environmental concentrations have been predicted from plant effluent source terms, site hydrology, and site meterological conditions. Other factors considered were applicable regulations, population distribution, ease of access to sampling stations, availability of samples at desired locations, security and future program integrity.

The preoperational environmental radiological program for Comanche Peak is summarized in Table 1. Figures 1 and 2 show the locations of the various sampling points.

III. SAMPLING METHODS AND PROCEDURES

To derive meaningful and useful data from the Radiological Environmental Monitoring Program, sampling methods and procedures are required which will provide samples representative of potential pathways of the area. During the preoperational phase of the program, samples are collected and analyzed not only to obtain background radiological levels, but at the same time to acquire experience with the sampling methodology and procedural format dictated by site specific requirements.

A. Direct Radiation

Thermoluminescent dosimeters (TLDs) were used to determine the direct (ambient) radiation levels at monitoring points. Sampling locations were chosen according to the criteria given in the USNRC Branch Technical Position on Radiological Monitoring (Revision 1, November 1979).(1) The area around the station was divided into 16 radial sectors of 22 1/2 degrees each. TLDs were placed in all sectors. TLDs were located in two rings around the station. An inner ring was located at the site boundary and an outer ring

was located at a distance of 4 to 6 miles from the station. Eleven additional TLDs were located at points of special interest, including two control locations. For routine TLD measurements, two dosimeters of $CaSO_4$:Dy in teflon cards were deployed at each selected location. One set of dosimeters was exchanged on a quarterly basis and the second set was exchanged on an annual basis. Additional sets of dosimeters were shipped with each exchange cycle to serve as in-transit controls. For routine exchanges, TLDs were shipped by Federal Express.

Individual dosimeters were calibrated by exposure to an accurately known radiation field from a calibrated Cs-137 source.

B. Air Particulates/Air Iodine

Air particulate and air iodine samples were collected from the 8 locations described in Table 1. No samples were collected from Stations N-2.2, E-0.5, SE-3.85, W-2 and NNW-4.6, which had been included in the sampling program in previous years. These locations were deleted as a part of the transition to the operational monitoring program required by the CPSES ODCM.

Each air particulate sample was collected by drawing air through a 47-millimeter diameter glass-fiber filter. Air iodine was collected by drawing air through a TEDA impregnated charcoal cartridge/(Scott NO-605018-03) which was connected in series behind the filter. The filters and charcoal cartridges were collected weekly by CPSES staff. In the laboratory, air particulate filters were analyzed for gross beta activity and were composited quarterly for analysis by gamma spectrometry. Charcoal cartridges were analyzed for iodine-131.

C. Milk

Milk samples were collected by CPSES staff monthly except for May through October when samples were collected bimonthly. There were two

principal milk sampling locations; one indicator location, SSE-2.2 and one control location, SW-13.5. Upon arrival at the laboratory, the milk samples were promptly analyzed for gamma emitters and for I-131 by radiochemistry.

D. Water

The CPSES staff collected water from 11 locations. Surface water was collected at four locations (N-19.3, ESE-1.4, N-1.5 and NE-7.4). Surface-drinking water was collected at two locations (N-9.9 and NNW-0.1). Location N-1.5 provides samples representative of Squaw Creek Reservoir surface water at a location beyond significant influence of the plant discharge. Location ESE-1.4 provides samples representative of discharges from Squaw Creek Reservoir, both down Squaw Creek and to Lake Granbury via the return line. Location N-7.4 provides samples of Lake Granbury surface water down stream of the discharge of the return line from Squaw Creek Reservoir.

There are five groundwater locations (SSE-4.6, W-1.2, WSW-0.1, N-1.45 and N-9.8. Samples from these locations were analyzed pursuant to the ODCM drinking water requirements through 04/24/89. After this date, the analysis for drinking water was eliminated and the samples were analyzed only for gamma emitters and tritium. This change was made as part of the transition to the operational program described by the ODCM. ODCM Table 3.1, Note (5) states that groundwater supplies in the site area are not affected by plant effluents and are sampled only to provide confirmation that groundwater is not affected by plant discharges.

All samples were shipped back to the laboratory and analyzed by gamma spectrometry and composited by location quarterly for tritium analysis. Drinking water samples were also analyzed monthly for gross beta, gamma isotopic and bi-monthly for iodine-131.

E. Fish

Eleven fish samples were collected at two locations for the 1989

program. An area 2.0 miles east-northeast of the site in Squaw Creek Reservoir was chosen as the indicator location, and a location at Lake Granbury was chosen as a control location. Fish sampling was conducted in April and October for Station NNE-8(F2) and April and September for Station ENE-2(F1).

Fish were collected by CPSES staff. Available edible species were gutted at the time of collection. Samples were then frozen and shipped to the laboratory for analysis. Fish were filleted in the laboratory and the edible portion analyzed by gamma spectrometry.

F. Shoreline Sediment

Shoreline sediment samples were collected in February and August from Squaw Creek Reservoir, the indicator location. This is in an area of potential recreational usage, 1.0 mile north-northeast of the station. Samples were also collected from Lake Granbury, the control location, on the same days. Samples were also collected from Lake Granbury downstream of the discharge of the return line from Squaw Creek Reservior on the same dates. CPSES staff collected the sediment samples and shipped them to the laboratory for analysis by gamma spectrometry.

G. Food Products and Broadleaf Vegetation

During the period May through December, forty-seven samples were collected from five sampling locations. Food products were collected from a control (13.5 miles southwest) and two indicator stations. A total of ten different types of food products were collected during this sampling period.

Broadleaf vegetation was collected from the control location and two indicator stations near the site boundary. Collection of broadleaf vegetation started in May, 1989, as part of the transition to the operational program required by the ODCM. Broadleaf samples consisted primarily of available tree leaves; if tree leaves were unavailable, native grasses and weeds were substituted.

SUMMARY AND DISCUSSION OF 1989 ANALYTICAL RESULTS

IV. SUMMARY AND DISCUSSION OF 1989 ANALYTICAL RESULTS

Data from the radiological analyses of environmental media collected during the report period are tabulated and discussed below. The procedures and specifications followed in the laboratories for these analyses are as required in the Teledyne Isotopes Quality Assurance manual, IWL-0032-395 and are detailed in Teledyne Isotopes Analytical Procedures manual.

Radiological analyses of environmental media characteristically approach and frequently fall below the detection limits of state-of-the-art measurement methods.[2] The use of "<" in the data tables symbolizes that the result is less than the lower limit of detection (LLD) as defined in Appendix B. "ND" (Not Detected) is used periodically in the tables presenting gamma analysis results for various media. It primarily appears under the "Others" column, and indicates that no other detectable gamma emitting nuclides were identified. The Teledyne Isotopes analytical methods meet the LLD requirements addressed in the CPSES Offsite Dose Calculation Manual.

Tables 2 through 21 give the radioanalytical results for individual samples. A statistical summary of the results appears in Table 22. The reported averages are based only on concentrations above the limit of detection. In Table 22, the fraction (f) of the total number of analyses with detectable activity follows in parentheses. Also given in parentheses are the minimum and maximum values of detectable activity during the report period.

A. Direct Radiation

Environmental radiation dose rates determined by thermoluminescent dosimeters (TLDs) are given in Table 2. TLD badges of four readout areas each were deployed at each location on quarterly and annual cycles. The mean values of four readings (corrected individually for response to a known dose and for in-transit exposure) are reported.

A statistical summary of the 1989 data is included in Table 22. For the quarterly analyses the average activity of the control locations was 0.16 mR/day with a range of 0.12 to 0.18 mR/day. The average of the indicator locations for the quarterly samples was 0.16 mR/day with a range of 0.11 to 0.22 mR/day. For the annual samples: The activity for the control samples was 0.13 mR/day for each. The indicator locations had an average of 0.13 mR/day with a range of 0.11 to 0.17 mR/day.

Oakley[3] calculates an ionizing radiation dose equivalent of 82.2 mR/year for Fort Worth including a terrestrial component of 45.6 mR/year and an ionizing cosmic ray component of 36.6 mR/year (excludes neutron component). Since Oakley's values represent averages covering wide geographical areas, the measured ambient radiation average of 58 mR/year for the immediate locale of CPSES is not inconsistent with Oakley's observations. Significant variations occur between geographical areas as a result of geological composition and altitude differences. Temporal variations result from changes in cosmic ray intensity, local human activities, and factors such as ground cover and soil moisture.

B. Air Particulates/Air Iodine

A total of 411 charcoal cartridges were analyzed for airborne iodine-131 by gamma spectrometry. No iodine-131 was detected at any of the sampling stations. Results of these measurements are presented in Table 3.

A total of 410 air particulate filters were collected and analyzed for gross beta activity. For the year of 1989 the average gross beta activity for the control location was 0.024 pCi/m^3 with a range from 0.0097 to 0.051 pCi/m^3. For the eleven indicator locations the yearly average was 0.024 pCi/m^3 with a range from 0.0053 to 0.055 pCi/m^3. The gross beta analysis data are presented in Table 4.

Air filters were composited quarterly and then analyzed by gamma spectrometry. The gamma spectrometry data is presented in Table 5. Cosmogenic beryllium-7 was detected in all 32 samples while potassium-40, a naturally occurring nuclide, was measured in four samples. The average beryllium-7 activity for the control location was 0.071 pCi/m^3 with a range of 0.066 to 0.081 pCi/m^3. For the indicator locations, the average beryllium-7 activity was 0.072 pCi/m^3 with a range of 0.060 to 0.099 pCi/m^3. Naturally occurring potassium-40 was not detected at the control location. The average potassium-40 activity for the indicator locations was 0.012 pCi/m^3 with a range of 0.0093 to 0.015 pCi/m^3.

C. Milk

There were a total of 38 milk samples collected in 1989; 19 from the indicator location and 19 from the control location. All samples were analyzed for iodine-131 by radiochemistry and for other gamma-emitting isotopes by gamma spectrometry.

No iodine-131 was found in any of the milk samples. The lower limits of detection can be found in Table 6.

Results of the gamma spectrometry measurements are presented in Table 7. Naturally occurring potassium-40 was detected in all of the milk samples. The average activity for the control location was 1379 pCi/l with a range of 1110 to 1560 pCi/l. For the indicator location the average activity was 1298 pCi/l with a range of 1150 to 1510 pCi/l. Cesium-137 was not detected in any of the samples.

D. Water

Ground and drinking water samples were collected from five locations during 1989. Samples were analyzed pursuant to drinking water requirements through 04/24/89. Subsequent samples were analyzed only for gamma isotopic and tritium on a quarterly basis, pursuant to the ODCM requirements for groundwater. Thirty samples were analyzed for gamma emitters by gamma spectrometry. The gamma spectrometry analyses showed no detectable activity above the LLD for all samples. Fifty samples were also analyzed for iodine-131 with no measurable activity. Quarterly composites for each sampling location were analyzed for tritium. No tritium was detected. Twenty-five ground and drinking water samples were analyzed for gross beta; 16 indicator locations had measurable activity with an average of 7.0 pCi/l and a range of 1.0 to 10 pCi/l. All five of the control samples had measurable gross beta activity with an average of 3.0 pCi/l and a range of 2.2 to 3.9 pCi/l. Results of these analyses are contained in Table 8, 9, 10 and 11 respectively.

Surface water was sampled from four locations during 1989. Samples from these locations were analyzed pursuant to drinking water requirements through 04/24/89. Subsequent samples were analyzed only for gamma isotopic on a monthly basis and tritium composite on a quarterly basis, per the ODCM requirements for drinking water. Fifty-two samples were analyzed by gamma spectrometry. No radioactivity was detected above the lower level of detection. Sixteen samples were analyzed for iodine-131, results were below

the lower limit of detection. Sixteen composited surface water samples were analyzed for tritium and all were below the lower level of detection. Results are presented in Tables 16, 17 and 18 respectively.

Surface water-drinking was collected from two stations. All samples were analyzed for gamma emitters; results were below the lower limit of detection. Thirty samples were analyzed for gross beta activity. The indicator station had an average activity of 16 pCi/l with a range of 13 to 21 pCi/l. The control station had an average activity of 14 pCi/l with a range of 9.0 to 21 pCi/l. The quarterly composites for tritium were below the lower limit of detection.

Iodine-131 analyses by radiochemistry were performed on 54 samples of surface water-drinking. There was no measurable activity. Results of these analyses are contained in Tables 12-15.

E. Fish

The results of gamma spectrometric analyses of fish samples collected during 1989 are presented in Table 19. A total of eleven samples were analyzed, six from the indicator location ENE-2 and five from the control location NNE-8. Sampling efforts concentrated on the larger edible species of commercial and/or recreational importance.

Cesium-137 was detected in one of the samples with an average activity of 13 pCi/kg wet.

Naturally occurring potassium-40 was detected in all samples. The average potassium-40 concentration for the six indicator samples is 3485 pCi/kg wet with a range of 2730 to 4490 pCi/kg wet. The average concentration for the control location is 3144 pCi/kg wet with a range of 1960 to 3930 pCi/kg wet.

F. Shoreline Sediments

The processes by which radionuclides and stable elements are concentrated in bottom sediments are complex, involving physiochemical interaction

in the environment between the various organic and inorganic materials from the watershed. These interactions can proceed by a myriad of steps in which the elements are absorbed on or displaced from the surfaces of colloidal particles enriched with chelating organic materials. Biological action of bacteria and other benthic organisms also contribute to the concentration of certain elements and in the acceleration of the sedimentation process.

Results of the gamma isotopic analyses of the sediments sampled from the CPSES environment are given in Table 20. For 1989 three locations, one control and two indicators, were sampled semiannually. The average, fraction of detectables, and range of radionuclide concentrations are summarized in Table 22.

Gamma emitters found in detectable concentrations were K-40, Pb-212, Ra-226, Bi-214, Pb-214 and Th-228, Be-7 and Cs-137.

G. Food Products and Broadleaf Vegetation

Results of gamma spectrometric analyses of vegetation samples are contained in Table 21. A total of 47 samples were analyzxed from 5 locations. Potassium-40, a naturally occurring isotope, was found in 47 samples. The average potassium-40 activity for the control location was 4837 pCi/kg wet with a range of 896 to 9810 pCi/kg wet. For the indicator locations the average potassium-40 activity was 4959 pCi/kg wet with a range of 1570 to 12300 pCi/kg wet. Naturally occurring beryllium-7 was detected in twenty-one indicator samples with an average activity of 1781 pCi/kg wet; the range was 359 to 5670 pCi/kg wet. Fourteen samples from control station, SW-13.5 were found to have beryllium-7 with an average activity of 1294 pCi/kg (wet) and a range of 225-3120 pCi/kg (wet).

Iodine-131, cesium-134 and cesium-137 were below the lower limit of detection in all samples.

CONCLUSIONS

V. CONCLUSIONS

It can be concluded from the levels and fluctuations of radioactivity obtained in environmental samples during 1989, that sensitive indicators of radioactivity for the environment around the CPSES have been selected. The atmospheric environment was sampled for airborne particulate matter, radioiodine, and direct radiation. The terrestrial environment was sampled for milk, ground-drinking water, surface-drinking water and food products. The aquatic environment was sampled for surface water, fish and shoreline sediment. The analyses of these samples provided results which were either below the measurement detection limits or were indicative of natural terrestrial and cosmic ray radiation levels.

REFERENCES

VI. REFERENCES

1. U. S. Nuclear Regulatory Commission, "An Acceptable Radiological Environmental Monitoring Program", Radiological Assessment Branch Technical Position, November 1979, Rev. 1

2. National Council on Radiation Protection and Measurements, "Environmental Radiation Measurements", NCRP Report No. 50, Washington, D. C., December 27, 1976.

3. Oakley, D. C., "Natural Radiation Exposure in the United States", ORP/SID 72-1 Office of Radiation Programs, U. S. Environmental Protection Agency, Washington, D. C., June 1972.

DATA TABLES

TABLE 1

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CPSES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1989

Media	Number of Locations	Identification by Sector and Distance (Miles)	Sampling Frequency (a)	Analyses	Analytical Frequency (a)
Gamma Exposure	43	N-1.45; N-4.4; N-6.5; N-9.4; NNE-1.1; NNE-5.65; NE-1.7; NE-4.8; ENE-2.5; ENE-5.0; E-0.5; E-1.9; E-3.5; E-4.2; ESE-1.4; ESE-4.7; SE-1.3; SE-3.85; SE-4.6; SSE-1.3; SSE-4.4; SSE-4.5; S-1.5; S-4.2; SSW-1.1; SSW-4.4; SW-0.9; SW-4.8; SW-12.3; WSW-1.0; WSW-5.35; WSW-7.0; W-1; W-2; W-5.5; WNW-1; WNW-5.0; WNW-6.7; NW-1; NW-5.7; NW-9.9; NNW-1.35; NNW-4.6	Q,A	Thermoluminescent Dosimetry	Q,A
Air Particulate, Air Iodine	8	N-9.4 E-3.5; SSE-4.5 SW-12.3; NW-1.0; N-1.45, SW/WSW-0.95 S/SSW-1.2	W	Gross Beta Gamma Spectrometry Filter Gamma Spectrometry Charcoal Cartridge	W QE W
Surface Water	4	N-19.3; ESE-1.4; N-1.5 NE-7.4.	M (b)	Gamma Spectrometry H-3	M QE
Groundwater	5	SSE-4.6 W-1.2; WSW-0.1 N-9.8; N-1.45.	SM	Gamma Spectrometry H-3	Q Q
Water-Surface Drinking	2	NNW-0.1; N-9.9	SM (c)	Gross Beta Gamma Spectrometry I-131 H-3	M M SM QE

TABLE 1

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CPSES RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - 1988

Media	Number of Locations	Identification by Sector and Distance (Miles)	Sampling Frequency (a)	Analyses	Analytical Frequency (a)
Sediment	3	N-9.9; NNE-1, NE-7.4	SA	Gamma Spectrometry	SA
Fish	2	NNE-8; ENE-2	SA	Gamma Spectrometry	SA
Milk	2	SW-13.5; SE-2.2	SM, M Pasture Season	I-131 Gamma Spectrometry	SM, M Pasture Seas. SM, M Pasture Seas.
Food Products	3	E-4.2; SW-13.5; ENE-9.0,	MH	Gamma Spectrometry I-131	MH MH
Broadleaf Vegetation	3	N-1.45; SW-1.0; SW-13.5	M	Gamma Spectrometry I-131	M M

(a) Frequency Codes Are W = Weekly
M = Monthly
Q = Quarterly
QC = Quarterly Composite
SM = Semimonthly
MH = Monthly during availability for harvest
SA = Semiannual
A = Annual

(b) Surface water samples from Squaw Creek Reservoir are monthly composites of weekly grab samples. Samples from Lake Granbury are monthly composites of weekly grab samples when Lake Granbury is receiving letdown from Squaw Creek Reservoir; otherwise they are monthly grab samples.

(c) Drinking water samples are composite of weekly grab samples over a 2 week period when I-131 analysis is performed; otherwise they are monthly composites of weekly grab samples.

TABLE 2

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T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

Direct Radiation - Thermoluminescent Dosimetry
Results in mR/day +- 2 s.d.

Station	FIRST QUARTER 01/03/89-04/04/89	SECOND QUARTER 04/04/89-07/03/89	THIRD QUARTER 07/03/89-10/03/89	FOURTH QUARTER 10/03/89-01/04/90	AVERAGE +-2 s.d.	ANNUAL 01/03/89-01/04/90
N-1.45	0.16 +-0.01	0.16 +-0.005	0.16 +-0.02	0.15 +-0.01	0.15 +-0.03	0.12 +-0.02
N-4.4	0.21 +-0.02	0.19 +-0.01	0.16 +-0.01	0.17 +-0.02	0.18 +-0.05	0.15 +-0.02
N-6.5	0.16 +-0.02	0.17 +-0.008	0.15 +-0.01	0.15 +-0.01	0.15 +-0.04	0.12 +-0.01
N-9.4	0.17 +-0.02	0.17 +-0.01	0.16 +-0.008	0.12 +-0.02	0.15 +-0.04	0.14 +-0.009
NNE-1.1	0.17 +-0.01	0.18 +-0.007	0.16 +-0.004	0.14 +-0.01	0.16 +-0.04	0.13 +-0.009
NNE-5.65	0.19 +-0.01	0.19 +-0.01	0.16 +-0.01	0.16 +-0.02	0.17 +-0.04	0.15 +-0.007
NE-1.7	0.15 +-0.04	0.16 +-0.005	0.15 +-0.003	0.15 +-0.02	0.15 +-0.03	0.12 +-0.005
NE-4.8	*	*	0.16 +-0.007	0.16 +-0.01	0.16 +-0.00	0.15 +-0.03**
ENE-2.5	0.20 +-0.03	0.19 +-0.02	0.16 +-0.02	0.16 +-0.03	0.17 +-0.04	0.16 +-0.02
ENE-5	0.20 +-0.01	0.22 +-0.02	0.22 +-0.01	0.18 +-0.02	0.20 +-0.05	0.17 +-0.02
E-0.5	0.17 +-0.01	0.17 +-0.01	0.16 +-0.009	0.19 +-0.01	0.16 +-0.04	0.13 +-0.01
E-1.9	0.14 +-0.01	0.15 +-0.02	0.16 +-0.02	0.14 +-0.01	0.14 +-0.02	0.13 +-0.01
E-3.5	0.20 +-0.01	0.21 +-0.009	0.21 +-0.01	0.17 +-0.02	0.19 +-0.05	0.16 +-0.01
E-4.2	0.20 +-0.01	0.20 +-0.02	0.18 +-0.04	0.18 +-0.04	0.18 +-0.04	0.15 +-0.01
ESE-1.4	0.16 +-0.01	0.17 +-0.01	0.17 +-0.003	0.14 +-0.01	0.15 +-0.05	0.11 +-0.01
ESE-4.7	0.19 +-0.01	0.19 +-0.03	0.19 +-0.01	0.19 +-0.05	0.18 +-0.04	0.15 +-0.02
SE-1.3	0.18 +-0.01	0.19 +-0.01	0.18 +-0.008	0.15 +-0.02	0.17 +-0.05	0.13 +-0.02
SE-3.85	*	0.18 +-0.01	0.17 +-0.008	0.15 +-0.03	0.17 +-0.03	0.13 +-0.01
SE-4.6	0.17 +-0.01	0.18 +-0.02	0.17 +-0.02	0.14 +-0.008	0.16 +-0.03	0.15 +-0.01
SSE-1.3	0.17 +-0.02	0.17 +-0.01	0.16 +-0.03	0.15 +-0.02	0.15 +-0.04	0.12 +-0.01
SSE-4.5	0.16 +-0.01	0.17 +-0.02	0.17 +-0.02	0.15 +-0.02	0.16 +-0.03	0.14 +-0.009
SSE-4.3	0.18 +-0.01	0.18 +-0.008	0.18 +-0.002	0.16 +-0.03	0.16 +-0.05	0.12 +-0.005

*TLD missing. Vandalized.

NOTE: The annual TLD NE-4.8 was in the field from 07/10/89-01/04/90; the annual TLD SE-3.85 was in the field from 04/07/89-01/04/90.

TABLE 2

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T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

Direct Radiation - Thermoluminescent Dosimetry
Results in mR/day +- 2 s.d.

Station	FIRST QUARTER 01/03/89-04/04/89	SECOND QUARTER 04/04/89-07/03/89	THIRD QUARTER 07/03/89-10/03/89	FOURTH QUARTER 10/03/89-01/04/90	AVERAGE +-2 s.d.	ANNUAL 01/03/89-01/04/90
S-1.5	0.16 +-0.01	0.16 +-0.009	0.15 +-0.008	0.14 +-0.03	0.15 +-0.03	0.12 +-0.003
S-4.2	0.16 +-0.02	0.16 +-0.01	0.16 +-0.02	0.14 +-0.02	0.15 +-0.02	0.14 +-0.009
SSW-1.1	0.16 +-0.01	0.17 +-0.01	0.18 +-0.01	0.15 +-0.009	0.16 +-0.05	0.12 +-0.003
SSW-4.4	0.17 +-0.01	0.18 +-0.01	0.17 +-0.009	0.15 +-0.01	0.16 +-0.03	0.14 +-0.1
SW-0.9	0.15 +-0.01	0.18 +-0.007	0.17 +-0.009	0.14 +-0.01	0.15 +-0.04	0.13 +-0.02
SW-4.8	0.16 +-0.01	0.17 +-0.007	0.16 +-0 01	0.16 +-0.03	0.15 +-0.05	0.11 +-0.005
SW-12.3	0.17 +-0.01	0.18 +-0.002	0.18 +-0.02	0.17 +-0.03	0.17 +-0.04	0.13 +-0.004
WSW-1	0.17 +-0.01	0.18 +-0.01	0.16 +-0.02	0.14 +-0.02	0.16 +-0.04	0.14 +-0.009
WSW-5.35	0.15 +-0.01	0.18 +-0.009	0.17 +-0.00	0.15 +-0.01	0.15 +-0.05	0.12 +-0.008
WSW-7	0.17 +-0.02	0.18 +-0.01	0.18 +-0.005	0.12 +-0.02	0.16 +-0.06	0.13 +-0.02
W-1	0.15 +-0.01	0.16 +-0.02	0.15 +-0.03	0.12 +-0.01	0.14 +-0.04	0.12 +-0.01
W-2	0.14 +-0.01	0.15 +-0.01	0.15 +-0.02	0.15 +-0.03	0.14 +-0.03	0.11 +-0.005
W-5.5	0.15 +-0.01	0.16 +-0.007	0.16 +-0.02	0.13 +-0.002	0.14 +-0.04	0.11 +-0.003
WNW-1	0.17 +-0.01	0.18 +-0.02	0.17 +-0.005	0.17 +-0.01	0.16 +-0.04	0.13 +-0.01
WNW-5	0.15 +-0.01	0.17 +-0.02	0.17 +-0.007	0.16 +-0.02	0.16 +-0.03	0.13 +-0.002
WNW-6.7	0.15 +-0.01	0.16 +-0.007	0.16 +-0.02	0.15 +-0.01	0.15 +-0.03	0.12 +-0.007
NW-1	0.15 +-0.01	0.16 +-0.01	0.16 +-0.008	0.17 +-0.02	0.15 +-0.04	0.12 +-0.01
NW-5.7	0.16 +-0.02	0.16 +-0.009	0.17 +-0.01	0.16 +-0.02	0.15 +-0.04	0.12 +-0.01
NW-9.9	0.15 +-0.004	0.13 +-0.02	0.11 +-0.01	0.16 +-0.01	0.13 +-0.05	0.11 +-0.007
NNW-1.35	0.16 +-0.01	0.12 +-0.01	0.15 +-0.01	0.16 +-0.008	0.14 +-0.04	0.12 +-0.009
NNW-4.6	0.18 +-0.01	0.18 +-0.01	0.18 +-0.01	0.18 +-0.02	0.17 +-0.04	0.14 +-0.009

TABLE 3

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T U ELECTRIC - 1989 REMP

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN FILTERED AIR

Results in Units of pCi/m^3 +- 2 s.d.

SAMPLING PERIOD	STATIONS NW-1.0	SW/WSW-0.95	S/SSW-1.2	SW-12.2	SSE-4.5	E-3.5	N-1.45	N-9.4
JANUARY								
01/03-01/10/89	<0.05	<0.03	<0.05	<0.05	<0.06	<0.05	<0.03	<0.03
01/10-01/17/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.03	<0.03	<0.03
01/17-01/24/89	<0.03	<0.03	<0.03	<0.03	<0.01	<0.03	<0.03	<0.03
01/24-01/31/89	<0.04	<0.03	<0.04	<0.04	<0.03	<0.07	<0.04	<0.03
FEBRUARY								
01/31-02/07/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.02	<0.03	<0.02
02/07-02/14/89	<0.07	<0.03	<0.03	<0.06	<0.05	<0.04	<0.05	<0.03
02/14-02/21/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
02/21-02/28/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
MARCH								
02/28-03/07/89	<0.02	<0.02	<0.02	<0.02	<0.04	<0.04	<0.04	<0.03
03/07-03/14/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
03/14-03/21/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.03
03/21-03/28/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
03/28-04/04/89	<0.03	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02
APRIL								
04/04-04/12/89	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.03	<0.03
04/12-04/18/89	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05
04/18-04/24/89	<0.05	<0.05	<0.05	<0.05	<0.04	<0.04	<0.03	<0.04
04/24-05/02/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.03

TABLE 3

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T U ELECTRIC - 1989 REMP

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN FILTERED AIR

Results in Units of pCi/m^3 +- 2 s.d.

SAMPLING PERIOD	STATIONS NW-1.0	SW/WSW-0.95	S/SSW-1.2	SW-12.3	SSE-4.5	E-3.5	N-1.45	N-9.4
MAY								
05/02-05/09/89	*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
05/11-05/16/89	<0.08***	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
05/16-05/23/89	*	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05
05/23-05/30/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
JUNE								
05/30-06/06/89	<0.03	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02
06/06-06/13/89	<0.02	<0.03	<0.03	<0.02	<0.04	<0.04	<0.04	<0.04
06/13-06/20/89	*	<0.05	<0.05	**	<0.06	<0.04	<0.04	<0.04
06/20-06/27/89	*	<0.02	<0.02	<0.01**	<0.02	<0.03	<0.03	<0.03
06/27-07/03/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.03
JULY								
07/03-07/11/89	<0.06	<0.06	<0.06	<0.06	<0.04	<0.04	<0.04	<0.04
07/11-07/18/89	<0.02	<0.02	<0.02	<0.02	<0.04	<0.04	<0.04	<0.06
07/18-07/24/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.04	<0.04	<0.04
07/24-08/01/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
AUGUST								
08/01-08/08/89	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03
08/08-08/15/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
08/15-08/22/89	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
08/22-08/29/89	<0.03	<0.03	<0.03	<0.03	<0.03	*	<0.03	<0.03

*Pump out of service, sample not collected.
**Charcoal Filter on for two weeks 06/13-06/27/89
***15 days old

TABLE 3

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T U ELECTRIC - 1989 REMP

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN FILTERED AIR

Results in Units of pCi/m^3 +- 2 s.d.

SAMPLING PERIOD	STATIONS NW-1.0	SW/WSW-0.95	S/SSW-1.2	SW-12.3	SSE-4.5	E-3.5	N-1.45	N-9.4
SEPTEMBER								
08/29-09/05/89	<0.03	<0.03	<0.03	<0.03	<0.04	<0.05	<0.04	<0.04
09/05-09/12/89	<0.03	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.02
09/12-09/19/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
09/19-09/26/89	<0.04	<0.06	<0.06	<0.04	<0.03	<0.03	<0.03	<0.03
09/26-10/03/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.03
OCTOBER								
10/03-10/10/89	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
10/10-10/17/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.03
10/17-10/24/89	<0.04	<0.03	<0.04	<0.03	<0.03	<0.03	<0.03	<0.03
10/24-10/31/89	<0.04	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.03
NOVEMBER								
10/31-11/07/89	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05
11/07-11/14/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
11/14-11/21/89	<0.03	<0.03	<0.03	<0.03	<0.04	<0.04	<0.05	<0.04
11/21-11/28/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
DECEMBER								
11/28-12/05/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.04	<0.03
12/05-12/12/89	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
12/12-12/19/89	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.09***	<0.05
12/19-12/26/89	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02
12/26-01/02/89	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05

***Nine days old and low total flow.

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T U ELECTRIC - 1989 REMP

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATES

Results in Units of 10^{-3} pCi/m^3 +- 2 s.d.

SAMPLING PERIOD	STATIONS NW-1.0	SW/WSW-0.95	S/SSI 1.2	SW-12.3	SSE-4.5	E-3.5	N-1.45	N-9.4
JANUARY								
01/03-01/10/89	30+-4	30+-4	37+-4	36+-4	33+-4	37+-4	40+-4	42+-4
01/10-01/17/89	26+-4	20+-3	24+-4	23+-4	21+-4	25+-4	22+-4	24+-4
01/17-01/24/89	19+-4	23+-4	23+-4	22+-4	21+-4	27+-4	24+-4	27+-4
01/24-01/31/89	38+-4	45+-4	44+-4	51+-4	43+-4	49+-4	47+-4	52+-4
FEBRUARY								
01/31-02/07/89	29+-4	30+-4	28+-4	33+-4	30+-4	35+-4	37+-4	35+-4
02/07-02/14/89	23+-3	26+-3	27+-3	26+-3	26+-3	30+-4	30+-4	29+-3
02/14-02/21/89	11+-3	12+-3	14+-3	12+-3	12+-3	14+-3	16+-3	15+-3
02/21-02/28/89	24+-3	27+-3	29+-3	33+-4	29+-3	35+-4	37+-4	29+-3
MARCH								
02/28-03/07/89	18+-3	21+-3	21+-3	24+-3	19+-3	26+-3	25+-3	19+-3
03/07-03/14/89	20+-3	21+-3	20+-3	23+-3	20+-3	26+-3	*	25+-3
03/14-03/21/89	20+-3	22+-3	21+-3	26+-3	22+-3	28+-3	28+-4	24+-3
03/21-03/28/89	23+-3	19+-3	15+-3	24+-3	20+-3	24+-3	23+-3	20+-3
APRIL								
03/28-04/04/89	11+-3	18+-3	14+-3	16+-3	16+-3	20+-3	1.+-3	15+-3
04/04-04/12/89	17+-3	18+-3	14+-3	20+-3	17+-3	20+-3	22+-3	18+-3
04/12-04/18/89	12+-4	22+-4	15+-4	15+-4	19+-4	18+-4	26+-4	18+-4
04/18-04/24/89	17+-4	24+-4	20+-4	27+-4	27+-4	27+-4	28+-4	23+-4
04/24-05/02/89	12+-3	15+-3	14+-3	20+-3	17+-3	23+-3	22+-3	20+-3

* Filt crooked -- sample not collected.

TABLE 4

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T U ELECTRIC - 1989 REMP

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATES

Results in Units of 10^{-3} pCi/m^3 +- 2 s.d.

SAMPLING PERIOD	STATIONS NW-1.0	SW/WSW-0.95	S/SSW-1.2	SW-12.3	SSE-4.5	E-3.5	N-1.45	N-9.4
MAY								
05/02-05/09/89	*	16+-3	15+-3	21+-3	16+-3	20+-3	22+-3	15+-3
05/11-05/16/89	13+-4	20+-3	15+-3	19+-3	16+-3	20+-3	22+-3	16+-3
05/16-05/23/89	*	15+-3	16+-3	21+-3	21+-3	21+-3	24+-4	18+-3
05/23-05/30/89	2?+-3	25+-3	21+-3	25+-3	29+-3	30+-3	27+-3	28+-3
JUNE								
05/30-06/06/89	11+-3	9.5+-2.8	9.6+-2.8	15+-3	12+-3	12+-3	12+-3	14+-3
06/06-06/13/89	17+-3	13+-3	14+-3	16+-3	17+-3	15+-3	16+-3	13+-3
06/13-06/20/89	*	13+-3	13+-3	13+-3	15+-3	15+-3	14+-3	12+-3
06/20-06/27/89	*	7.2+-2.8	12+-3	13+-3	8.3+-2.7	9.5+-2.8	15+-0.3	13+-3
06/27-07/03/89	12+-3	11+-3	10+-0.3	9.7+-3.0	11+-3	6.1+-2.7	13+-3	12+-3
JULY								
07/03-07/11/89	26+-3	23+-3	25+-3	23+-3	27+-3	28+-3	23+-3	25+-3
07/11-07/18/89	18+-3	16+-3	18+-3	16+-3	19+-3	19+-3	20+-3	18+-3
07/18-07/24/89	26+-4	21+-4	23+-4	26+-4	22+-3	29+-4	27+-4	24+-4
07/24-08/01/89	18+-3	14+-2	12+-2	16+-3	13+-2	16+-3	15+-3	14+-3
AUGUST								
08/01-08/08/89	9.6+-3.4	8.0+-3.4	11+-3	12+-3	9.8+-3.3	9.6+-3.3	9.5+-3.3	10+-3
08/08-08/15/89	27+-4	33+-5	24+-4	25+-4	23+-4	29+-4	29+-4	41+-4
08/15-08/22/89	16+-3	14+-3	12+-3	13+-3	11+-3	12+-3	16+-3	12+-?
08/22-08/29/89	13+-3	8.4+-2.3	11+-3	12+-3	5.3+-2.2	*	13+-3	12+-3

*Pump out of service; sample not collected.

TABLE 4

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T U ELECTRIC - 1989 REMP

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATES

Results in Units of 10^{-3} pCi/m^3 +- 2 s.d.

SAMPLING PERIOD	NW-1.0	SW/WSW-0.95	S/SSW-1.2	STATIONS SW-12.3	SSE-4.5	E-3.5	N-1.45	N-9.4
SEPTEMBER								
08/29-09/05/89	12+-3	13+-3	15+-3	12+-3	14+-3	13+-3	18+-3	15+-3
09/05-09/12/89	11+-3	13+-3	10+-3	16+-3	14+-3	11+-3	12+-3	13+-3
09/12-09/19/89	19+-3	16+-3	12+-3	16+-3	13+-3	10+-3	20+-4	17+-3
09/19-09/26/89	28+-5	41+-6	35+-5	23+-3	26+-4	26+-4	26+-4	25+-3
09/26-10/03/89	37+-4	32+-4	32+-4	34+-4	30+-4	30+-4	35+-4	38+-4
OCTOBER								
10/03-10/10/89	41+-4	35+-4	38+-4	38+-4	34+-4	31+-4	42+-4	37+-4
10/10-10/17/89	33+-4	31+-4	32+-4	31+-4	30+-4	32+-4	35+-4	35+-4
10/17-10/24/89	19+-4	19+-4	20+-4	19+-4	22+-4	13+-4	17+-4	20+-4
10/24-10/31/89	17+-4	14+-4	22+-4	23+-4	20+-4	15+-4	21+-4	14+-4
NOVEMBER								
10/31-11/07/89	32+-4	36+-4	35+-4	38+-4	35+-4	33+-4	29+-4	30+-4
11/07-11/14/89	35+-4	33+-4	37+-4	33+-4	33+-4	39+-4	37+-4	42+-4
11/14-11/21/89	32+-4	31+-4	34+-4	29+-4	33+-4	35+-4	29+-4	32+-4
11/21-11/28/89	43+-4	39+-4	44+-5	43+-4	38+-4	43+-4	35+-4	40+-4
DECEMBER								
11/28-12/05/89	22+-4	20+-4	19+-4	-4	20+-4	25+-4	18+-4	21+-4
12/05-12/12/89	34+-4	31+-4	32+-4	-4	31+-4	34+-4	30+-4	29+-4
12/12-12/19/89	48+-5	48+-5	46+-5	45+-5	41+-5	46+-5	41+-7	42+-5
12/19-12/26/89	52+-5	47+-5	47+-5	50+-5	46+-5	54+-5	55+-9	44+-5
12/26-01/02/90	39+-4	38+-4	37+-4	39+-4	37+-4	37+-4	32+-4	36+-4
Average +- 2 s.d.								

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T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN AIR PARTICULATE FILTERS

Results in Units of E-03 pCi/m^3 +- 2 s.d.

LOCATION	COMPOSITE PERIOD	Be-7	K-40	Ru-103	Cs-134	Cs-137
FIRST QUARTER						
NW-1.0	01/03/89-03/28/89	72.8+-7.3	9.33+-4.65	<0.5	<0.5	<0.5
SW/WSW-0.95	01/03/89-03/28/89	82.0+-8.2	< 7	<0.5	<0.4	<0.4
S/SSW-1.2	01/03/89-03/28/89	67.2+-6.7	<10	<0.6	<0.6	<0.5
SW-12.3	01/03/89-03/28/89	80.5+-8.0	<10	<0.6	<0.5	<0.5
SSE-4.5	01/03/89-03/28/89	73.2+-7.3	< 8	<0.5	<0.4	<0.5
E-3.5	01/03/89-03/28/89	99.1+-9.9	<10	<0.6	<0.6	<0.6
N-1.45	01/03/89-03/28/89	82.2+-8.2	<20	<0.8	<0.8	<0.8
N-9.4	01/03/89-03/28/89	78.3+-7.8	<20	<0.7	<0.7	<0.7
SECOND QUARTER						
NW-1.0	03/28/89-07/03/89	65.8+-8.9	<10	<0.8	<0.6	<0.6
SW/WSW-0.95	03/28/89-07/03/89	70.1+-7.6	< 9	<0.7	<0.4	<0.4
S/SSW-1.2	03/28/89-07/03/89	59.7+-6.0	< 8	<0.5	<0.4	<0.3
SW-12.3	03/28/89-07/03/89	65.6+-6.6	< 5	<0.5	<0.3	<0.3
SSE-4.5	03/28/89-07/03/89	65.7+-6.6	< 8	<0.5	<0.3	<0.4
E-3.5	03/28/89-07/03/89	68.3+-6.8	< 8	<0.6	<0.4	<0.4
N-1.45	03/28/89-07/03/89	63.6+-7.1	<20	<0.8	<0.5	<0.5
N-9.4	03/28/89-07/03/89	70.7+-7.1	< 7	<0.5	<0.5	<0.3

* All other gamma emitters were <LLD.

TABLE 5

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T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN AIR PARTICULATE FILTERS

Results in Units of E-03 pCi/m^3 +- 2 s.d.

LOCATION	COMPOSITE PERIOD	Be-7	K-40	Ru-103	Cs-134	Cs-137
THIRD QUARTER						
NW-1.0	07/03/89-10/03/89	72.8+-7.9	< 8	<0.8	<0.4	<0.5
SW/WSW-0.95	07/03/89-10/03/89	63.4+-6.9	< 9	<0.6	<0.3	<0.4
S/SSW-1.2	07/03/89-10/03/89	60.3+-7.3	<10	<0.8	<0.6	<0.6
SW-12.3	07/03/89-10/03/89	67.8+-7.2	<10	<0.8	<0.5	<0.5
SSE-4.5	07/03/89-10/03/89	60.4+-6.0	< 8	<0.6	<0.4	<0.5
E-3.5	07/03/89-10/03/89	69.4+-7.2	< 9	<0.7	<0.5	<0.5
N-1.45	07/03/89-10/03/89	86.3+-8.6	12.8+-4.7	<0.7	<0.4	<0.4
N-9.4	07/03/89-10/03/89	69.9+-7.5	< 7	<0.6	<0.5	<0.5
FOURTH QUARTER						
NW-1.0	10/03/89-01/02/90	79.4+-8.4	<10	<0.8	<0.5	<0.4
SW/WSW-0.95	10/03/89-01/02/90	78.3+-7.9	14.7+-5.9	<0.7	<0.4	<0.4
S/SSW-1.2	10/03/89-01/02/90	69.1+-7.3	<10	<0.8	<0.5	<0.5
SW-12.3	10/03/89-01/02/90	69.0+-7.2	<10	<0.8	<0.5	<0.5
SSE-4.5	10/03/89-01/02/90	74.8+-7.6	<10	<0.5	<0.4	<0.4
E-3.5	10/03/89-01/02/90	71.6+-7.6	12.8+-5.5	<0.7	<0.5	<0.5
N-1.45	10/03/89-01/02/90	68.4+-7.7	< 9	<0.7	<0.5	<0.4
N-9.4	10/03/89-01/02/90	69.8+-9.2	<10	<0.8	<0.5	<0.5

* All other gamma emitters were <LLD.

TABLE 6

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN MILK

Results in pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	SSE-2.2	SW-13.5
JANUARY	01/17/89	<0.4	<0.5
FEBRUARY	02/14/89	<0.5	<0.5
MARCH	03/14/89	<0.3	<0.3
APRIL	04/12/89	<0.3	<0.2
MAY	05/09/89	<0.3	<0.3
	05/23/89	<0.2	<0.2
JUNE	06/06/89	<0.3	<0.3
	06/20/89	<0.3	<0.4
JULY	07/04/89	<0.3	<0.3
	07/18/89	<0.3	<0.3
AUGUST	08/01/89	<0.3	<0.3
	08/15/89	<0.3	<0.3
	08/29/89	<0.3	<0.3
SEPTEMBER	09/12/89	<0.2	<0.3
	09/25/89	<0.4	<0.3
OCTOBER	10/10/89	<0.2	<0.3
	10/24/89	<0.4	<0.3
NOVEMBER	11/21/89	<0.5	<0.2
DECEMBER	12/12/89	<0.3	<0.3

TABLE 7

(PAGE 1 of 2)

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN MILK

Results in Units of pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	K-40	Cs-134	Cs-137	La-140-BA-140
STATION - SSE-2.2					
JANUARY	01/17/89	1220+-120	<4	<4	< 6
FEBRUARY	02/14/89	1360+-140	<4	<4	<10
MARCH	03/14/89	1400+-140	<4	<4	< 6
APRIL	04/12/89	1150+-120	<5	<5	< 6
MAY	05/09/89	1190+-120	<4	<4	< 6
	05/23/89	1330+-130	<4	<4	< 8
JUNE	06/06/89	1330+-130	<4	<4	< 6
	06/20/89	1260+-130	<4	<4	< 9
JULY	07/04/89	1310+-130	<4	<4	< 6
	07/18/89	1340+-130	<4	<4	< 6
AUGUST	08/01/89	1230+-120	<4	<4	< 7
	08/15/89	1210+-120	<6	<6	<10
	08/29/89	1430+-140	<4	<4	< 8
SEPTEMBER	09/12/89	1340+-130	<4	<4	< 6
	09/25/89	1260+-130	<4	<5	< 9
OCTOBER	10/10/89	1510+-150	<4	<4	< 9
	10/24/89	1230+-120	<4	<4	< 9
NOVEMBER	11/21/89	1280+-130	<4	<4	< 9
DECEMBER	12/12/89	1290+-130	<4	<4	< 7

* All other gamma emitters were <LLD.

TABLE 7

(PAGE 2 of 2)

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN MILK

Results in Units of pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	K-40	Cs-134	Cs-137	Ba/La-140
STATION - SW-13.5					
JANUARY	01/17/89	1460+-150	<4	<4	< 6
FEBRUARY	02/14/89	1400+-140	<4	<4	< 9
MARCH	03/14/89	1430+-140	<4	<4	< 6
APRIL	04/12/89	1290+-130	<4	<4	< 5
MAY	05/09/89	1250+-130	<4	<4	< 7
	05/23/89	1280+-130	<4	<4	< 6
JUNE	06/06/89	1400+-140	<4	<4	< 6
	06/20/89	1440+-140	<4	<3	< 9
JULY	07/04/89	1560+-160	<4	<4	< 6
	07/18/89	1300+-130	<4	<4	< 6
AUGUST	08/01/89	1460+-150	<4	<4	< 6
	08/15/89	1110+-110	<6	<6	< 9
	08/29/89	1430+-140	<4	<4	< 9
SEPTEMBER	09/12/89	1220+-120	<3	<4	< 6
	09/25/89	1420+-140	<4	<4	<10
OCTOBER	10/10/89	1530+-150	<4	<4	< 8
	10/24/89	1240+-120	<4	<4	< 8
NOVEMBER	11/21/89	1560+-160	<4	<4	<10
DECEMBER	12/12/89	1430+-140	<4	<4	< 6
Average +-2 s.d.					

* All other gamma emitters were <LLD.

TABLE 8

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GROSS BETA IN GROUND AND DRINKING WATER*

Results in Units of pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	W-1.2	WSW-0.1	SSE-4.6	N-9.8	N-1.45
JANUARY	01/17/89	9.2+-1.8	<1	7.4+-1.7	2.7+-1.5	8.0+-1.7
FEBRUARY	02/14/89	1.0+-0.2	<1	7.4+-1.6	3.9+-1.5	6.2+-1.5
MARCH	03/14/89	10 +-2	4.4 +-1.2	1.7+-0.8	2.3+-1.3	7.3+-1.5
APRIL	04/12/89	9.0 +-1.8	<1	7.8+-1.7	3.3+-1.5	6.9+-1.6
JULY	07/04/89	9.0 +-1.7	<0.9	9.0+-1.7	2.2+-1.3	7.3+-1.5
Average +-2 s.d.						

*Drinking water analyses eliminated 04/24/90. Subsequent samples were analyzed pursuant to GDCM groundwater analysis requirements of quarterly gamma isotopic and tritium analyses.

TABLE 9

(PAGE 1 OF 2)

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN GROUND/DRINKING WATER**

Results in Units of pCi/l +- 2 s.d.

COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb/Zr-95	Cs-134	Cs-137	Ba/La-140
STATION N-1.45									
01/17/89	<5	<6	<10	<6	<10	< 6	<6	<6	<10
02/14/89	<5	<5	<10	<6	<10	< 5	<6	<5	<10
03/14/89	<2	<3	< 6	<3	< 7	< 3	<3	<3	< 4
04/12/89	<5	<5	<10	<5	<10	< 5	<5	<5	<10
07/04/89	<3	<3	< 6	<3	< 8	< 3	<3	<3	< 6
10/03/89	<5	<5	<10	<6	<10	< 6	<6	<5	<10
STATION W-1.2									
01/17/89	<5	<5	<10	<5	<10	< 5	<5	<5	< 8
02/14/89	<4	<4	<10	<5	< 9	< 5	<4	<5	<10
03/14/89	<4	<4	< 8	<5	< 8	< 4	<5	<4	< 5
04/12/89	<3	<3	< 7	<4	< 7	< 4	<3	<3	< 7
07/04/89	<3	<3	< 8	<4	< 7	< 4	<3	<4	< 6
10/03/89	<4	<4	< 9	<4	< 8	< 5	<4	<4	<10
STATION WSW-0.1									
01/17/89	<3	<3	< 8	<4	< 7	< 3	<3	<3	< 6
02/14/89	<3	<3	< 8	<3	< 7	< 3	<3	<4	< 8
03/14/89	<3	<3	< 6	<4	< 7	< 3	<3	<4	< 4
04/12/89	<3	<3	< 8	<4	< 7	< 4	<3	<3	< 7
07/04/89	<3	<3	< 7	<4	< 7	< 4	<4	<4	< 6
10/03/89	<3	<4	< 9	<4	< 8	< 4	<4	<4	<10
STATION SSE-4.6									
01/17/89	<3	<3	< 8	<4	< 7	< 4	<4	<3	< 6
02/14/89	<3	<3	< 7	<3	< 7	< 3	<3	<3	< 8
03/14/89	<4	<4	< 9	<5	< 9	< 4	<5	<5	< 7
04/12/89	<3	<3	< 7	<4	< 7	< 3	<4	<4	< 8
07/04/89	<5	<5	<10	<5	<10	< 5	<5	<5	< 7
10/03/89	<5	<5	<10	<5	<10	< 6	<5	<5	<10

TABLE 9

(PAGE 2 OF 2)

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN GROUND/DRINKING WATER**

Results in Units of pCi/l +- 2 s.d.

COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb/Zr-95	Cs-134	Cs-137	Ba/La-140
STATION N-9.8									
01/17/89	<3	<3	< 7	<4	< 7	< 4	<4	<4	< 6
02/14/89	<5	<6	<10	<6	<10	< 6	<6	<6	<10
03/14/89	<3	<3	< 6	<3	< 6	< 3	<3	<3	< 4
04/12/89	<3	<4	< 8	<4	< 8	< 4	<4	<4	< 8
07/04/89	<4	<4	< 9	<4	< 9	< 4	<4	<4	< 8
10/03/89	<4	<4	<10	<5	< 9	< 5	<4	<5	<10

*All other gamma emitters were LLD.

**Drinking water analyses eliminated 04/24/90. Subsequent samples were analyzed pursuant to the ODCM groundwater analysis requirements of quarterly gamma isotopic and tritium analyses.

TABLE 10

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN GROUND AND DRINKING WATER*

Results in Units of pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	W-1.2	WSW-0.1	SSE-4.6	N-9.8	N-1.45
JANUARY	01/03/89	<0.7	<0.8	<0.8	<1	<1
	01/17/89	<0.3	<0.2	<0.3	<0.3	<0.3
	01/31/89	<0.5	<0.5	<0.4	<0.5	<0.5
FEBRUARY	02/14/89	<0.5	<0.5	<0.5	<0.3	<0.4
	02/28/89	<0.2	<0.2	<0.2	<0.2	<0.2
MARCH	03/14/89	<0.1	<0.1	<0.1	<0.3	<0.2
	03/28/89	<0.3	<0.3	<0.2	<0.2	<0.2
APRIL	04/12/89	<0.3	<0.2	<0.2	<0.2	<0.2
	04/24/89	<0.5	<0.5	<0.5	<0.4	<0.4
JULY	07/04/89	<0.2	<0.2	<0.2	<0.2	<0.2
OCTOBER	10/02/89	<20**	<20**	<30**	<30**	<20**

*Drinking water analyses eliminated 04/24/90. Subsequent samples were analyuzed pursuant to the ODCM groundwater analysis requirements of quarterly gamma isotopic and tritium analyses.

**Required LLD for I-131 in water if there is no drinking water pathway is 15 pCi/l. This LLD was not achieved due to delay between sample collection and analysis (approximately 20 days).

TABLE 11

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF TRITIUM IN GROUND/DRINKING WATER*

Results in pCi/l +- 2 s.d.

QUARTER	COLLECTION PERIOD	LOCATION	TRITIUM ACTIVITY
1	01/03/89-03/28/89	SSE-4.6	<2000
	01/03/89-03/28/89	N-9.8	<2000
	01/03/89-03/28/89	W-1.2	<2000
	01/03/89-03/28/89	WSW-0.1	<2000
	01/03/89-03/28/89	N-1.45	<2000
2	04/12/89-04/24/89	SSE-4.6	<2000
	04/12/89-04/24/89	N-9.8	<2000
	04/12/89-04/24/89	W-1.2	<2000
	04/12/89-04/24/89	WSW-0.1	<2000
	04/12/89-04/24/89	N-1.45	<2000
3	07/04/89	SSE-4.6	<2000
	07/04/89	N-9.8	<2000
	07/04/89	W-1.2	<2000
	07/04/89	WSW-0.1	<2000
	07/04/89	N-1.45	<2000
4	10/03/89	SSE-4.6	<2000
	10/03/89	N-9.8	<2000
	10/03/89	W-1.2	<2000
	10/03/89	WSW-0.1	<2000
	10/03/89	N-1.45	<2000

*Drinking water analyses eliminated 04/24/90. Subsequent samples were analyzed pursuant to the ODCM groundwater analysis requirements of quarterly gamma isotopic and tritium analyses.

TABLE 12

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF Gr-B IN WATER-SURFACE/DRINKING

Results in pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	NNW-0.1	N-9.9
JANUARY	01/17/89	18+-4	14+-4
FEBRUARY	02/14/89	21+-4	17+-4
MARCH	03/14/89	16+-4	14+-3
APRIL	04/12/89	19+-4	11+-3
MAY	05/09/89	16+-4	14+-3
JUNE	05/30-06/06/89	13+-3	12+-3
JULY	06/27-07/04/89	14+-3	9.0+-2.4
JULY	07/04-07/18/89	16+-3	9.8+-2.5
AUGUST	07/24-08/01/89	16+-3	15+-3
AUGUST	08/08-08/29/89	16+-3	15+-3
SEPTEMBER	09/05-09/25/89	14+-3	11+-3
OCTOBER	10/03-10/10/89	18+-3	12+-3
OCTOBER	10/03-10/24/89	17+-4	14+-4
NOVEMBER	10/31-11/21/89	15+-3	14+-4
DECEMBER	11/28-12/19/89	15+-3	21+-4
AVERAGE +-2 s.d.			

TABLE 13

(PAGE 1 of 2)

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN WATER-SURFACE/DRINKING

Results in Units of pCi/l +- 2 s.d.

COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb/Zr-95	Cs-134	Cs-137	Ba/La-140
STATION - NNW-0.1									
01/17/89	<3	<3	<7	<4	< 7	< 4	<3	<3	< 6
02/14/89	<3	<3	<7	<3	< 6	< 3	<3	<3	< 9
03/14/89	<3	<3	<6	<3	< 6	< 3	<3	<3	< 4
04/12/89	<3	<4	<8	<4	< 7	< 4	<4	<4	< 8
05/09/89	<3	<3	<8	<4	< 7	< 4	<3	<3	< 9
05/30-06/06/89	<3	<3	<8	<4	< 7	< 3	<3	<4	< 9
06/27-07/04/89	<5	<5	<9	<5	<10	< 5	<5	<5	< 7
07/04-07/18/89	<3	<3	<6	<3	< 6	< 3	<3	<3	< 6
07/24-08/01/89	<4	<4	<8	<5	< 8	< 4	<4	<4	< 7
08/08-08/29/89	<3	<4	<8	<4	< 8	< 4	<3	<4	<10
09/05-09/25/89	<4	<4	<8	<4	< 8	< 4	<4	<4	< 9
10/03-10/10/89	<3	<4	<9	<3	< 7	< 4	<4	<4	<10
10/03-10/24/89	<4	<4	<9	<5	< 9	< 5	<5	<5	< 8
10/31-11/21/89	<5	<6	<10	<6	<10	< 6	<6	<6	<10
11/28-12/19/89	<4	<4	<10	<4	< 9	< 4	<4	<4	<10
Average +- 2 s.d.									

TABLE 13

(PAGE 2 of 2)

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN WATER-SURFACE/DRINKING

Results in Units of pCi/l +- 2 s.d.

COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb/Zr-95	Cs-134	Cs-137	Ba/La-140
STATION N-9.9									
01/17/89	<4	<4	<9	<5	< 9	< 4	<4	<4	< 7
02/14/89	<3	<3	<6	<3	< 6	< 3	<3	<3	< 8
03/14/89	<4	<4	<8	<5	< 8	< 4	<5	<4	< 6
04/12/89	<3	<3	<8	<4	< 8	< 4	<3	<4	< 7
05/09/89	<3	<3	<8	<4	< 7	< 4	<3	<4	< 9
05/30-06/06/89	<3	<3	<9	<4	< 7	< 4	<4	<4	<10
06/27-07/04/89	<4	<4	<9	<4	< 9	< 4	<4	<4	< 6
07/04-07/18/89	<2	<2	<6	<3	< 6	< 3	<3	<3	< 6
07/24-08/01/89	<3	<3	<7	<3	< 7	< 3	<3	<4	< 6
08/08-08/29/89	<5	<5	<10	<6	<10	< 6	<6	<6	<10
09/05-09/25/89	<3	<3	<8	<4	< 7	< 4	<4	<4	< 9
10/03-10/10/89	<4	<4	<8	<4	< 8	< 4	<4	<4	<15
10/03-10/24/89	<3	<4	<8	<4	< 7	< 3	<4	<4	< 8
10/31-11/21/89	<4	<4	<10	<5	<10	< 5	<5	<5	<10
11/28-12/19/89	<3	<3	< 7	<3	< 6	< 4	<4	<4	< 8
Average +- 2 s.d.									

TABLE 14

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN WATER-SURFACE/DRINKING

Results in pCi/l +- 2 s.d.

MONTH	COLLECTION DATE	NNW-0.1	N-9.9
JANUARY	01/03/89	<0.9	<0.5
	01/17/89	<0.3	<0.3
	01/31/89	<0.5	<0.5
FEBRUARY	02/14/89	<0.4	<0.5
	02/28/89	<0.2	<0.2
MARCH	03/14/89	<0.3	<0.4
	03/28/89	<0.2	<0.2
APRIL	04/12/89	<0.2	<0.2
	04/24/89	<0.4	<0.4
MAY	05/09/89	<0.3	<0.2
	05/16-05/23/89	<0.3	<0.2
JUNE	05/30-06/06/89	<0.4	<0.5
	06/13-06/20/89	<0.4	<0.4
JULY	06/27-07/04/89	<0.2	<0.2
	07/04-07/18/89	<0.4	<0.3
	07/24-08/01/89	<0.3	<0.2
AUGUST	08/08-08/15/89	<0.2	<0.4
	08/08-08/29/89	<0.4	<0.5
SEPTEMBER	09/05-09/12/89	<0.2	<0.2
	09/05-09/25/89	<0.3	<0.2
OCTOBER	10/03-10/10/89	<0.2	<0.2
	10/03-10/24/89	<0.3	<0.3
NOVEMBER	10/31-11/07/89	<0.3	<0.3
	10/31-11/21/89	<0.2	<0.3
DECEMBER	11/28-12/05/89	<0.4	<0.3
	11/28-12/19/89	<0.3	<0.3
	12/26-01/02/90	<0.2	<0.2

TABLE 15

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF TRITIUM IN WATER-SURFACE/DRINKING

Results in pCi/l +- 2 s.d.

QUARTER	COLLECTION PERIOD	LOCATION	TRITIUM ACTIVITY
1	01/03/89-03/28/89	N-9.9	<2000
	01/03/89-03/28/89	NNW-0.1	<2000
2	04/12/89-06/20/89	N-9.9	<2000
	04/12/89-06/20/89	NNW-0.1	<2000
3	06/27/89-09/25/89	N-9.9	<2000
	06/27/89-09/25/89	NNW-0.1	<2000
4	10/03/89-12/19/89	N-9.9	<2000
	10/03/89-12/19/89	NNW-0.1	<2000

TABLE 16

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T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF *MMA EMITTERS* IN SURFACE WATER

Results in Units of pCi/l +- 2 s.d.

COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb/Zr-95	Cs-134	Cs-137	Ba/La-140
STATION ESE-1.4									
01/17/89	<4	<4	< 8	<4	< 7	< 4	<4	<4	< 5
02/14/89	<4	<4	<10	<5	< 8	< 5	<5	<5	<10
03/14/89	<3	<3	< 7	<4	< 7	< 3	<3	<4	< 5
04/12/89	<3	<3	< 8	<4	< 8	< 4	<4	<4	< 7
05/09/89	<4	<4	< 8	<3	< 7	< 4	<4	<4	< 8
05/16-06/06/89	<5	<5	<10	<5	<10	< 5	<5	<5	< 9
06/13-07/04/89	<3	<3	< 6	<3	< 6	< 3	<3	<3	< 5
07/11-08/01/89	<3	<3	< 7	<3	< 8	< 3	<3	<4	< 7
08/08-08/29/89	<3	<3	< 6	<3	< 6	< 3	<3	<3	< 9
09/05-09/25/89	<3	<3	< 8	<3	< 6	< 3	<3	<3	< 8
10/03-10/24/89	<4	<4	< 9	<5	< 9	< 5	<4	<5	< 9
10/31-11/21/89	<4	<4	< 9	<4	< 8	< 6	<3	<5	<10
11/28-12/19/89	<3	<3	< 9	<4	< 8	< 4	<4	<4	< 9
Average +- 2 s.d.									
STATION N-1.5									
01/17/89	<5	<5	<10	<6	<10	< 5	<5	<6	< 8
02/14/89	<3	<4	< 8	<4	< 7	< 4	<4	<4	< 9
03/14/89	<3	<2	< 6	<3	< 5	< 3	<3	<3	< 4
04/12/89	<3	<3	< 8	<4	< 8	< 4	<3	<4	< 7
05/09/89	<3	<3	< 7	<4	< 7	< 3	<4	<3	< 9
05/16-06/06/89	<4	<4	< 9	<5	< 9	< 5	<4	<4	< 8
06/13-07/04/89	<3	<3	< 6	<3	< 6	< 3	<3	<3	< 7
07/11-08/01/89	<3	<3	< 7	<4	< 7	< 3	<4	<3	< 6
08/08-08/29/89	<3	<3	< 7	<3	< 6	< 3	<3	<3	< 9
09/05-09/25/89	<3	<3	< 7	<3	< 6	< 3	<3	<3	< 9
10/03-10/24/89	<3	<4	< 8	<4	< 6	< 4	<4	<4	< 9
10/31-11/21/89	<4	<4	< 9	<5	< 8	< 5	<4	<4	<10
11/28-12/19/89	<4	<4	< 8	<3	< 8	< 4	<3	<4	< 7
Average +- 2 s.d.									

TABLE 16

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T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN SURFACE WATER

Results in Units of pCi/l +- 2 s.d.

COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb/Zr-95	Cs-134	Cs-137	Ba/La-140
STATION NE-7.4									
01/17/89	<4	<4	< 8	<4	< 7	< 4	<4	<4	< 6
02/14/89	<2	<3	< 7	<3	< 6	< 3	<3	<3	< 8
03/14/89	<3	<3	< 6	<3	< 6	< 3	<3	<4	< 4
04/12/89	<4	<4	< 9	<5	< 8	< 4	<4	<4	< 8
05/09/89	<5	<5	<10	<5	<10	< 5	<5	<5	<10
06/06/89	<5	<5	<10	<5	<10	< 5	<5	<6	<10
07/04/89	<3	<3	< 7	<3	< 6	< 3	<3	<3	< 6
08/01/89	<3	<3	< 8	<3	< 7	< 4	<3	<3	< 8
08/29/89	<3	<3	< 7	<3	< 6	< 3	<3	<3	< 9
09/25/89	<4	<4	<10	<5	< 9	< 5	<4	<4	<10
10/24/89	<3	<4	< 7	<4	< 8	< 5	<4	<4	<10
11/21/89	<5	<5	<10	<6	<10	< 6	<5	<5	<10
12/12/89	<4	<3	< 7	<4	< 7	< 4	<3	<3	< 8
Average +- 2 s.d.									
STATION N-19.3									
01/17/89	<3	<3	< 8	<4	< 6	< 4	<3	<3	< 6
02/14/89	<3	<3	< 7	<3	< 6	< 4	<3	<3	< 8
03/14/89	<5	<5	<10	<6	<10	< 5	<6	<5	< 7
04/12/89	<3	<3	< 7	<3	< 7	< 3	<4	<3	< 8
05/09/89	<3	<3	< 8	<4	< 7	< 3	<3	<4	< 9
06/06/89	<5	<5	<10	<5	<10	< 5	<6	<5	<10
07/04/89	<2	<3	< 6	<3	< 6	< 3	<3	<3	< 7
08/01/89	<3	<3	< 7	<3	< 7	< 3	<3	<3	< 9
08/29/89	<3	<3	< 7	<3	< 6	< 3	<3	<3	< 9
09/25/89	<2	<3	< 7	<3	< 6	< 3	<3	<3	< 9
10/24/89	<3	<4	< 8	<3	< 8	< 4	<4	<4	< 8
11/21/89	<5	<5	<10	<5	<10	< 6	<5	<6	<10
12/12/89	<3	<3	< 8	<3	< 7	< 4	<4	<3	< 9
Average +- 2 s.d.									

*All other gamma emitters were LLD.

TABLE 17

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF I-131 IN SURFACE WATER*

Results in pCi/l +- 2 s.d

MONTH	COLLECTION DATE	N-1.5	N-19.3	NE-7.4	ESE-1.4
JANUARY	01/17/89	<0.3	<0.3	<0.2	<0.3
FEBRUARY	02/14/89	<0.5	<0.5	<0.5	<0.4
MARCH	03/14/89	<0.2	<0.2	<0.2	<0.2
APRIL	04/12/89	<0.2	<0.2	<0.2	<0.2
MAY	05/09/89	<10	<10	<10	<10
JUNE	06/06/89	<10	<10	<20**	<20**
JULY	07/04/89	< 6	< 7	< 8	< 8
AUGUST	08/01/89	< 7	<10	<10	< 9
AUGUST	08/29/89	<10	<10	<10	<10
SEPTEMBER	09/25/89	<20**	<10	<20**	<20**
OCTOBER	10/24/89	<10	<10	<10	<10
NOVEMBER	11/21/89	<20**	<20**	<20**	<20**
DECEMBER	12/19/89	<10	<10	<10	<10

*Surface water samples were analyzed pursuant to drinking water requirements through 04/24/89. At that time, the drinking water analyses were eliminated and subsequent samples were analyzed pursuant to the ODCM surface water analysis requirements of monthly gamma iostopic and quarterly tritium composite.

**The required LLD for I-131 in water if there is no drinking water pathway is 15 pCi/l. This LLD was not achieved due to confusion over elimination of the I-131 analysis for drinking water discussed in the above notation. TU notified Teledyne Isotopes by telephone and by letter of this discrepancy. (See letter included in Appendix C).

TABLE 10

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF TRITIUM IN SURFACE WATER*

Results in pCi/l +- 2 s.d.

QUARTER	COLLECTION PERIOD	LOCATION	TRITIUM ACTIVITY
1	01/17/89-03/14/89	N-19.3	<2000
	01/17/89-03/14/89	ESE-1.4	<2000
	01/17/89-03/14/89	N-1.5	<2000
	01/17/89-03/14/89	NE-7.4	<2000
2	04/12/89-06/06/89	N-19.3	<2000
	04/12/89-06/06/89	ESE-1.4	<2000
	04/12/89-06/06/89	N-1.5	<2000
	04/12/89-06/06/89	NE-7.4	<2000
3	07/04/89-09/25/89	N-19.3	<2000
	07/04/89-09/25/89	ESE-1.4	<2000
	07/04/89-09/25/89	N-1.5	<2000
	07/04/89-09/25/89	NE-7.4	<2000
4	10/03/89-12/12/89	N-19.3	<2000
	10/03/89-12/19/89	ESE-1.4	<2000
	10/03/89-12/19/89	N-1.5	<2000
	10/03/89-12/12/89	NE-7.4	<2000

*Surface water samples were analyzed pursuant to drinking water requirements through 04/24/89. At that time, drinking water analyses were eliminated and subsequent samples were analyzed pursuant to the ODCM surface water analysisd requirements of monthly gamma isotopic and quarterly tritium composite.

TABLE 19

T U ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN FISH

Results in pCi/kg (wet) +- 2 s.d.

COLLECTION DATE	STATION	DESCRIPTION	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
APRIL										
04/13/89	NNE-8/F-2	Crappie	3820+-540	<40	<40	<100	<40	< 90	<40	<40
04/13/89	NNE-8/F-2	Catfish	3930+-390	<20	<20	< 50	<20	< 40	<20	<20
04/13/89	NNE-8/F-2	Hybrid Strip	3800+-380	< 7	< 9	< 20	< 9	< 20	< 7	< 8
04/21/89	ENE-2/F1	Sand Bass	3160+-320	<10	<10	< 30	<10	< 30	<10	<20
04/21/89	ENE-2/F1	Walleye	3560+-360	< 7	< 9	< 20	< 9	< 20	< 9	< 8
04/21/89	ENE-2/F1	Perch	4490+-750	<60	<60	<100	<70	<100	<70	<70
04/21/89	ENE-2/F1	Catfish	3900+-390	<10	<20	< 40	<10	< 40	<10	<10
09/18/89	ENE-2/F1	Walleye	2730+-270	<10	<30	< 70	<10	< 30	<20	<20
09/18/89	ENE-2/F1	Hybrid St Bass	3070+-310	< 7	<10	< 40	< 8	< 20	< 7	13.3+-6.0
10/11/89	NNE-8/F2	Crappie	2210+-220	< 8	<10	< 30	< 9	< 20	< 8	< 9
10/11/89	NNE-8/F2	Sand Bass	1960+-200	< 8	<10	< 30	< 9	< 20	< 9	< 8
AVERAGE +-2 s.d.										

*All other gamma emitters were LLD.

TABLE 20

TU ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN SEDIMENT

Results in pCi/kg (dry) +- 2 s.d.

COLLECTION DATE	STATION	Be-7	K-40	Cs-134	Cs-137	Pb-212	Bi-214	Pb-214	Ra-226	Th-228
STATION N-9.9										
02/14/89		<200	3270+-330	<20	<20	126+-13	168+-24	165+-26	<200	124+- 12
08/15/89		<200	4800+-480	<20	<20	212+-21	288+-100	304+-45	<400	211+- 21
STATION NE-7.4										
02/14/89		<100	1860+-190	<10	<10	92+- 11.2	264+-26	217+-26	370+-140	8.1+- 0.81
08/15/89		<200	2050+-260	<20	<20	107+- 16	178+-32	202+-35	<400	106+- 15
STATION NNE-1.0										
02/14/89		274+-126	2220+-220	<10	20.6+-11.4	82.3+-8.2	188+-19	238+-24	403+-202	90.6+-11
08/15/89		<200	1740+-210	<20	<20	101+-17	142+-31	157+-36	<400	100+- 17
Average +- 2 sd										

* All other gamma emitters were LLD.

TABLE 21

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TU ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN FOOD PRODUCTS AND BROADLEAF VEGETATION

Results in pCi/kg (wet) +- 2 s.d.

STATION	DESCRIPTION	COLLECTION DATE	Be-7	K-40	I-131	Cs-134	Cs-137
SW-13.5	BL3 Weeds	05/09/89	2030+-200	9810+-980	<10 **	< 8	< 8
	FP3 Spinach	06/06/89	231+- 66	6680+-670	<20	< 9	<10
	FP3 Cabbage	06/06/89	437+- 69	4430+-440	<10	< 8	< 8
	FP3 Radishes	06/06/89	< 80	5590+-560	<30	<10	<10
	BL3 Weed Lvs	06/06/89	965+- 97	965+- 97	< 6 **	< 7	< 6
	FP3 Cabbage	07/04/89	225+-75	3860+-390	<30	<10	< 9
	FP3 Potatos	07/04/89	< 70	4730+-470	<20	< 9	< 9
	BL3 Weed Lvs	07/04/89	510+-77	7660+-770	< 6 **	< 8	< 8
	FP3 Cabbage	08/01/89	<100	3520+-350	<20	<10	<10
	FP3 Potatos	08/01/89	< 60	4450+-450	<10	< 7	< 8
	BL3 Blood Wd	08/01/89	548+-126	7110+-710	< 7 **	<10	<20
	BL3 Oak Lvs	08/01/89	2290+-230	4670+-470	< 6 **	<20	<20
	BL3 Johnson	08/01/89	1030+-150	2500+-340	< 8 **	<20	<20
	BL3 Tree Lvs	08/29/89	2240+-510	2600+-670	< 8 **	<50	<50
	BL3 Weed	09/25/89	1390+-180	6520+-650	<20 **	<10	<10
	BL3 Tree Lvs	10/24/89	3120+-330	3810+-380	<10 **	<20	<20
	BL3 Tree Lvs	11/21/89	1660+-220	7210+-730	<10 **	<20	27.5+-15.4
	BL3 Forage grasses	12/12/89	1440+-560	896+-427	<20 **	<60	<60
N-1.45	BL1 Tree Lvs	05/09/89	1290+-130	5900+-590	<10 **	<10	<10
	BL1 Sumac Lvs	06/06/89	1080+-180	5380+-540	<10 **	<20	<20
	BL1 Sumac Lvs	07/04/89	1870+-190	6290+-630	< 7 **	<20	<20
	BL1 Grass	08/01/89	4560+-460	9360+-940	< 6 **	<30	<40
	BL1 Sumac Lf	08/01/89	1310+-130	6140+-610	< 8 **	<10	<10
	BL1 Sumac	08/29/89	1400+-300	4760+-480	< 7 **	<30	<30
	BL1 Sumac	09/25/89	3080+-340	5850+-580	<20 **	<20	<20
	BL1 Sumac Lvs	10/24/89	858+-252	4730+-470	<10 **	<20	<20
	BL1 Tree Lvs	11/21/89	1830+-290	7690+-770	<20 **	<30	<30
	BL1 Forage grasses	12/12/89	5670+-770	5630+-720	<20 **	<60	<70

Average +- 2 sd

* All other gamma emitters were LLD.

** Iodine-131 by radiochemical method

TABLE 21

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TU ELECTRIC

COMANCHE PEAK STEAM ELECTRIC STATION

CONCENTRATIONS OF GAMMA EMITTERS* IN VEGETATION

Results in pCi/kg (wet) +- 2 s.d.

STATION	DESCRIPTION	COLLECTION DATE	Be-7	K-40	I-131	Cs-134	Cs-137
SW-1.0	BL2 Tree Lvs	05/09/89	979 +- 98	4310+-430	<10 **	< 9	< 9
	BL2 Weed Lvs	06/06/89	1080+-130	8310+-830	< 9 **	<10	<10
	BL2 Weed Lvs	07/04/89	360+-60	9830+-980	< 7 **	< 8	< 8
	BL2 Sunflower	08/01/89	359+-78	12300+-1200	< 8 **	<10	<10
	BL2 Cotton Gr	08/01/89	500+-106	4060+-410	< 8 **	<10	<20
	BL2 Sumac Lf	08/01/89	954+-126	6330+-630	< 6 **	<20	<20
	BL2 Sumac	08/29/89	3180+-330	4010+-400	< 8 **	<20	<20
	BL2 Sumac	09/26/89	2270+-230	1570+-170	<10 **	<20	<20
	BL2 Tree Lvs	10/24/89	761+-125	2090+-210	<10 **	<10	<10
	BL2 Tree Lvs	11/21/89	1230+-250	6020+-600	<20 **	<30	<30
	BL2 Forage grasses	12/12/89	2780+-480	1870+-520	< 9 **	<40	<50
Average +- 2 sd							
E-4.2	FP2 Cucumbers	06/06/89	< 70	2070+-210	<20	< 7	< 7
	FP2 Peas	06/06/89	< 90	2770+-280	<30	< 9	<10
	FP2 Cucumbers	07/04/89	< 80	1750+-180	<30	<10	<10
	FP2 Squash	07/04/89	< 70	2880+-290	<20	< 8	< 8
	FP2 Okra	07/04/89	<100	2460+-250	<40	<10	<10
	FP2 Okra	08/01/89	< 70	2540+-250	<20	< 8	< 8
	Okra	08/29/89	< 50	2710+-270	<30	< 6	< 6
Average +- 2 sd							
ENE-9.0	FP1 Pecans	11/14/89	< 60	4220+-420	<60	< 6	< 6
Average +- 2 sd							

* All other gamma emitters were LLD.
** Iodine-131 by radiochemical method

TABLE 22

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

T U ELECTRIC - COMANCHE PEAK STEAM ELECTRIC STATION

JANUARY 01 TO DECEMBER 31, 1989

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) (1)	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN(f)(2) RANGE	CONTROL LOCATION MEAN(f)(2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
TLDs (mR/day)	Gamma Dose-211	-	0.16(201/201) (0.13-0.20)	ENE-5	0.20(5/5) (0.17-0.22)	0.16(10/10) (0.12-0.18)	0
Air Iodine-131 (10^{-3} pCi/m^3)	I-131 411	70	-(0/359) --	NA	NA	-(0/52) --	0
Air Particulates (10^{-3} pCi/m^3)	Gross Beta 410	10	24(352/358) (5.3-55)	N-1.45	25(51/51) (9.5-55)	25(52/52) (9.7-51)	0
	Gamma Spec 32						
	Be-7	-	72(28/28) (60-99)	E-3.5	77(4/4) (68-99)	71(4/4) (66-81)	0
	K-40	-	12(4/28) (9.3-15)	SW/WSW-0.95	15(1/4) --	-(0/4) --	0
	Cs-134	-	-(0/28) --	NA	NA	-(0/4) --	0
	Cs-137	-	-(0/28) --	NA	NA	-(0/4) --	0
	Ru-103	-	-(0/28) --	NA	NA	-(0/4) --	0

(1) LLD is lower limit of detection as defined and required in USNRC Branch Technical Position on an Acceptable Radiological Environmental Monitoring Program, Revision 1, November 1979.

(2) (f) is the ratio of positive results to the number of samples analyzed for the parameter of interest, means are of positive results only.

TABLE 22

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

T U ELECTRIC - COMANCHE PEAK STEAM ELECTRIC STATION

JANUARY 01 TO DECEMBER 31, 1989

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) (1)	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN(f)(2) RANGE	CONTROL LOCATION MEAN(f)(2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Milk (pCi/l)	I-131 (38) (BY RADIOCHEMISTRY)	-	-(0/19) --	NA	NA	-(0/19) --	0
	Gamma Spec (38)						
	Cs-137	-	-(0/19) --	NA	NA	-(0/19) --	0
	K-40	-	1298(19/19) (1150-1510)	SW-13.5	1379(19/19) (1110-1560)	1379(19/19) (1110-1560)	0
Surface Water (pCi/l)	Gamma Spec (52)	-	-(0/39) --	NA	NA	-(0/13) --	0
	Tritium (16)	2000	-(0/12) --	NA	NA	-(0/4) --	0
	I-131 (16) (BY RADIOCHEMISTRY)		-(0/12)	NA	NA	-(0/4)	0
Ground Drinking Water (pCi/l)	Gamma Spec. (30)	-	-(0/24) --	NA	NA	-(0/6) --	0
	Tritium (20)	2000	-(0/16) --	NA	NA	-(0/4) --	0
	Gross Beta (57)	4	7.0(16/20) (1.0-10)	W-1.2	8.0(5/5) (1.0-10)	3.0(5/5) (2.2-3.9)	0
	I-131 (50) (BY RADIOCHEMISTRY)	1	-(0/40) --	NA	NA	-(0/10) --	0

(1) LLD is lower limit of detection as defined and required in USNRC Branch Technical Position on an Acceptable Radiological Environmental Monitoring Program, Revision 1, November 1979.

(2) (f) is the ratio of positive results to the number of samples analyzed for the parameter of interest, means are of positive results only.

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

T U ELECTRIC - COMANCHE PEAK STEAM ELECTRIC STATION

JANUARY 01 TO DECEMBER 31, 1989

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) (1)	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN(f)(Z) RANGE	CONTROL LOCATION MEAN(f)(Z) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Water-Surface Drinking (pCi/l)	Gamma Spec (30)	-	-(0/15) --	NA	NA	(0/15) --	0
	Tritium (8)	2000	-(0/4) --	NA	NA	-(0/4) --	0
	Iodine-131 (54) (BY RADIOCHEMISTRY)		-(0/27) --	NA	NA	-(0/27) --	0
	Gross Beta (30)		16(15/15) (13-21)	NNW-0.1	16(15/15) (13-21)	14(15/15) (9.0-21)	0
Fish (pCi/kg wet)	Gamma Spec (11)						
	K-40	-	3485(6/6) (2730-4490)	ENE-2/F1	3485(6/6) (2730-4490)	3144(5/5) (1960-3930)	0
	Cs-137	-	13(1/6) --	ENE-2/F1	13(1/6) --	-(0/5) --	0
Shoreline Sediments (pCi/kg dry)	Gamma Spec (6)						
	Bi-214	-	193(4/4) (142-264)	N-9.9	228(2/2) (168-288)	228(2/2) (168-288)	0
	Pb-214	-	204(4/4) (157-238)	N-9.9	235(2/2) (165-304)	235(2/2) (165-304)	0
	Pb-212	-	96(4/4) (82-107)	N-9.9	169(2/2) (126-212)	169(2/2) (126-212)	0

TABLE 22

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

T U ELECTRIC - COMANCHE PEAK STEAM ELECTRIC STATION

JANUARY 01 TO DECEMBER 31, 1989

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) (1)	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN(f)(2) RANGE	CONTROL LOCATION MEAN(f)(2) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Shoreline Sediments (pCi/kg dry)	K-40	-	1967(4/4) (1740-2220)	NNE-1.0	4035(2/2) (3270-4800)	4035(2/2) (3270-4800)	0
	Ra-226	-	387(2/4) (370-403)	NNE-1.0	403(1/2) --	-(0/2) --	0
	Th-228	-	76(4/4) (8.1-106)	N-9.9	168(2/2) (124-211)	168(2/2) (124-211)	0
	Cs-137	-	21(1/4) --	NNE-1.0	21(1/2) --	-(0/2) --	0
	Be-7	-	274(1/4) --	NNE-1.0	274(1/2) --	-(0/2) --	0
Vegetation (pCi/kg wet)	Gamma Spec (47)						
	K-40	-	4959(29/29) (1570-12,300)	N-1.45	6173(10/10) (4730-9360)	4837(18/18) (896-9810))	0
	Be-7	-	1781(21/29) (359-5670)	N-1.45	2294(10/10) (858-5670)	1294(14/18) (225-3120)	0
	Cs-137	-	-(0/29) --	NA	NA	-(0/18) --	0

(1) LLD is lower limit of detection as defined and required in USNRC Branch Technical Position on an Acceptable Radiological Environmental Monitoring Program, Revision 1, November 1979.

(2) (f) is the ratio of positive results to the number of samples analyzed for the parameter of interest, means are of positive results only.

APPENDIX A

EPA CROSS-CHECK PROGRAM

US EPA INTERLABORATOTRY COMPARISON PROGRAM 1989

Collection Date	Media	Nuclide	EPA Result(a)	Teledyne Isotopes Result(b)	
01/06/89	Water	Sr-89	40.00 ± 5.00	37.00 ± 2.65	
		Sr-90	25.00 ± 1.50	26.00 ± 2.00	
01/20/89	Water	Gr-Alpha	8.00 ± 5.00	8.00 ± 1.00	
		Gr-Beta	4.00 ± 5.00	6.00 ± 0.00	
02/10/89	Water	Cr-51	235.00 ± 24.00	245.67 ± 11.72	
		Co-60	10.00 ± 5.00	12.67 ± 1.53	
		Zn-65	159.00 ± 16.00	181.33 ± 5.51	(c)
		Ru-106	178.00 ± 18.00	191.00 ± 9.85	
		Cs-134	10.00 ± 5.00	10.33 ± 0.58	
		Cs-137	10.00 ± 5.00	13.67 ± 0.58	
02/17/89	Water	I-131	106.00 ± 11.00	98.67 ± 0.58	
02/24/89	Water	H-3	2754.00 ± 356.00	2866.67 ± 251.66	
03/10/89	Water	Ra-226	4.90 ± 0.70	5.07 ± 0.29	
		Ra-228	1.70 ± 0.30	1.47 ± 0.29	
03/31/89	Air Filter	Gr-Alpha	21.00 ± 5.00	28.67 ± 1.15	(d)
		Gr-Beta	62.00 ± 5.00	65.67 ± 1.53	
		Sr-90	20.00 ± 1.50	19.67 ± 2.08	
		Cs-137	20.00 ± 5.00	18.00 ± 1.00	
04/18/89	Lab Perf.	Gr-Alpha	29.00 ± 7.00	21.33 ± 2.31	
	Water	Ra-226	3.50 ± 0.50	3.47 ± 0.23	
	Sample A	Ra-228	3.60 ± 0.50	3.60 ± 0.10	
	Sample B	Gr-Beta	57.00 ± 5.00	53.00 ± 3.61	
		Sr-89	8.00 ± 5.00	8.00 ± 0.00	
		Sr-90	8.00 ± 1.50	7.67 ± 0.58	
		Cs-134	20.00 ± 5.00	19.67 ± 1.53	
		Cs-137	20.00 ± 5.00	20.00 ± 2.65	
04/28/89	Milk	Sr-89	39.00 ± 5.00	36.67 ± 1.15	
		Sr-90	55.00 ± 3.00	56.33 ± 1.53	
		Cs-137	50.00 ± 5.00	53.33 ± 2.31	
		K	1600.00 ± 80.00	1760.00 ± 113.58	(e)
05/05/89	Water	Sr-89	6.00 ± 5.00	6.33 ± 0.58	
		Sr-90	6.00 ± 1.50	6.33 ± 0.58	

2/8/90

US EPA INTERLABORATORY COMPARISON PROGRAM 1989 (Cont.)

Collection Date	Media	Nuclide	EPA Result(a)	Teledyne Isotopes Result(b)	
06/09/89	Water	Ba-133	49.00 ± 5.00	33.00 ± 3.61	(f)
		Co-60	31.00 ± 5.00	30.00 ± 2.65	
		Zn-65	165.00 ± 17.00	165.33 ± 0.58	
		Ru-106	128.00 ± 13.00	113.67 ± 17.50	
		Cs-134	39.00 ± 5.00	34.00 ± 2.65	
		Cs-137	20.00 ± 5.00	22.00 ± 3.61	
06/23/89	Water	H-3	4503.00 ± 450.00	4466.67 ± 152.75	
08/25/89	Air Filter	Gr-Alpha	6.00 ± 5.00	8.33 ± 0.98	
		Cs-137	10.00 ± 5.00	12.00 ± 1.00	
09/22/89	Water	Gr-Alpha	4.00 ± 5.00	5.00 ± 5.00	
		Gr-Beta	6.00 ± 5.00	8.00 ± 0.00	
10/06/89	Water	Ba-133	59.00 ± 6.00	51.00 ± 4.36	(g)
		Co-60	30.00 ± 5.00	30.67 ± 2.08	
		Zn-65	129.00 ± 13.00	128.33 ± 2.89	
		Ru-106	161.00 ± 16.00	139.00 ± 15.72	(g)
		Cs-134	29.00 ± 5.00	23.67 ± 1.15	
		Cs-137	59.00 ± 5.00	61.67 ± 1.53	
10/20/89	Water	H-3	3496.00 ± 364.00	3433.33 ± 57.74	
11/10/89	Water	Ra-226	8.70 ± 1.30	8.47 ± 0.49	
		Ra-228	8.57 ± 1.40	8.57 ± 1.46	

2/8/90

US EPA INTERLABORATORY COMPARISON PROGRAM 1989 (Cont.)

Footnotes:

(a) EPA Results-Expected laboratory precision (1 sigma). Units are pCi/liter for water, and milk except K is in mg/liter. Units are total pCi for air particulate filters.

(b) Teledyne Results - Average ± one sigma. Units are pCi/liter for water and milk except K is in mg/liter. Units are total pCi for air particulate filters.

(c) The three Zn-65 measurements were 184, 175 and 185 pCi/liter. These were measured on three detectors using the same aliquot. The other reported results (Cr-51, Co-60, Ru-106, Cs-134, Cs-137) were all within two standard deviations of the EPA results. This would indicate that the dilution made was correct (except that possibly the Zn-65 was not well mixed). Other parameters were investigated. The branching intensity, decay factor, and detection efficiencies were checked. Since one of the Co-60 gamma ray energies is only 60 KeV from Zn-65, the detector efficiencies must be correct. There is no obvious reason for the deviation. Another aliquot will be prepared from the original solution and will be counted.

(d) The EPA deposits activity on the filter over a small diameter (nearly a point source) whereas our calibration is based on a deposit nearly 2 inches in diameter. In order to correct to point source geometry our practice has been to divide our results by 1.2. We neglected to do it on this test.

(e) There is no apparent reason why the potassium was high. Three separate detectors were used and the K-40 value for each was correctly divided by 0.86 to convert to potassium in mG/liter.

(f) There is no apparent reason why Ba-133 was low by 5.54 standard deviation while the other isotopes were within ± 2 standard deviations. The detector efficiencies and Ba-133 branching intensities were checked and found to be correct. On 10/31/89, 300 ml of the original, irradiated sample was counted giving 43.9 ± 5.8 pCi/liter Ba-133.

(g) This EPA sample was counted in two geometries; one in diluted stage, the other undiluted. There was no significant difference. Comparing detector efficiencies between two annual sets did not reveal any significant difference. Thus there is no apparent reason why our results differed as much as they did.

2/8/90

APPENDIX B

SYNOPSIS OF ANALYTICAL PROCEDURES

APPENDIX B

APPLICABLE PROCEDURES

NUMBER	TITLE	DATE	PAGE
PRO-032-10	Determination of Gross Beta in Air Particulate Filters	03/01/87	65
PRO-032-35	Determination of Tritium in Water by Liquid Scintillation	12/30/87	66
PRO-032-11	Determination of Radioiodine in Milk and Water Samples	08/01/88	67
PRO-342-17	Environmental Thermoluminescent Dosimetry (TLD)	09/04/87	68
PRO-042-5	Determination of Gamma Emitting Radioisotopes	10/26/84	69
PRO-032-1	Determination of Gross Alpha and/or Gross Beta in Water Samples	03/21/86	71

GROSS BETA ANALYSIS OF SAMPLES

Air Particulates

After a delay of five or more days, allowing for the radon-222 and radon-220 (thoron) daughter products to decay, the filers are counted in a gas-flow proportional counter. An unused air particulate filter, supplied by TU Electric, is counted as the blank.

Calculations of the results, the two sigma error and the lower limit of detection (LLD).

$$\text{RESULT } (pCi/m^3) = ((S/T) - (B/t))/(2.22\ V\ E)$$

$$\text{TWO SIGMA ERROR } (pCi/m^3) = 2((S/T^2) + (B/t^2))^{1/2}/(2.22\ V\ E)$$

$$\text{LLD } (pCi/m^3) = 4.66\ (B^{1/2})/(2.22\ V\ E\ t)$$

where:

S = Gross counts of sample including blank
B = Counts of blank
E = Counting efficiency
T = Number of minutes sample was counted
t = Number of minutes blank was counted
V = Sample aliquot size (cubic meters)

ANALYSIS OF WATER SAMPLES FOR TRITIUM

One milliliter of water is added to 20 ml of liquid scintillation solution in a 25 ml vial. The sample is inserted into a Liquid Scintillator and counted for 100 minutes.

Calculations of the results, the two sigma error and the lower limit of detection (LLD).

RESULT (pCi/ℓ) = $((S/T) - (B/t))/(2.22 \text{ V E})$

TWO SIGMA ERROR (pCi/ℓ) = $2((S/T^2 + (B/t^2))^{1/2}/(2.22 \text{ V E})$ ~~$2((S/T^2 + (B/t^2))^{1/2}/(2.22 \text{ V E})$~~ WCK 8-28-90

LLD (pCi/ℓ) = $4.66 (B^{1/2})/(2.22 \text{ V E t})$

where
- S = Gross counts of sample
- B = Counts of blank
- E = Counting efficiency
- T = Number of minutes sample was counted
- t = Number of minutes blank was counted
- V = Sample aliquot size (ℓ)

ANALYSIS OF SAMPLES FOR IODINE-131

Milk or Water

Two liters of sample are first equilibrated with stable iodide carrier. A batch treatment with anion exchange resin is used to remove iodine from the sample. The iodine is then stripped from the resin with sodium hypochlorite solution, is reduced with hydroxylamine hydrochloride and is extracted into carbon tetrachloride as free iodine. It is then back-extracted as iodide into sodium bisulfite solution and is precipitated as palladium iodide. The precipitate is weighed for chemical yield and is mounted on a nylon planchet for low level beta counting. The chemical yield is corrected by measuring the stable iodide content of the milk or the water with a specific ion electrode.

Calculations of results, two sigma error and the lower limit of detection (LLD) in pCi/ℓ:

RESULT = $(N/\Delta t - B)/(2.22\ E\ V\ Y\ DF)$

TWO SIGMA ERROR = $2((N/\Delta t + B)/\Delta t)^{1/2}(2.22\ E\ V\ Y\ DF)$

LLD = $4.66(B/\Delta t)^{1/2}/(2.22\ E\ V\ Y\ DF)$

where:

- N = total counts from sample (counts)
- Δt = counting time for sample (min)
- B = background rate of counter (cpm)
- 2.22 = dpm/pCi
- V = volume or weight of sample analyzed
- Y = chemical yield of the mount or sample counted
- DF = decay factor from the collection to the counting date
- E = efficiency of the counter for I-131, corrected for self absorption effects by the formula
- $E = E_s(\exp -0.0061M)/(\exp -0.0061M_s)$
- E_s = efficiency of the counter determined from an I-131 standard mount
- M_s = mass of PdI_2 on the standard mount, mg
- M = mass of PdI_2 on the sample mount, mg

ENVIRONMENTAL DOSIMETRY

Teledyne Isotopes uses a $CaSO_4$:Dy thermoluminescent dosimeter (TLD) which the company manufactures. This material has a high light output, negligible thermally induced signal loss (fading), and negligible self dosing. The energy response curve (as well as all other features) satisfies NRC Reg. Guide 4.13. Transit doses are accounted for by use of separate TLDs.

Following the field exposure period the TLDs are placed in a Teledyne Isotopes Model 8300. One fourth of the rectangular TLD is heated at a time and the measured light emission (luminescence) is recorded. The TLD is then annealed and exposed to a known Cs-137 dose; each area is then read again. This provides a calibration of each area of each TLD after every field use. The transit controls are read in the same manner.

Calculations of results and the two sigma error in net milliRoetgen (mR):

RESULT $= D = (D_1+D_2+D_3+D_4)/4$

TWO SIGMA ERROR $= 2((D_1-D)^2+(D_2-D)^2+(D_3-D)^2+(D_4-D)^2)/3)^{1/2}$

where D_1 = the net mR of area 1 of the TLD, and similarly for D_2, D_3, and D_4

D_1 $= I_1 K/R_1 - A$

I_1 = the instrument reading of the field dose in area 1

K = the known exposure by the Cs-137 source

R_1 = the instrument reading due to the Cs-137 dose on area 1

A = average dose in mR, calculated in similar manner as above, of the transit control TLDs

GAMMA SPECTROMETRY OF SAMPLES

Milk and Water

A 1.0 liter Marinelli beaker is filled with a representative aliquot of the sample. The sample is then counted for at least 1000 minutes with a shielded Ge(Li) detector coupled to a mini-computer-based data acquisition system which performs pulse height analysis.

Dried Solids Other Than Soils and Sediments

A large quantity of the sample is dried at a low temperature, less than 100°C. As much as possible (up to the total sample) is loaded into a tared 1-liter Marinelli and weighed. The sample is then counted for at least 1000 minutes with a shielded Ge(Li) detector coupled to a mini-computer-based data acquisition system which performs pulse height analysis.

Fish

As much as possible (up to the total sample) of the edible portion of the sample is loaded into a tared Marinelli and weighed. The sample is then counted for at least 1000 minutes with a shielded Ge(Li) detector coupled to a mini-computer-based data acquisition system which performs pulse height analysis.

Soils and Sediments

Soils and sediments are dried to a low temperature, less than 100°C. The soil or sediment is loaded fully into a tared, standard 300 cc container and weighed. The sample is then counted for at least six hours with a shielded Ge(Li) detector coupled to a mini-computer-based data acquisition system which performs pulse height analysis.

Charcoal Cartridges (Air Iodine)

Charcoal cartridges are counted up to five at a time, with one positioned on the face of a Ge(Li) detector and up to four on the side of the Ge(Li) detector. Each Ge(Li) detector is calibrated for both positions. The detection limit for I-131 of each charcoal cartridge can be determined (assuming no positive I-131) uniquely from the volume of air which passed through it. In the event I-131 is observed in the initial counting of a set, each charcoal cartridge is then counted separately, positioned on the face of the detector.

Air Particulate

The four or five (depending on the calendar month) air particulate filters for a monthly composite for each field station are aligned one in front of another and then counted for at least six hours with a shielded Ge(Li) detector coupled to a mini-computer-based data acquisition system which performs pulse height analysis.

A mini-computer software program defines peaks by certain changes in the slope of the spectrum. The program also compares the energy of each peak with a library of peaks for isotope identification and then performs the radioactivity calculation using the appropriate fractional gamma ray abundance, half life, detector efficiency, and net counts in the peak region. The calculation of results, two sigma error and the lower limit of detection (LLD) in pCi/volume or pCi/mass:

$$\text{RESULT} = (S-B)/(2.22\ t\ E\ V\ F\ DF)$$

$$\text{TWO SIGMA ERROR} = 2(S+B)^{1/2}/(2.22\ t\ E\ V\ F\ DF)$$

$$\text{LLD} = 4.66(B)^{1/2}/(2.22\ t\ E\ V\ F\ DF)$$

where:

- S = Area, in counts, of sample peak and background (region of spectrum of interest)
- B = Background area, in counts, under sample peak, determined by a linear interpolation of the representative backgrounds on either side of the peak
- t = length of time in minutes the sample was counted
- 2.22 = dpm/pCi
- E = detector efficiency for energy of interest and geometry of sample
- V = sample aliquot size (liters, cubic meters, kilograms, or grams)
- F = fractional gamma abundance (specific for each emitted gamma)
- DF = decay factor from the collection to the counting date

DETERMINATION OF GROSS ALPHA AND/OR GROSS BETA ACTIVITY IN WATER SAMPLES

1.0 INTRODUCTION

The procedures described in this section are used to measure the overall radioactivity of water samples without identifying the radioactive species present. No chemical separation techniques are involved.

One liter of the sample is evaporated on a hot plate. Different volumes may be used if the sample has a significant salt content as measured by a conductivity meter, or if unusual sensitivity is desired. If requested by the customer, the sample is filtered through No. 54 filter paper before evaporation, removing particles greater than 30 microns in size.

After evaporating to a small volume in a beaker, the sample is rinsed into a 2-inch diameter stainless steel planchet which is stamped with a concentric ring pattern to distribute residue evenly. Final evaporation to dryness takes place under heat lamps. Samples which appear to be hygroscopic are dried again under heat lamps just prior to counting.

Residue mass is determined by weighing the planchet before and after mounting the sample. The planchet is counted for alpha and/or beta activity on an automatic proportional counter. Results are calculated using empirical self-absorption curves which allow for the change in effective counting efficiency caused by the residue mass.

2.0 DETECTION CAPABILITY

Detection capability depends upon the sample volume actually represented on the planchet, the background and the efficiency of the counting instrument, and upon self-absorption of alpha and beta particles by the mounted sample. Because the radioactive species are not identified, no decay corrections are made and the reported activity refers to the counting time.

The minimum detectable level (MDL) for water samples is nominally 1.6 picocuries per liter for gross beta at the 4.66 sigma level (1.0 pCi/ℓ at the 2.83 sigma level), assuming that 1 liter of sample is used and that 1/2 gram of sample residue is mounted on the planchet. These figures are based upon a nominal counting time of 50 minutes and upon representative values of counting efficiency and background of 0.2 and 1.2 cpm, respectively. The MDL for gross alpha activity is nominally 2.3 picocuries per liter at the 4.66 sigma level (1.4 pCi/ℓ at the 2.83 sigma level) also assuming that 1 liter of sample is used and that 1/2 gram of sample residue is mounted on the planchet. These figures are based upon a nominal 200 minute counting time and upon a representative efficiency of 0.02 and a background of 0.1 cpm.

The MDL becomes significantly lower as the mount weight decreases because of reduced self-absorption. At a zero mount weight, the 4.66 sigma MDL for gross beta is 0.9 picrocuries per liter and the MDL for gross alpha is 0.3 picocuries per liter. These values reflect a beta counting efficiency of 0.38 and an alpha counting efficiency of 0.18.

APPENDIX C

EXCEPTIONS TO THE 1989 REMP

APPENDIX C

REMP PROGRAM EXCEPTIONS FOR SCHEDULED
SAMPLING AND ANALYSIS DURING 1989

Location	Description	Date of Sampling	Reasons for Loss/ Exception
Sta-NE-4.8	Direct Radiation	First Quarter	TLD missing, vandalized
Sta-SE-3.84	Direct Radiation	First Quarter	TLD missing, vandalized
Sta-NE-4.8	Direct Radiation	Second Quarter	TLD missing, vandalized
Sta-NE-4.8	Direct Radiation	Annual	Replacement, put in field on 07/10/89
Sta-SE-3.85	Direct Radiation	Annual	Replacement, put in field on 04/07/89
Sta-NW-1.0	Air Filter	05/02/89-05/09/89	Pump out of service Sample not collected Service power off*
Sta-NW-1.0	Air Filter	05/16/89-05/23/89	Pump out of service Sample not collected Service power off*
Sta-NW-1.0	Air Filter	06/13/89-06/20/89	Pump out of service Sample not collected Service power off*
Sta-NW-1.0	Air Filter	06/20/89-06/27/89	Pump out of service Sample not collected Service power off*
Sta-E-3.5	Air Filter	08/22/89-08/29/89	Pump out of service Sample not collected Pump vanes broken
Sta-N-1.45	Air Filter	03/07/89-03/14/89	Flt crooked. Sample not collected
Sta-NW-1.0	Air charcoal	05/02/89-05/09/89	Pump out of service Service power off*
Sta-NW-1.0	Air charcoal	05/16/89-05/23/89	Pump out of service Service power off*
Sta-NW-1.0	Air charcoal	06/13/89-06/20/89	Pump out of service Service power off*
Sta-NW-1.0	Air charcoal	06/20/89-06/27/89	Pump out of service Service power off*

APPENDIX C

REMP PROGRAM EXCEPTIONS FOR SCHEDULED
SAMPLING AND ANALYSIS DURING 1989

Location	Description	Date of Sampling	Reasons for Loss/ Exception
Sta-NW-1.0	Air charcoal	05/09/89-05/16/89	Required LLD for I-131 not achieved due to delay in shipment
Sta-E-3.5	Air charcoal	08/22/89-08/29/89	Pump out of service Pump vane broken
Sta-SW-13.5	Vegetation	12/12/89	No tree lvs available Collected forage grasses
Sta-N-1.45	Air charcoal	12/12/89-12/19/89	Required LLD for I-131 not achieved due to low sample volume resulting from removal of power from the pump
Sta-N-1.45	Vegetation	12/12/89	No tree lvs available Collected forage grasses
Sta-SW-1.0	Vegetation	12/12/89	No tree lvs available Collected forage grasses
Stations W-1.2 WSW-0.1, SSE-. 0, N-9.8	Groundwater	10/03/89	Required LLD's for I-131 not achieved due to delay between sample collection and analysis
Stations NE-7.4, ESE-1.4	Surface Water	06/06/89	Required LLD for I-131 not achieved.**
Stations N-1.5 NE-7.4, ESE-1.4	Surface Water	09/25/89	Required LLD for I-131 not achieved**
Stations N-1.5 N-19.3, NE-7.4, ESE-1.4	Surface Water	11/21/89	Required LLD for I-131 not achieved**

APPENDIX C

REMP PROGRAM EXCEPTIONS FOR SCHEDULED
SAMPLING AND ANALYSIS DURING 1989

*Severe electrical storms striking system tripping service power. System fuses reset except for final service power to this station.

**The required LLD for I-131 in water if there is no drinking water pathway is 15 pCi/l. This LLD was not achieved due to confusion over elimination of the I-131 analysis for drinking water for these locations. TU notified Teledyne Isotopes by telephone and by letter of this discrepancy. TU letter CPSES-8901210 is attached.

TUELECTRIC

CPSES-8901210
December 13, 1989

No Response Required

Dr. David Martin
Teledyne Isotopes
50 Van Buren Ave.
Westwood, New Jersey 07675

SUBJECT: CPSES STEAM ELECTRIC STATION
LLD REQUIREMENTS

Dear Dr. Martin:

In reference to our phone conversation of December 8, 1989, we request that an LLD requirement of 15 pCi/L on Iodine-131 be met on Gamma Isotopic for all waters submitted by this company. Thank you again for your cooperation. If you have any questions please call me at 817-897-5337.

Sincerely,

Chuck Curry
Environmental Technician, Sr.

CWC/jnp

cc: E. J. Schmitt 009
D. C. Kay 009
CCS E06

APPENDIX D

EXCEEDED REPORTING LEVELS

APPENDIX D

EXCEEDED REPORTING LEVELS

1989	None of the analytical measurements exceeded any notification level.

APPENDIX E

LAND USE CENSUS

LAND USE CENSUS

The Land Use Census for 1989 was conducted in August 1989. It indentifies receptors within a five (5) mile radius of the plant in each of the sixteen (16) meteorological sectors. The Land Use Census includes the following items:

Title

1. Population by Sector and Distance
2. Nearest Resident by Sector and Distance
3. Nearest Garden by Sector and Distance
4. Nearest Milk Animal by Sector and Distance
5. A Map with an Accompanying Map Legend
6. Environmental Sampling Locations

Public Use Areas

Listed below are public use areas within the five (5) mile radius and the approximate attendance for the areas in 1988:

1. Camp Arrowhead - 3500
2. Dinosaur State park - 219,000
3. Glen Lake Camp - 6,175
4. Cedar Brake Girl Scout Camp - 250
5. Squaw Creek Park - 46,900
6. Kellers Camp - 6,000 March to November
7. Tres Rios Camp - 40,000
8. Oakdale Camp and Fish - 5200
9. Oakdale Park - 69,000
10. Creation Science Museum - 12,000

Population* By Sector and Distance

Sector	Distance (Miles)					
	0-1	1-2	2-3	3-4	4-5	Total
N	-	-	3	22	55	80
NNE	-	-	12	55	17	84
NE	-	-	60	86	222	368
ENE	-	-	46	7	22	75
E	-	-	22	173(1)	34(2)	229
ESE	-	-	7	86	91	184
SE	-	-	43	22	36	101
SSE	-	24	22	22	2548	2616
S	-	19	7	31	91	148
SSW	-	3	5	3	43	54
SW	-	98	5	36	22	161
WSW	-	130	3	7	-	140
W	-	58	5	36	7	106
WNW	-	3	7	19	74	103
NW	-	-	-	-	-	0
NNW	-	-	3	29	7	39
TOTAL	-	335	250	634	3269	4488

Based on an average of 2.4 residents per house. (Obtained from North Central Texas Council of Governments, 1988 based on an average from 2.6 for single family, 1.8 for mobile home and 2.66 for multi family residences.

(1) Includes permanent residents at Happy Hills Children's Home.

(2) Includes permanent residents at Camp Arrowhead.

Nearest Resident by Sector and Distance

Sector	Distance (Miles)
N	2.2
NNE	2.3
NE	2.3
ENE	2.1
E	2.4
ESE	2.0
SE	2.1
SSE	1.6
S	1.6
SSW	1.9
SW	1.0
WSW	1.0
W	1.5
WNW	2.0
NW	None
NNW	2.7

Nearest Garden by Sector and Distance

Sector	Distance (Miles)
N	None
NNE	2.4
NE	2.7
ENE	2.5
E	3.5
ESE	2.3
SE	2.5
SSE	2.0*
S	1.9
SSW	None*
SW	1.6*
WSW	1.3
W	1.5
WNW	3.0
NW	None
NNW	4.5

* Denotes change from previous year

Nearest Milk Animal by Sector and Distance

Sector	Distance_Miles
SSE	2.2
WNW	4.0
NNE	4.5
All other Sectors	None

EVALUATION OF 1989 LAND USE CENSUS

The results of the 1989 Land Use Census were reviewed for impact on the Radiological Environmental Monitoring Program (REMP). The sampling program requirements that could be affected by changes in land use are:

(1) Milk -

ODCM Table 3.12-1 requires that samples be obtained from milking animals in three locations within 5 km having the highest potential dose. If none are available, samples are acceptable from milking animals in locations 5 to 8 km distant where doses are calculated to be greater than 1 mrem per year. A sample is also required at a control location.

Currently, milk samples are collected at one indicator location (SSE-2.2) and at a control location.

(2) Food Products -

ODCM Table 3.12-1 requires that one sample of each principal class of food product be collected from any area that is irrigated with water in which liquid plant wastes have been discharged.

Currently, food products are sampled from two indicator locations: (ENE-9.0, Pecans; E-4.2, vegetables) and one control location.

(3) Broadleaf Vegetation -

ODCM Table 3.12-1 requires a sample of broadleaf vegetation from each of two offsite locations of highest predicted annual average D/Q if milk sampling is not performed at all required locations.

Currently, broadleaf vegetation samples are collected at two indicator locations (N-1.45 and SW-1.0) and one control location. These locations are near the site boundary in sectors where broadleaf is available and D/Q is greatest.

Based on these requirements, the milk animals identified at locations NNE-4.5 and WNW-4.0 were evaluated for possible inclusion in the REMP. The land owners at these locations were contacted by Chemistry and Environmental Personnel and it was determined that these milk animals are not milked and are not available for sampling. Also, the goats identified at location NE-3.9 are considered "brush goats" and are not available for sampling. Therefore, no changes to the milk sampling locations of the REMP are required.

Of the gardens that were identified, no new gardens were identified that are irrigated with water in which liquid plant wastes are discharged. Therefore, no change to the REMP is required.

Finally, since broadleaf vegetation is currently collected at the site boundary, no changes to broad leaf sampling locations are required. There are no identified locations closer to the plant.

Evaluation Performed by: Douglas C. Kay Date: 9-18-89
Health Physicist

ENVIRONMENTAL SAMPLING LOCATIONS

Sampling Point	Location (Sector-Miles)	Sample Type*
A1	N-1.45	A
A2	N-9.4	A
A3	E-3.5	A
A4	SSE-4.5	A
A5	S/SSW-1.2	A
A6	SW-12.3	A
A7	SW/WSW-0.95	A
A8	NW-1.0	A
R1	N-1.45	R
R2	N-4.4	R
R3	N-6.5	R
R4	N-9.4	R
R5	NNE-1.1	R
R6	NNE-5.65	R
R7	NE-1.7	R
R8	NE-4.8	R
R9	ENE-2.5	R
R10	ENE-5.0	R
R11	E-0.5	R
R12	E-1.9	R
R13	E-3.5	R
R14	E-4.2	R
R15	ESE-1.4	R
R16	ESE-4.7	R
R17	SE-1.3	R
R18	SE-3.85	R
R19	SE-4.6	R
R20	SSE-1.3	R
R21	SSE-4.4	R
R22	SSE-4.5	R
R23	S-1.5	R
R24	S-4.2	R
R25	SSW-1.1	R
R26	SSW-4.4	R
R27	SW-0.9	R
R28	SW-4.8	R
R29	SW-12.3	R
R30	WSW-1.0	R
R31	WSW-5.35	R
R32	WSW-7.0	R
R33	W-1.0	R
R34	W-2.0	R
R35	W-5.5	R
R36	WNW-1.0	R
R37	WNW-5.0	R
R38	WNW-6.7	R
R39	NW-1.0	R
R40	NW-5.7	R
R41	NW-9.9	R
R42	NNW-1.35	R
R43	NNW-4.6	R
SW1	N-1.5	SW
SW2	N-9.9	SW/DW
SW3	N-19.3	SW
SW4	NE-7.4	SW
SW5	ESE-1.4	SW
SW6	NNW-0.1	SW/DW
GW1	W-1.2	GW/DW
GW2	WSW-0.1	GW/DW
GW3	SSE-4.6	GW/DW
GW4	N-9.8	GW/DW
GW5	N-1.45	GW/DW
SS1	NNE-1.0	SS
SS2	N-9.9	SS
SS3	NE-7.4	SS
M1	SSE-2.2	M
M4	SW-13.5	M
F1	ENE-2.0	F
F2	NNE-8.0	F
FP1	ENE-9.0	FP
FP2	E-4.2	FP
FP3	SW-13.5	FP
BL1	N-1.45	BL
BL2	SW-1.0	BL
BL3	SW-13.5	BL

*Types: A - Air Sample
R - Direct Radiation
SW - Surface Water
DW - Drinking Water
GW - Groundwater
SS - Shore Line Sediment
M - Milk
F - Fish
FP - Food Product
BL - Broad Leaf Vegetation

FIGURE 1

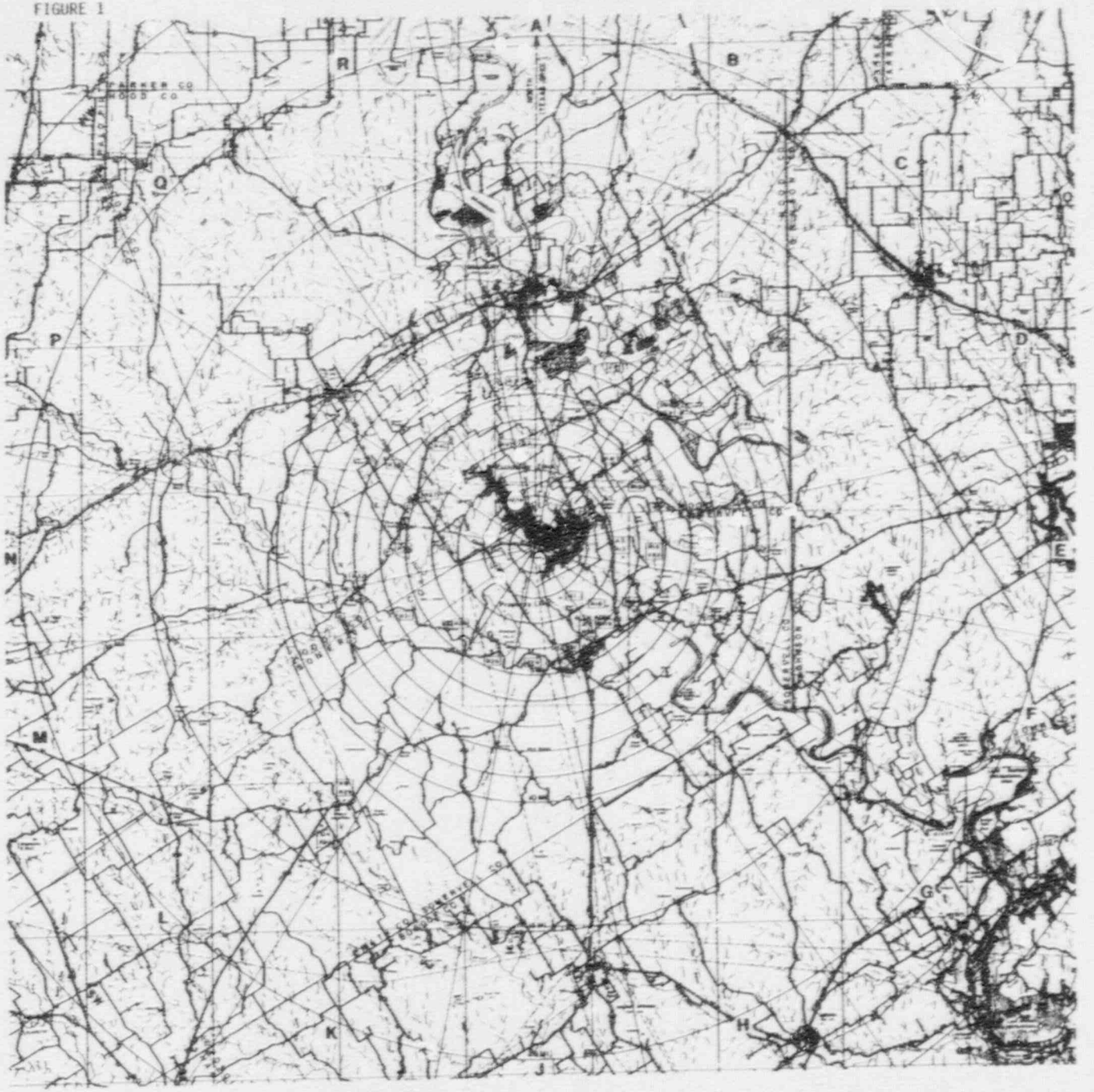

FIGURE 2

Locations Within 2 Miles of the Statio^

Radiological Environmental

Monitoring Locations