Project No. NM81-433
Dec. 81

D'APPOLONIA

Volume I
Text and Tables

State of New Mexico Environmental Improvement Division Uranium Mill License Renewal Application-Environmental Report License No. NM-UNC-ML

UNC Mining and Milling
Church Rock Operations
Division of United Nuclear Corporation

Church Rock Mill
Gallup, New Mexico

UNC

Project No. NM81-433
Dec. 81

D'APPOLONIA

Volume I
Text and Tables

State of New Mexico Environmental Improvement Division Uranium Mill License Renewal Application- Environmental Report License No. NM-UNC-ML

UNC Mining and Milling
Church Rock Operations
Division of United Nuclear Corporation

Church Rock Mill
Gallup, New Mexico

UNC

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

LIST OF TABLES

VOLUME I

LIST OF TABLES
(CONT'D)

VOLUME I

LIST OF TABLES
(CONT'D)

LIST OF TABLES
(CONT'D)

VOLUME II

LIST OF FIGURES

VOLUME II

LIST OF FIGURES
(CONT'D)

VOLUME II

LIST OF FIGURES
(CONT'D)

VOLUME III

LIST OF APPENDICES

A.1.0

A1.0 EXECUTIVE SUMMARY

United Nuclear Corporation's (UNC) Mining and Milling Division, the Applicant, with division offices in Church Rock, New Mexico, hereby seeks a renewal of the Uranium Mill License for its Northeast Church Rock (NECR) Uranium Mill. The mill has been in operation since 1977 and presently operates in conjunction with two underground mines currently owned and operated by the Applicant. Ore from other sources has been and may continue to be processed in the mill.

A1.1 BACKGROUND INFORMATION

A1.1.1 Mill Description and Location

The mill is located in a sparsely populated, semi-arid area northeast of Gallup, New Mexico, (Figure A1-1) in Section 2, Township 16 North, Range 16 West, of McKinley County.

The mill employs the conventional acid leach, solvent extraction process which produces a semi-refined uranium compound commonly referred to as "yellowcake." The U_3O_8 content of the processed ore has ranged from about 0.035 to about 0.381 percent with a mean of about 0.12 percent. The mill has a design throughput capacity of 4,000 tons per day (TPD) and is currently operating at a reduced capacity of about 36,000 tons per month or 1,200 TPD. To date, the mill has produced about 7.2 million pounds of yellowcake with an associated throughput of 3.1 million tons of ore.

A1.1.2 Tailings Management

The processing of the uranium ore results in yellowcake. However, after processing, the great majority of the ore consists of coarse and fine solids and slimes which are commonly referred to as mill tailings. UNC transports the tailings in slurry form to its disposal area about one-half mile southeast of the mill. The tailings disposal area receives about 4,000 TPD of material under the maximum throughput. The

tailings transported to the pond are separated by cycloning into the coarse and slimes fractions. The coarse material is used as beach material along cross dikes and as "backfill" in the Applicant's mine northwest of the mill.

To date, the tailings disposal area has received about 3.1 million tons of tailings. Of this, about 200,000 tons have been backfilled in the Applicant's NECR mine, and 2.9 million tons have been disposed of in the tailings disposal pond area. The total area currently occupied by tailings as of December 1981 is about 100 acres. The tailings area is separated, as shown in Figure A1-2, into the north, central, and south areas with two associated borrow pits. The central area is bounded by two cross dikes separating it from the north and south areas. The Applicant is initiating a neutralization procedure to enhance the chemical quality of the tailings slurry in all three areas.

UNC has also initiated a groundwater monitoring and pumpback system as part of its activities related to the Applicant's Ground Water Discharge Plan. The program has reduced the extent to which seepage is occurring from the tailings area.

A1.1.3 Operational History

The mill has continued operation since mid-June, 1977 with one interruption from mid-July to late October, 1979. The tailings impoundment structure breached on July 16, 1979. The breach has had no permanent impact on surface waterways or alluvial wells downstream from the mill.

Since October 1979, the mill has continued operation interrupted with minor shutdowns principally for regularly scheduled maintenance. The Applicant is currently operating in accordance with conditions and stipulations in effect and enforced by NMEID.

A1.2 ENVIRONMENTAL SETTING

A1.2.1 Geography and Demography

United Nuclear's Church Rock mill site is on an alluvial plain situated near an arroyo. The surrounding terrain is varied consisting of sagebrush/grassland lowlands and pinon/juniper vegetated uplands. Narrow canyons, arroyos, steep cliffs, and mesas are common features throughout the surrounding area.

The area surrounding the UNC mill is sparsely populated and about two-thirds of the area population is American Indian. The regional population has grown steadily since the fifties and continued growth is projected through the year 2000.

Mining is an important component of the local economy; however, the local unemployment rate is relatively high and personal income levels are far below the national and state levels.

The great majority of the land areas in the region consists of rangelands and woodlands, and a large percentage of the region is Indian Trust and government owned land.

Within a five mile radius of the site, most of the population is located south of the mill along the Puerco River Valley and near Pinedale, New Mexico. No substantial seasonal or transient populations occur in this localized area.

Details on the Geography and Demography of the mill site are in the Environmental Report Section B1.0.

A1.2.2 Meteorology

The site area has an arid to semi-arid continental climate with more than 50 percent sunshine throughout the year. On an annual basis winds average about five miles per hour and most are from the south-southwest to

southwest. Average daily temperatures range from about 14 degrees Fahrenheit in January to about 87 degrees Fahrenheit in July. The average relative humidity is about 55 percent.

Long term precipitation data from nearby Gallup, New Mexico, indicate the average annual precipitation is 10.7 inches with most rainfall occurring in July and August. Snowfall in Gallup averages 28.7 inches annually.

Details regarding the site meteorology are in Section B2.0 of the Environmental Report.

A1.2.3 Hydrology

The surface water regime of the mill site is influenced by the arid to semi-arid climate with its hot summers, cold winters, and relatively small amounts of precipitation. Naturally, the Pipeline Canyon drainage is ephemeral and flows only in response to summer thunderstorms. Presently, treated mine water discharge from UNC and the nearby Kerr-McGee mining operations provide a perennial flow of up to twelve cubic feet per second (cfs). Pipeline Canyon arroyo converges with the Puerco River which has a basin area of 588 square miles at Gallup, New Mexico.

The only surface water use of flows in Pipeline Canyon and the Puerco River is watering of livestock. There are no surface water bodies, diversions, or impoundments below the mill site and only one stock pond upstream of the site. The peak discharge with a recurrence interval of 100 years was determined by applying the 100-year precipitation amount to a runoff-producing model. The model used was the U.S. Soil Conservation Service's triangular unit hydrograph method. The 100-year, 1, 6, and 24-hour storm amounts of 1.6, 2.1, and 2.7 inches, respectively, were used to derive peak discharges of 2655, 2351, and 1711 cfs. The maximum peak discharge of 2655 cfs was used in the U.S. Corps of Engineers' water surface profile computer program to calculate the horizontal extent, depth, and velocity of the 100-year flood within Pipeline Canyon.

Although the 100-year flood will touch the toe of the tailings containment structure at one location, the velocity at this location is low and should cause no damage to the embankment.

UNC has been monitoring radiological constituents of surface water in Pipeline Canyon since 1975 and the Puerco River since 1979. On July 16, 1979, the release of tailings liquids caused the waterways to carry elevated levels of radionuclides at all but one of the sites downstream of the mill. The radionuclide levels returned to normal several weeks after the spill.

The near surface groundwater system in the mill site vicinity is influenced by the stratigraphy, recharge mechanisms, and aquifer characteristics of the formations beneath the site. The formations underlying the alluvium at the site consist of minor coal beds, shales, and sandstones of Cretaceous Age. They principally consist of units of the Mesa Verde Group, Crevasse Canyon Formation, and Upper Gallup Sandstone Members.

Details regarding the hydrology at the site are included in Sections B3.0 and C6.0 of the Environmental Report.

A1.2.4 Geology and Seismology

The UNC Church Rock mine and mill lie on the southwestern margin of the San Juan Basin of the Colorado Plateau. Cretaceous age sediments that underlie the site are marginal marine deposits, dipping and thickening to the north. The Plateau Province is characterized by large scale flexural folds which resulted from ancient faulting in the basement rock. This faulting is no longer active. The hinges of the folds tend to be fractured. Fracturing in the sedimentary strata is also attributed to dewatering of rapidly deposited material. Fracturing does not appear to be continuous through shale layers. The mill site overlies the Dilco Coal Member of the Crevasse Canyon Formation, and the Gallup Sandstone.

The alluvial deposits in the Canyon tend to include discontinuous strata or lenses of sand, silt, and clay.

Seismologic activity in the region is concentrated along the margins of the Colorado Plateau, particularly along the boundary with Rio Grande Rift to the east and along the Shear Zone to the south, both far from the site. Within 200 km of the UNC Church Rock mill site, the largest measured earthquake magnitude is 5.7 (Richter). The maximum magnitude earthquake with an epicenter at the site is projected to be 5.75 to 6.0 (Richter), and is not considered likely. An estimated maximum seismic loading coefficient estimated to be of 0.10 g (10 percent the acceleration due to gravity) and is also considered unlikely. The site is in Zone 2 of the Uniform Building Code or Seismic Risk Map.

A1.3 OPERATIONAL IMPACTS

A1.3.1 Monitoring

UNC performs operational radiological monitoring in accordance with NMEID requirements. Radiological monitoring programs are done in three basic sets; Environmental, Mill and Occupational, and Breach-related.

Environmental air quality monitoring includes:

- o dryer and packaging stack monitoring (two stacks)
- o ambient radon (eight locations)
- o suspended particulates (eight locations)
- o continuous gamma (eight locations)

Environmental water quality monitoring includes:

- o surface water (two locations)
- o groundwater (five locations)
- o drinking water (mill supply)

In addition, vegetation and soils environmental monitoring are done at five and eight sites, respectively. Additional environmental monitoring is also done as part of the discharge plan requirements using monitoring wells.

Mill and occupational monitoring includes:

- suspended particulates (ten locations)
- radon daughter working levels (five locations)
- mill alpha surface readings (numerous locations)
- instantaneous mill gamma (116 locations)
- continuous gamma radiation (24 locations)
- personnel gamma radiation (various personnel)
- Inhalation Exposure Reports (personnel in yellowcake areas)
- bioassay (selected employees)

Breach-related monitoring includes:

- suspended particulates (three locations)
- surface water (five locations)
- alluvial wells (five locations)
- vegetation monitoring (ten locations - now discontinued)
- ambient radon (by NMEID - various locations)
- sediment in Puerco River (various locations)

In addition to this radiological monitoring, non-radiological monitoring includes meteorology and water quality determinations for surface and groundwater and treated mine water discharge.

Details regarding the monitoring program are in Section C8.0 of the Environmental Report.

A1.3.2 Airborne Radiological Impacts

The computer code MILDOS was used to evaluate the predicted impact occurring as a result of airborne emissions from the mill and tailings disposal area. Results of the predictive model show all residents and communities below the 500 millirem (mrem) annual limit related to Part 4 of the NMEID Radiation Protection Regulations when sources include mill stack effluents, tailings, and radon and its daughter products. However, the MILDOS code indicates the predicted dose to the nearest resident from only mill stack and ore piles in the mill area exceeds the 25 mrem annual limit. UNC is in the process of developing a monitoring program to determine if the predictive data is substantiated by actual monitoring data.

Details regarding airborne radiological impacts are in Section C4.0 of the Environmental Report.

A1.3.3 Waterways and Groundwater Radiological Impact

The impact of mill operations on waterways includes the distribution of particulate and dissolved radionuclides lost in minor amounts from normal mill operations. Since facility, structural, and disposal designs limit the amount of material lost to the surrounding areas, these impacts are reduced. Another potential impact exists from the occurrence of an accidental large scale event that releases radionuclides. Such an event occurred in 1979 when the tailings impoundment breached and tailings sands and liquids were released to the adjacent arroyo. While the affected area extended for nearly 100 miles down the Puerco River to Sanders, Arizona, no humans or livestock were harmed by the incident. Monitoring and analysis of the affects of the spill on water and sediment quality in the waterways continues. There has been no evidence of permanent impact on the waterways in the period following the spill.

Seepage from the tailings area has locally impacted the groundwater quality within the immediate vicinity of the impoundment. However, UNC is embarking on a tailings neutralization procedure which will reduce this seepage impact.

After the breach, five alluvial wells within 200 feet of the Puerco River were sampled to determine if the downstream movement of tailings affected water in the shallow alluvium. No impact has occurred to any of these five wells.

Details of hydrologic impacts are in Section C6.0 of the Environmental Report.

A1.3.4 Occupational Dose

Mill area working levels data show working levels (WL) consistently less than 0.2 compared to a maximum permissible concentration (MPC) of 0.33 WL.

Inhalation exposures are also calculated for selected employees and in all cases employees are within exposure limits. The mean of all employee exposures is remaining constant at less than four percent of the annual limit.

Bioassay data for employees show declines in mean uranium concentrations from 0.034 mg/l in 1977 to 0.023 mg/l in 1980. Whole body dose as determined on selected employees has increased from about 36 mrem/yr in 1977 to about 110 mrem/yr in 1980.

Details regarding occupational dose are in Section C4.3 of the Environmental Report.

A1.3.5 Long Term Impacts

UNC, in conjunction with the Soil Conservation Service, is currently involved with attempts at investigating revegetation potential as part of

interim stabilization at the site. Five critical treatment units have been evaluated.

Long term impacts related to permanent stabilization of the mill and associated tailings facility have been evaluated in light of recent NMEID regulations for protection for 200 years against erosion. UNC proposes to provide a 26-inch cover over the tailings disposal area with recontoured slopes at less that six percent. Such a cover is calculated to provide protection against water-induced sheet and rill and wind induced erosion for a period in excess of 200 years. Along the embankment areas, the slopes would approach 20 percent, but would be resistant to water-induced erosion and the 200-year flood event for a period in excess of 200 years.

Reclamation costs including attempt at developing vegetation on the tailings area are estimated to be about $3500 per acre for long term stabilization.

Details regarding the long term impacts are in Section C9.0 of the Environmental Report.

A.2.0

A2.0 THE PROPOSED ACTION

United Nuclear Corporation's (UNC) Mining and Milling Division, the Applicant, with division offices in Church Rock, New Mexico and corporate headquarters in Falls Church, Virginia hereby seeks a renewal of the Uranium Mill License for its Northeast Church Rock (NECR) Uranium Mill. The mill has been in operation since May 1977 under Uranium Mill License NM-UNC-ML. The mill presently operates in conjunction with two underground mines currently owned and operated by the Applicant. Ore from other sources has been and may continue to be processed in the mill.

A2.1 MILL DESCRIPTION AND LOCATION

The mill is located in a sparsely populated, semiarid area about 16 miles northeast of Gallup, New Mexico (Figure A1-1). The mill and associated tailings disposal facilities are located in Section 2, Township 16 North, Range 16 West, of McKinley County, New Mexico. The facilities associated with the milling operation are on land owned by the Applicant. The mineral estate for Section 2 is owned by the State of New Mexico. The Applicant holds a general mining lease on Section 2 from the Commission or of Public Lands.

The mill employs the conventional acid leach, solvent extraction process which produces a semirefined uranium compound commonly referred to as "yellowcake." Historically, the U_3O_8 content of the processed ore has ranged from about 0.035 to about 0.381 percent with a mean of about 0.12 percent. The mill has a design throughput capacity of 4,000 tons per day (TPD). It is currently operating at a reduced capacity of about 36,000 tons per month (TPM) (1,200 TPD). However, if there is an increased demand for milling capacity, the throughput may be increased for design capacity.

In its first years of operation, the mill has produced about 7.2 million pounds of yellowcake (U_3O_8 concentrate) with an associated

throughput of 3.1 million tons of ore. The estimated yellowcake production to date, after further processing to nuclear reactor fuel, has yielded about 203 billion trillion kilowatt-hours of electricity. An equivalent amount of electricity generated from fossil fuels would require burning about 200 million barrels of oil or about 50 million tons of coal.

A2.2 TAILINGS MANAGEMENT

The processing of the uranium ore results in yellowcake, coarse and fine solids, and slimes commonly referred to as mill tailings. UNC transports the tailings in slurry form to its disposal area about one-half mile southeast of the mill. The tailings disposal area receives about 4,000 TPD of coarse material and slimes under the maximum throughput. The tailings transported to the pond are separated by cycloning into the coarse (greater than 100 sieve mesh) and slimes (less than 100 sieve mesh) fractions. The coarse material is used as beach material along the periphery of the facility and, in addition, an average of about 400 TPD are recovered and used as "backfill" in the Applicant's mine northwest of the mill.

To date, the tailings disposal area has received about 3.1 million tons of tailings. Of this, about 200,000 tons have been backfilled in the Applicant's NECR mine and 2.9 million tons have been disposed of in the tailings disposal pond area. The total area currently occupied by tailings as of December 1981 is about 100 acres. The tailings area is separated as shown in Figure A1-2 into three areas or cells with two associated borrow pits. The central area is bounded by two cross dikes separating it from the north and south cells. Coarse tailings and slimes have been primarily deposited only in the central area (cell) since October 1979, with liquid effluent pumped or flowing into the two borrow pits for additional aerial evaporation. As noted in Section A1.0, the Applicant is in the process of initiating a tailings neutralization scheme. This will enhance the chemical quality of the slurry

and, in conjunction with buildup of coarse tailings in the south area, will allow deposition of neutralized solution in all three ponds (cells) and the two borrow pit areas.

UNC in conjunction with New Mexico Environmental Improvement Division (NMEID) has initiated a groundwater monitoring and pumpback system to intercept the movement of contaminants in the vicinity of the entire tailings disposal area. This seepage control system is described in detail in documents associated with the Applicant's Ground Water Discharge Plan (GWDP-152). To date, the interceptor pumping wells have demonstrated that tailings-related seepage can be intercepted and returned to the tailings area. The pumpback schemes are now reducing the extent to which groundwater contamination is occurring from the tailings area.

A.3.0

A3.0 BACKGROUND INFORMATION

A3.1 OPERATIONAL HISTORY

UNC began construction activity at the site in 1975. Approval of the original license application was granted on May 3, 1977 and milling operations began shortly thereafter.

During the first four months of operation, the mill processed about 2,000 TPD. In September 1977, the mill throughput was increased to about 3,000 TPD and, again in 1978, it was increased to its current capacity of 4,000 TPD. The basis for this license's environmental report assumes a maximum capacity of 4,000 TPD.

The operation has continued since initiation with one major interruption. On July 16, 1979, a breach in the tailings impoundment structure occurred, resulting in the release of an estimated 93 million gallons of tailings liquid and about 1,100 tons of solids to the Pipeline Canyon arroyo, some of it transported off UNC's property. The breach resulted in mill shutdown. Milling operations resumed in October, 1979.

In late 1979, seepage of tailings-related contamination was suspected north of the tailings area. As noted in Section A2.2, UNC has subsequently installed a series of monitoring and pumping wells north of and within the impoundment. This system of wells has been used to identify and intercept tailings-related contamination from the source area. Initial activities related to this program have been addressed as part of the Applicant's GWDP-152. The seepage interception system and neutralization program are discussed in the GWDP.

The mill is, as of November 1981, producing about 67,500 pounds of yellowcake per month with the mill operating two and one-third days per week.

A3.2 LICENSING HISTORY AND CURRENT STATUS

The Applicant submitted its original Mill License Application on July 16, 1976, with its associated Environmental Report (ER) on August 25, 1976. The original License for the mill has been amended several times as documented in Table A3.1[1]. The Applicant's license has an "expiration" date of January 31, 1982.

The Applicant is currently operating in accordance with conditions and stipulations in effect and enforced by the NMEID. Regular site inspections have been made by NMEID representatives and any variances from license conditions as noted have been corrected and appropriate changes made in operating procedures. Numerous reports are submitted to and reviewed by NMEID in association with continuing operations.

Permits related to the NECR operation include:

GWDP-63 - Backfilling
GWDP-152 - NECR Operations
NPDES - Mine Water Discharge (NECR)
NPDES - Mine Water Discharge (OCR)

The license conditions and ammendments are given in Table A3.1.

(1) Some of the Applicant's Amendments were made without notice or hearing. By listing the amendments, the Applicant is not acknowledging the legal validity of some of the amendments.

B.1.0

B1.0 GEOGRAPHY AND DEMOGRAPHY

B1.1 GEOGRAPHY

UNC's Church Rock Mill is located about 16 miles northeast of Gallup, New Mexico in McKinley County. The mill and tailings storage area are located in Section 2 of Township 16 North, Range 16 West. The Kerr-McGee Navajo Uranium Mine is located about one mile north of the UNC site. The mill site, county boundaries, adjoining land ownership, and the towns as regional population centers within several counties are shown in Figures B1-1 and B1-2. The aerial photo in Figure A1-2 shows details of the mill, company property, tailings disposal area, and exclusion area fenced boundaries.

The UNC mill is situated above an alluvial plain near the bottom of northeast- to southwest-trending Pipeline Canyon. An arroyo flows through this canyon southwestward to a point about 2.5 miles southwest of the mill site where it joins the Rio Puerco. Ram Mesa, located about 1.25 miles south of the mill, is a predominant feature of the local landscape. The steep slopes of the mesa rise over 400 feet above the canyon bottom to a maximum elevation of 7400 feet above sea level.

The area surrounding the mill site consists of sagebrush/grassland lowlands and pinyon/juniper vegetated uplands. Narrow canyons, arroyos, steep cliffs, and mesas are common features throughout the surrounding area.

The elevation at the mill site is approximately 6980 feet above sea level. The Cebolleta Mountains lie to the southeast of the mill site, some distance away. The Zuni Mountains are approximately 20 miles away located to the south of the site, and the Chuska Mountains lie to the northwest.

B1.2 DEMOGRAPHY

B1.2.1 Regional Demography

UNC's Church Rock operation is located in McKinley County, New Mexico. The county occupies 5,461 square miles in the northwestern portion of the state. Apache County, Arizona adjoins McKinley County to the west. Gallup, the county seat, had a population of 18,161 in 1980, accounting for 33 percent of the county's total population.

McKinley County and the state of New Mexico are sparsely populated. The 1980 population density of McKinley County was 10.1 persons per square mile as compared to 10.7 persons per square mile in the state and 62.7 persons per square mile in the entire United States.

McKinley County, like the state of New Mexico, is culturally diverse with 66 percent of the county's 1980 population being American Indian, including Navajos, Zunis, and Hopis. Twenty-six percent of the county population was Anglo-American in 1980 and 14 percent was of Spanish origin. Part of the Navajo and Zuni Indian reservations are located within the county.

Population totals for Gallup, McKinley County, the state, and the nation are presented in Table B1.1. Gallup, the county, and the state all grew at substantially greater rates than the nation as a whole between 1970 and 1980. In fact, the area has experienced a steady increase in population since 1950. Rapid growth during the 1950's was stimulated by a significant expansion of mining activities in the region. The growth rate slowed, however, during the 1960's and the 16.1 percent growth experienced during this period is attributable to natural increase rather than substantial immigration.

The area population continued to grow during the 1970's as uranium mining development expanded. By 1978, the county population was nearly 55,000, an increase of almost 13,000 since 1970. Many of the smaller

communities in the county experienced extraordinary growth during this period.

B1.2.2 Population Projections

Population projections for the state, Gallup, McKinley County, and neighboring Valencia (recently divided into Valencia and Cibola counties) and San Juan counties are presented in Table B1.2. A comparison of the projected 1980 population and the actual 1980 count shows that the state population was underestimated by 2.3 percent, the McKinley County population was overestimated by 11.9 percent, the Valencia County population was underestimated by 9.3 percent, and the San Juan County population was underestimated by 2.0 percent. Population projections prepared by the University of New Mexico, Bureau of Business and Economic Research, in 1972 underestimated the state population by 11.2 percent and the McKinley County population by 14.5 percent. It is expected that the projections presented in Table B1.2 are in the same range of accuracy.

B1.2.3 Employment and Income

New Mexico and McKinley County 1980 employment data are presented in Table B1.3. Nearly 75 percent of the McKinley County civilian labor force is occupied in government, mining, and wholesale and retail trade. The importance of mining to the regional and state economy is emphasized by understanding that McKinley County mining activity employs almost 16 percent of the state's total mining labor force. Compared to the entire state, relatively few McKinley County workers are occupied in finance, insurance, and real estate.

Total employment in McKinley County increased 21 percent between 1972 and 1980. The October 1981 county unemployment rate (9.5 percent) is higher than that of both the state (6.9 percent) and the seasonably adjusted rate for the nation (8.3 percent) as of 1981. Recent changes in unemployment may render past data unrepresentative of current conditions.

Per capita personal income in McKinley County increased 171 percent between 1969 and 1979 (Table B1.4). This compares with a 163 percent increase in the state and a 137 percent increase in the nation during this period. Nevertheless, the 1980 average income level in McKinley County was 38.5 percent below the national level and 27.9 percent below the state level.

B1.2.4 Land Use and Ownership

Over 97 percent of the land area of McKinley County is rangeland having a low carrying capacity or commercial or noncommercial woodland (Table B1.5). All other individual land use types constitute a very small percentage of the total county land area.

About 17 percent of the land area of McKinley County is privately owned. About 62 percent of the county is Indian Trust land and about 21 percent is state and federal land (University of New Mexico, 1972).

B1.2.5 Study Areas

Two separate study areas are evaluated in this report. The larger area is an 80-kilometer (50-mile) radius circle centered on the UNC mill (Figure B1-3). Communities located within this area, for which there are recent published population data, and their populations are listed in Table B1.6. These data were tabulated for use in the MILDOS code to perform the radiological assessment described in Section C4.0.

The population totals presented on the New Mexico portion of Figure B1-3 were estimated from 1980 U.S. Census Bureau Enumeration District (ED) maps. ED maps were not readily available for the Arizona portion of the 80-kilometer study area. Totals for the Arizona sectors were estimated by calculating the density of the rural population within Apache County. The area of Apache County within the study area was calculated, and this total was multiplied by the density value. For the Arizona sectors, the rural population was assumed to be evenly distributed. Community populations were then added to the appropriate sector totals.

The smaller study area is an eight-kilometer (five-mile) radius circle centered on the UNC mill (Figure B1-4). Almost all of the northern one-half of this area lies within the Navajo Reservation and much of the remainder of the area is under Indian ownership. This area was segmented as shown in Figure B1-4 and, on July 9, 1981, an aerial reconnaissance survey of the area was conducted to collect demographic and land use data. All permanently occupied housing units in the area were identified. An estimate of the population of the area was obtained by multiplying the number of occupied units (148) by 5.5, the average number of inhabitants per household in the Navajo Nation in 1970 (Faich, 1981). The estimated population of this study area is 814. The locations of garden plots, livestock ponds and tanks, windmills, and livestock enclosures were also noted for use in the preparation of the radiological assessment.

Most of the population in the eight-kilometer radius study area is located generally south of the UNC mill site in the vicinity of the Puerco River Valley and Pinedale, New Mexico which is located about three miles from the mill. One exception is a cluster of homes located to the north of the mill. Dwellings typically occupy the lower elevations in the area and housing clusters often occupy narrow canyon bottoms. Settlements in the study area typically consist of conventional single family homes and mobile homes accompanied by hogans, outbuildings, and stock enclosures.

There are no substantial seasonal or transient population variations in the smaller study area.

B.2.0

B2.0 METEOROLOGY

The site area has an arid to semiarid continental climate with more than 50 percent sunshine throughout the year. On an annual basis, winds are moderate and from the west-southwest. Most precipitation occurs in the late summer with generally dry conditions persisting year-round. A detailed description of meteorological conditions is presented in this section and a description of on-site and off-site meteorological monitoring procedures and equipment is presented in Section C8.3.

B2.1 JOINT FREQUENCY DISTRIBUTION

The joint frequency distribution is described by wind speed, wind direction, and atmospheric stability. Table B2.1 presents the joint frequency distributions and Figures B2-1 through B2-13 present the monthly windroses based on the National Weather Service (NWS) data for the period from January 1976 to December 1980 at Gallup. These are data which have a joint recovery of 90 percent or more. They show that on an annual basis most winds are from the west-southwest at approximately seven miles per hour during neutral to stable conditions. Stable conditions (Classes E and F) occur approximately 44 percent of the time at Gallup, indicating limited diffusion potential. Mixing and dispersion take place during unstable conditions (Classes A, B, and C) which occur approximately 23 percent of the time. Neutral conditions (Class D) occur 33 percent of the time. During the winter season, winds are from the west-southwest, and winds predominate from the west-northwest during the summer.

The on-site data collected by UNC from May 1977 to April 1978 are presented in Tables B2.2 through B2.4. These data show that winter winds at the site are predominately from the northeast and summer winds are predominately from the southwest. On an annual basis, winds average about five miles per hour and most are from the south-southwest to southwest with an additional component from the northeast. The southwest to northeast direction in which the winds blow is partially a

result of funneling through the valley which is also oriented southwest to northeast.

B2.2. MIXING DEPTH HEIGHTS

The best available monthly average mixing height depth information for the site area was determined by Holzworth (1972). The annual average morning mixing depth height for the mill site is 1,213 feet above ground level and the annual average afternoon mixing depth height is 8,820 feet above ground level.

B2.3 TEMPERATURE AND HUMIDITY

Long-term temperature data collected at Gallup are presented in Table B2.5 and show that the annual average temperature is approximately 49 degrees Fahrenheit. The maximum daily average temperature (87 degrees Fahrenheit) typically occurs in July and the minimum daily average temperature (14 degrees Fahrenheit) is expected in January. The extreme maximum temperature observed during the 1938 to 1960 period of record was 99 degrees Fahrenheit, and the extreme minimum for the same time period was -23 degrees Fahrenheit. Only slight variances are expected for temperature values at the site as compared to the meteorological station at Gallup. Since the elevation of the UNC site is less than 600 feet higher than the Gallup NWS meteorological station, temperatures are only slightly lower at the site.

Table B2.6 summarizes relative humidity data for the site area. The average annual relative humidity is approximately 55 percent with the minimum monthly average relative humidity occurring in May (33 percent) and the maximum monthly average relative humidity occurring in January (75 percent).

B2.4 PRECIPITATION

Precipitation data, recorded by the NWS at the Gallup station from 1938 to 1960, are summarized in Table B2.7. The UNC site should experience approximately the same quantity and frequency of precipitation as the

Gallup meteorological station since the valley walls and the distance between the site and the monitoring station have only a minor influence on precipitation. The annual average precipitation is 10.7 inches, while the greatest seasonal precipitation was observed in the summer (6.3 inches) and the minimum in the winter (4.4 inches). The maximum extreme daily precipitation was 1.9 inches in 1954.

Gallup's annual average quantity of snow and sleet is 28.7 inches with the maximum monthly average being 6.8 inches in December. The extreme monthly quantity of snow and sleet is 17.8 inches and the extreme daily quantity is 8.0 inches. Gallup typically can expect approximately 33 days per year with precipitation equal to or more than 0.1 inch, but these days are not generally consecutive.

B2.5 SEVERE WEATHER

Long-term, adverse weather conditions are rare in the UNC site vicinity, however, the site is subject to brief, but rare cloudbursts which can produce localized runoff. No tornado has been observed in the site area and effects from Gulf Coast hurricanes are limited to possible brief localized heavy rainfall. Winter storms are not usually accompanied by severe winds so the chance of blizzards or deep snowdrifts is slight.

B.3.0

B3.0 HYDROLOGY

B3.1 SURFACE WATER

B3.1.1 Introduction

The UNC Church Rock Mill is located west of the Continental Divide in the Puerco River Basin. This basin and other major drainage areas are part of the Little Colorado River Basin, as indicated in Figure B3-1. The following sections provide descriptions of the hydrology and hydrometeorology of the region, surface water features, estimates of the 100-year flood and the resulting floodplain, and comparisons of surface water quality data with appropriate standards.

B3.1.2 Previous Work

Several studies have been devoted to assessing the surface water conditions at the UNC site. A major source of information is the Church Rock Uranium Mill Environmental Report (ER) (UNC, 1976). In this document, the discussions on surface water drainage basins, impoundments, usage, and flood flows were based on information provided by a separate study (Shomaker, 1974). The ER also presents data on the chemical composition of the mine discharge fluid as sampled in the receiving arroyo. More recent information on discharge chemical composition is available in UNC's quarterly Discharge Monitoring Reports (DMR). Surface flow entering Section 2 primarily consists of mine water released from the UNC and Kerr-McGee Mines. The UNC quarterly DMR's are sampled at a pond upgradient from where the Kerr-McGee water enters the arroyo which is upstream of Section 2. Thus, the flow entering Section 2 is not necessarily reflected in UNC's quarterly DMR's.

B3.1.3 Regional Hydrology and Hydrometeorology

The UNC site west of the Continental Divide is on the Colorado Plateau (Figure B3-1). This region is characterized by numerous mesas, buttes, and plateaus interspersed with steep gullies and arroyos. The smaller drainages flow only as a result of intense rainfall events or snowmelt.

Only the larger drainage basins have either intermittent or perennial flow.

Two U.S. Geologic Survey (USGS) gaging stations exist in the mill site vicinity, one of which lies directly on the North Fork Puerco River downstream of the confluence with Pipeline Canyon (Figure B3-2). This gaging station was moved about five miles downstream in June 1981. The location, operating period, drainage area, and recorded flows from the two gaging stations are given in Table B3.1. The larger basin has experienced periods of no flow while the smaller basin has had base flow throughout its two-year period of operation (USGS, 1981). The major part of this flow originates from the Applicant's and Kerr-McGee's mines which release water into Pipeline Canyon, a tributary of the North Fork Puerco River.

The climate of the area is classified as arid to semiarid continental with hot summers and cold winters (U.S. Department of Commerce, 1972). Seasonal and daily variations in temperature are large. Mean annual temperature is 49 degrees Fahrenheit with extremes ranging from 99 to -23 degrees Fahrenheit. Mean annual precipitation for this region is 10.7 inches with 43 percent of this amount occurring in the period of July through September. Most of the summer precipitation is derived from thunderstorms of short duration but high intensity. Precipitation during the winter months (December through February) falls mostly as snow but amounts only to net 2.1 inches. Monthly average variations in relative humidity range from about 33 percent in May to about 75 percent in January.

B3.1.4 Drainage Basin and Surface Water Body Characteristics

The UNC site lies within Pipeline Canyon, a minor basin connected to the North Fork Puerco River Basin (Figure B3-2). The Pipeline Canyon Basin above the UNC site has a drainage area of 18.7 square miles while, just below the site, it has an area of 20.2 square miles (Figure B3-3). The North Fork Puerco River Basin above the confluence of Pipeline Canyon

drains 280 square miles. The Pipeline Canyon Basin above the UNC boundary has a maximum relief of about 700 feet. Upland areas consist of relatively flat mesas with extremely steep sideslopes. Channel slopes vary considerably (0.0054 to 0.0347 feet per feet) and are dependent on local bedrock controls (SAI, 1980a).

There are no known surface water bodies, diversions, or control structures below the mill site within Pipeline Canyon. Above the mill site, one impoundment is capable of storing approximately ten acre-feet of runoff. The impoundment is used for both erosion control and livestock watering. There are also settling ponds for the mines upstream of Section 2.

There are no surface water users, with the exception of stock watering, directly adjacent to the North Fork Puerco River for at least ten miles downstream from the UNC site. The alluvium of the valley is recharged by storm runoff and is tapped by several shallow wells for domestic and stock watering purposes. Since this water is technically groundwater, the shallow alluvial wells are discussed in Section B3.2.

B3.1.5 Flood Flows

The peak discharge of the 100-year flood was determined for the Pipeline Canyon Basin starting at a point just below the mill site. The precipitation amounts for the 100-year storms with durations of 1, 6, and 24 hours were determined through the use of the NOAA precipitation frequency atlas for New Mexico (U.S. Department of Commerce, 1973). These amounts, adjusted for area reduction factors, are presented in Table B3.2. A computerized version of the U.S. Soil Conservation Service's (USSCS) triangular unit hydrograph was used to distribute the precipitation over time according to the graph shown in Figure 21-2 of the USSCS National Engineering Handbook, Section 4, Hydrology (1972). The USSCS method uses basin soil and vegetative cover characteristics to derive a curve number (CN) that relates to the basin's runoff producing potential. It uses basin geometry such as maximum relief and longest

drainage path to calculate a synthetic triangular hydrograph. The computer program applies the 100-year storm to this synthetic unit hydrograph and calculates the runoff hydrograph.

Input values for this method consisted of a CN of 80, basin area of 20.2 square miles, longest drainage path of 30,000 feet, and maximum relief of 700 feet. The results of the 100-year peak discharge calculations are presented in Table B3.2. The short-duration storms produced higher peak discharges because the higher intensity of rainfall produced relatively more runoff in a short period of time.

B3.1.6 Floodplain Determinations

The Hydrologic Engineering Center's (1976) water surface profile computer program, HEC-2, was used to calculate the surface width, elevation, and flow velocities of the 100-year flood within UNC's property. The HEC-2 program solves backwater curves for both subcritical and supercritical flows. Input requirements include digitized channel and overbank area cross sections, channel and overbank roughness coefficients, distances between cross sections, channel slope, and the streamflow (Hydrologic Engineering Center, 1976).

The Pipeline Canyon channel area of interest extends from 200 feet upstream of the northern UNC Mill site boundary to the southern boundary. The total distance along the channel is 6,900 feet. The width of the area varies from about 1,000 to 2,000 feet. In the upstream portion, above UNC property, the channel extends across the entire valley. Throughout the UNC property, the channel is bounded on the west by the valley wall and on the east by the tailings disposal site embankments. Fourteen cross sections defining this area were provided by Koogle and Pouls Engineering as described in the SAI, 1980a report. Two additional cross sections were digitized from the 1980 1 inch equals 200 feet, two-foot contour interval topographic map of the mill site. This brought the total number of cross sections to 16. The locations of the cross sections are provided in Figure B3-4.

The resistance to flow is characterized by the Manning coefficient "n." An "n" value of 0.030 was used for the main channel area and an "n" of 0.060 for the overbank regions. The overbank value of 0.060 was chosen since this area has a large number of irregular land features produced from the development of the site. These irregularities will cause a large amount of energy loss and therefore the high "n" value was chosen. The 100-year flood of 2,655 cubic feet per second as shown in Table B3.2 for the one-hour storm was used for the maximum flood flow discharge.

In performing the HEC-2 computations, the channel was divided into two segments. This segmentation was required because of the extreme break in slope between Cross Sections 7 and 8 caused by a bedrock control point (Figure B3-5). Below Cross Section 7, the steep channel slope results in supercritical flow. Above Cross Section 8, the flow is subcritical. Critical flow conditions were assumed at Cross Sections 7 and 8 because of their closeness to the point where the slope changes.

Table B3.3 lists the water surface elevations, widths, and velocities of each cross section along with the elevation of the toe of the embankment separating the channel and tailing disposal area. The 100-year flood will inundate the toe of the embankment at Cross Section 11 by a small amount (Figure B3-6). Because the velocity of the flow at this far edge is low, about 2.7 feet per second, little damage would result. To ensure that the toe of the embankment is not scoured, stabilization of the embankment toe by riprap would be adequate. A possible source of riprap could be sandstone excavated from Ram Mesa.

B3.1.7 Water Quality

UNC has analyzed surface water samples at the site since the preoperational program began in 1975. Five surface water sampling locations were included as part of the original license requirements. In addition, samples were taken for radiological analyses following the breach in July 1979.

Surface water flows in the mill site vicinity represent the discharge effluent from dewatering at the adjacent mining operations. This fluid is the only measurable flow in Pipeline Canyon except for precipitation or snowmelt event. Weekly samples are collected and analyzed for quarterly DMR submittals. Tables B3.4 and B3.5 list the specific constituents and their concentrations measured for the period April 1980 to March 1981 at two sampling sites. Kerr-McGee mine water enters the arroyo downgradient from the sampling points and upgradient from Section 2. Table B3.4 represents samples collected downstream from the ion exchange plant at the NCR Mine and is shown as Sampling Site M-1 in Figure B3-7. The data listed in Table B3.5 were derived from samples at the OCR Mine collected downstream of the treatment system outlet. This location is noted in Figure B3-7. The UNC monitoring for Sampling Sites M-1 and M-2 are listed in Table B3.6. All measured quantities exceeding the discharge limitations have been noted (USEPA, 1980, Personal Communication) and have been discussed and alleviated at the mine sites.

Radiological constituents of surface water in Pipeline Canyon and North Fork Puerco River have been measured by UNC since 1975. Since July 1979, following the breach, sampling has been done in the Pipeline Canyon, the North Fork Puerco River, and the Puerco River. These samples were taken by UNC personnel as part of the radiological monitoring program (Section C8.0).

The results of the radiological monitoring program are given in Tables B3.7 through B3.13. Ra-226 levels were above 30 pCi/l on June 11 and December 22, 1976 at Site SW-3 and on December 22, 1976 at Site SW-5. These concentrations occurred before UNC and Kerr-McGee installed the present mine discharge treatment facilities. The New Mexico water quality regulations for groundwater at place of nearest use are shown in Table B3.14, although not directly applicable to surface flow.

The tailings liquid release on July 16, 1979 caused elevated concentrations of U-238, Ra-226, and Th-230 at Sites SW-5, RWS-25, RWS-26, and RWS-27. Sites SW-3 and "Above the Falls" were upstream of the tailings release location and were not affected. Site RWS-28 is about 36 miles downstream of the mill. The concentration at Site RWS-28 on July 16, 1979 for radionuclides was below groundwater standards on an annual basis as a result of dilution and sorption. Samples collected 12 days later on July 27, 1979 showed that radionuclide concentrations had decreased to prespill levels at all sites.

B3.2 GROUNDWATER

B3.2.1 Introduction

Hydrogeological investigations have been ongoing at the UNC Church Rock site since 1974. Currently, UNC is continuing work at the site. UNC submittals related to their GWDP summarize results of all investigations that have been conducted. The GWDP submittals should be referred to for the results of the data submitted to NMEID to date, and continuing studies.

The purposes of the previous and continuing studies have been to evaluate the local hydrogeological system. To date, the GWDP submittals provide the most recent assessment of hydrogeological conditions at the site.

The Qualitative Analysis of Water Level Changes in Wells Near the Central Tailings Area at the UNC Church Rock Mill (SAI, 1981c), the Updated Seepage Analysis--April 28, 1981 - May 10, 1981 (SAI, 1981d), and the GWDP Volume III Addendum (SAI, 1981e) provide most recent published hydrological information. Again, it is noted that ongoing work at the UNC site is continuing to provide refinement to the existing data base. These refinements will be included in future submittals to NMEID related to the GWDP. The following section summarizes the available data sources related to an assessment of hydrogeologic conditions at the site.

B3.2.2 Previous Investigations

The initial assessment of local hydrogeological conditions at the site was made by Shomaker (1974). It includes a well inventory compiled from state records and identifies domestic wells. Characteristics of pertinent formations underlying the site were summarized from published reports.

The ER (UNC, 1976) incorporates Shomaker's (1974) report and summarizes primary sources of hydrogeological information. The ER also describes formation characteristics and water use within the study area. This GWDP includes a comprehensive site history and a description of present mill practices, site geology and hydrology, monitoring plans, and reclamation plans.

In March 1981, SAI studied the time history of water level fluctuations in wells immediately surrounding the central tailings area. The purpose of the study was to detect seepage from the central tailings area as reflected by increasing well water levels. An update of this report was made in May of 1981 based on data gathered between February 28 and May 10, 1981 (SAI, 1981d).

B3.2.3 Regional Setting

The UNC Church Rock Mill is located on the southern rim of the San Juan Basin. This basin is a structural depression covering an area of approximately 30,000 square miles at the eastern edge of the Colorado Plateau. The basin is filled with a very thick sequence of marine transgression and regression sedimentary deposits, some of which outcrop at the Church Rock Mill site. Several formations within the basin, such as the Westwater Canyon Member, are recharged at relatively elevated outcrops around the basin rim.

B3.2.4 Site Hydrogeology

The Church Rock Mill and tailings ponds are located within Pipeline Canyon. Flow in the canyon is naturally ephemeral but presently has

flow due to treated mine water it receives from UNC and Kerr-McGee mining operations. Local bedrock consists of Cretaceous sedimentary deposits which generally dip to the north. Detailed geology of the site is in Section B4.0, although pertinent information is included in this section as related to the groundwater regime.

The alluvium at the Church Rock Mill site ranges from 20 to approximately 140 feet in thickness (SAI, 1981e). It consists of clays, silts, and sands commonly deposited in graded or poorly sorted lenticular bodies. The beds underlying the alluvium consist of sands, shales, and coals of the Upper Cretaceous Mesa Verde Group. Those pertinent to the local hydrogeologic regime are:

- o The Dilco Coal Member of the Crevasse Canyon Formation;
- o The Upper Gallup Sandstone, including the Torrivio Sandstone; and
- o The Upper D-Cross Tongue of the Mancos Shale.

In certain areas, these beds are in direct hydrologic contact with the alluvium because the alluvium was deposited on an angular unconformity (Figure B4-7).

The Dilco Coal Member consists of fine- to medium-grained sandstones, siltstones, carbonaceous shales, and coals. It is generally 110 to 150 feet thick and has a sharp contact with the underlying Upper Gallup Sandstone. As discussed in Section B4.0, recent studies have indicated some of the sandstone previously thought to be in the Dilco has now been identified as the Torrivio Sandstone of the Upper Gallup Formation. The sandstone is referenced, where pertinent, as the Dilco/Torrivio.

The Upper Gallup Sandstone ranges from about 40 to 120 feet thick at the site. It has been divided, below the Dilco/Torrivio Sandstone, into three zones of different lithologies. From top to bottom, they are:

- Zone 3 is a medium- to coarse-grained sandstone with occasional thin beds of shale. It has a very sharp contact with Zone 2.
- Zone 2 consists of shale and coal with an underclay. It is 15 to 20 feet thick and has a gradational contact with Zone 1.
- Zone 1 is a very fine- to fine-grained sandstone with argillaceous sandstones and carbonaceous stringers from 40 to 75 feet thick.

The Upper D-Cross Tongue of the Mancos Shale consists of shale with minor siltstone beds and fine-grained sandstone. It underlies the Upper Gallup Sandstone and the contact between these beds is gradational and interfingered.

The remaining formations below the mill site are not significant to discussion. It should be noted, however, that the major source of water for the UNC milling operation is the Westwater Canyon Member of the Morrison Formation. This aquifer is about 1,400 to 1,600 feet deep and consists of 250 to 300 feet of sandstone interbedded with shale.

B3.2.5 Groundwater Use

In 1974, a general study of the geology and hydrology of the Church Rock Mill site was conducted (Shomaker, 1974). At that time, there were 13 wells and one spring within a four-mile radius of the mill site. Figure B3-8 provides the locations of these wells and spring, while Table B3.15 provides well and spring descriptions. The wells tapped the valley alluvium, the Westwater Canyon Member of the Morrison Formation, and the Dalton, Dakota, and Gallup Sandstones. Water from these wells is used for domestic purposes and for watering livestock. Presently, UNC and Kerr-McGee mining operations are using water from the Westwater Canyon Member of the Morrison Formation for drinking water.

B3.2.6 Monitoring, Extraction, and Interception Wells

Details of the hydrology and geochemistry of groundwater at the mill site have been acquired through the installation of an extensive system

of monitoring, extraction, and interception wells. As of December 1980, there were 43 central pond extraction wells, 28 contaminant boundary identification wells, and 100 other monitoring wells. Table 4.1 of the GWDP (SAI, 1980a) provides the characteristics of these wells and Figure C6-1 of this report shows the well locations. As of December 1981, over 200 wells have been installed at the site and field investigations are continuing related to the GWDP studies.

The central pond extraction wells form a ring around the central region. They are completed with a 4.5-inch I.D. PVC and are all suitable for pumping contaminated water from the central cell region. Three of these wells (303, 323A, and 335) were tested to determine aquifer characteristics. Test results are summarized in Section B3.2.7 of this report. The results of the tests were used to determine which wells would be used as extraction wells and the rate at which they would be pumped. Table B3.16 provides the characteristics of Wells 303, 323A, and 335; Figure B3-7 shows their locations.

The other monitoring wells on site are a variety of one- to four-inch observation wells and piezometers. Results of the monitoring are discussed in Section B3.2.8. The well completion summaries of Monitoring Wells GW-1, GW-2, GW-3, GW-4, and GW-D1 are presented in Table B3.16, while Figure B3-7 shows their locations. These five wells have been used by UNC as part of their radiological monitoring program (Section C8.0).

Since submission of the GWDP in December of 1980 (SAI, 1980a), the NMEID requested that UNC install a well system for intercepting seepage which was migrating north from below the central pond area. Pumping tests were performed in Wells 402 and 438 and the results are summarized in Section B3.2.7 of this report. The locations of Wells 402 and 438 are shown in Figure B3-7; Table B3.16 provides their completion summaries. The design and operation of the interception system are provided in detail in several of UNC's GWDP submittals. To date, it has been

demonstrated that the interceptor wells have been effective in controlling flow in that area. Results are continuing to be evaluated as part of the GWDP investigations.

B3.2.7 Formations

The water-bearing units which play an important role in the hydrogeologic dynamics of the site are the valley alluvium and the Upper Gallup Sandstone. Pumping tests have been run in Zones 1 and 3 of the Upper Gallup Sandstone. Transmissivities calculated from Pumping Wells 303, 323A, and 335, which are completed in the Upper Gallup Sandstone, range from 11 to 3,000 square feet per day. Storage coefficients range from 6×10^{-5} to 1×10^{-1}.

Data from pumping tests performed in Wells 402 and 438, which are completed in Zone 3, were used to calculate major and minor transmissivity values. The major transmissivity trends North 27 degrees West and is 340 square feet per day; the minor transmissivity is 205 square feet per day. Storage coefficient is about 2×10^{-2}. Water levels in the Dilco/Torrivio Sandstone and in Zone 2 were monitored during the Zone 3 pumping tests and indicated that there is no hydrologic connection between these beds and Zone 3.

A potentiometric surface map has been constructed for Zone 3 of the Upper Gallup Sandstone (Figure B3-7). The potentiometric surface map for Zone 3 was constructed from preliminary data taken in April 1981. It shows a general east-northeast hydraulic gradient. However, flow direction would be influenced by the anisotropy of the formation and, therefore, should be in a more northeasterly direction than the potentiometric surface would indicate. The generally easterly flow in Zone 3 indicates that the point of recharge for this aquifer exists west of the site, possibly the mine effluent water that flows down the arroyo. Gradients associated with each of the zones of interest are being continually evaluated as part of the ongoing GWDP studies.

B3.2.8 <u>Groundwater Quality</u>

As part of its radiological monitoring program, UNC has been taking water quality samples from five wells on a quarterly basis since January 1977. The results of the sampling program are listed in Tables B3.17 through B3.21. These results may be compared to the annual MPC for releases beyond the restricted area (NMEID, 1980) which are presented in Table B3.14. In the four and one-half years of sampling, there was one instance in Well GW-4 where Ra-226 concentration in excess of the 30 pCi/l. This well is located in the restricted area.

Table B3.20 shows that this was an isolated incident as most Ra-226 concentrations are less than 2.0 pCi/l. Total uranium concentrations ranged from 3.0 pCi/l in Well GW-3 to 190 pCi/l in Well GW-4, below the MPC. Th-230 concentrations ranged from 0.14 pCi/l in Well GW-1 to a maximum of 36.3 pCi/l in Well GW-2. The MPC for Th-230 is 2,000 pCi/l.

Discussion of the status of continuing investigations is summarized in Section C6.2, Impacts on Groundwater, and in the GWDP documents previously referenced.

Following the breach in July 1979, the U.S. Public Health Service and UNC have been sampling five alluvial wells that are within 200 feet of the alluvial channel to a distance of about 30 miles downstream from the site. These wells were selected because they were being used for domestic and stock water. Results of radiological monitoring from these wells are presented in Tables B3.22 through B3.26. As described in Section C6.2, the spill has not had any permanent impact on the alluvial well water quality.

B.4.0

B4.0 GEOLOGY AND SEISMICITY

B4.1 PREVIOUS WORK

The mill site has been the subject of some of the most intense and comprehensive geology studies performed in this country. These studies have been based upon extensive drilling at or near the site, geotechnical testing, field observations, and photogrammetric analysis of stereographic aerial photography, as well as examination of publicly available literature and mapping.

Several geologic and seismologic studies to assess the feasibility and environmental consequences of the UNC Church Rock Mill have been conducted over the past five years. Geologic studies are included in the GWDP (SAI, 1980a) and the Southeast Evaporation Pond Design Report by Civil Systems, Inc. (CSI, 1980). These reports are supplemented by reports to UNC by Sergent, Hauskins and Beckwith (SH&B) (1974, 1976a, 1976b, 1978); SAI (1980b); SAI and Bearpaw Geosciences (1980); and the Applicant's earlier ER on the Church Rock, New Mexico Uranium Mill and Mine (UNC, 1976), as well as upon primary sources.

The GWDP incorporates detailed stratigraphic description of the units occurring at or directly beneath the mill site. The data are based in part on the Seepage Study (SAI, 1980b) and primary sources. Structural geology is based on a detailed study of the Church Rock area geology (SAI and Bearpaw, 1980).

The Southeast Evaporation Pond Design Report (CSI, 1980) includes analyses of site seismicity and consequences. The report addresses the tectonic framework of the Colorado Plateau, and the structural basis for regional seismicity, and estimates the seismic potential of the region and site, based on historical and structural data. Similar seismic studies are also included in SH&B (1976a and 1976b) and SAI and Bearpaw (1980).

Geologic discussions are included in the reports of SH&B (1974, 1976a, 1976b, 1978), along with geotechnical studies relating to Church Rock and the potential for seepage beneath the site. These reports contain mainly stratigraphic details and a description of the alluvium at the site. The SH&B (1978) report contains a brief seismic history and estimates of the maximum intensity earthquake and the peak horizontal ground acceleration for the site.

The Seepage Study (SAI, 1980b) contains a brief discussion of the tailings disposal site geology. Cross sections and core logs based on earlier drilling by SH&B are also included.

The structural geology of the area was studied extensively in the Geology of the Churchrock Area, New Mexico (SAI and Bearpaw, 1980), which also contains stratigraphic descriptions of the Mancos Shale and overlying formations at or near the site. Photo lineations were analyzed, and regional and local patterns were overprinted in the site area.

UNC's ER (1976) contains an exposition of site stratigraphy, areal geology and structure, and seismicity. An historical summary of seismic activity in the region (within a 200-mile radius) and an estimated peak horizontal ground acceleration (0.1g) are given.

Major conclusions of these studies are summarized below in Sections B4.2 and B4.3 and formulate the scope of investigations for this section. In the final section (B4.4), seismologic data from the Southeast Evaporation Pond Design Report (CSI, 1980) and SH&B (1978) are compared.

B4.2 GEOLOGY OF THE UNC CHURCH ROCK SITE

B4.2.1 Regional Geologic Setting

The Church Rock Mill site lies in the Colorado Plateau physiographic province. The geomorphology of the Plateau region is characterized by plateaus, escarpments, and canyons. The canyons are steep-sided and of

variable width and depth. Volcanic extrusions and intrusions result in the major topographic "irregularities" in a region otherwise distinguished by vast, flat-lying, lofty tablelands and benchlands (King, 1959). There are no large volcanic extrusions or intrusions within 20 miles of the site.

The Plateau incorporates several major structural elements as shown in Figure B4-1, including the San Juan Basin in its eastern extent. The Zuni Uplift, which demarks the southern boundary of the San Juan Basin, forms the Chaco Slope to the north. The mill site is located on the Chaco Slope which forms the southwestern rim of the San Juan Basin.

B.4.2.1.1 Regional Stratigraphy

The Colorado Plateau is underlain by sediments deposited by repeated transgressions and regressions of a Mesozoic epicontinental sea. Many of the formations can be traced over enormous areas on the present North American continent, although regional variation is frequently apparent.

A stratigraphic column typical of the San Juan Basin region is shown in Figure B4-2. Except for the alluvium, the stratigraphic units above the Crevasse Canyon Formation are not present at the mill site. The Jurassic Morrison Formation is the major uranium ore-bearing formation in the region.

B4.2.1.2 Regional Structure

The Colorado Plateau is bounded by the Rio Grande Rift on the east, a broad region of right lateral movement (Walker Line, Texas Lineament) on the south, the Basin and Range Province on the west, and the Uncompaghre and Wind River Range on the north. Structurally, the Colorado Plateau is characterized by very broadly folded strata, often resulting in extensive monoclinal structures. The folding is accompanied by local faulting. The monoclinal structures may result from flexure of sedimentary layers draped over relief in the basement rocks. The Colorado Plateau has a typical pattern of large structural basins and

uplifts resulting from the broad folding of the strata. The San Juan Basin and the Zuni Uplift are examples of these structures in the eastern portion of the Plateau.

The San Juan Basin lies in the eastern region of the Colorado Plateau. It is bounded by the Rio Grande Rift and the Nacimiento Uplift (Tertiary volcanics) on the east, the Zuni Uplift on the south, the Defiance Uplift on the west, and the San Juan Mountains (Tertiary volcanics) on the north. Pre-Cambrian rocks are exposed on the normally faulted southern edge of the Zuni Uplift. The outcrop patterns north of the Zuni Uplift on the Chaco Slope show progressively younger formations exposed toward the north (Figure B4-3) and strata dip of one to three degrees to the northeast into the basin. The beds thicken and dip more steeply toward the center of the basin (Figure B4-4).

Structural features in the Colorado Plateau include broad monoclinal folding and orthogonal fractures perpendicular to bedding striking north-northeast and west-northwest. The orthogonal feature is attributed to rapid sedimentation in the Colorado Plateau region during the Cretaceous and Tertiary Periods, and the concommitant dewatering of the sediments. Individual fractures in sandstones are not continued through shales below the sandstones. Fractures in the shales are generally tightly closed due to the weakness and ductility of the shales under the stresses imposed by gravity.

Broad monoclinal folding in the Colorado Plateau is attributed to passive draping of the younger sediments over pre-existing relief in the basement rocks. The relief in the basement rock is attributed to ancient faulting. Local, very small faults have formed in brittle sandstone beds as the result of local extension across the monoclinal hinge but are not continuous through the interbedded shales. A late Cretaceous or early Tertiary age is strongly implied for the broad monoclinal folding. All of the faults which shaped the late Cretaceous - early Tertiary history of the region are syndepositional with the

original tectonics of the Colorado Plateau and are no longer active. Studies of stream beds exposing Pleistocene sediments revealed no offsets, which implies any ancient faulting in basement rock has not been activated in geologically recent epochs (SAI and Bearpaw, 1980).

B4.2.2 Site Geology

B4.2.2.1 Site Topography and Geomorphology

The UNC Church Rock site lies in the narrow alluvium-filled Pipeline Canyon which drains into the North Fork of the Rio Puerco. Pipeline Canyon transects the Chaco Slope, the southwestern rim of the San Juan Basin. The alluvium in the relatively flatbottom valley abuts steeper slopes composed of the Crevasse Canyon Formation or the Mancos Shale. The bedrock-alluvium contact in the canyon is considered to be the pre-Pleistocene surface of the valley.

B4.2.2.2 Site Bedrock Stratigraphy

Figure B4-5 shows the local stratigraphic column as determined at the NECR Mine shaft. The site geology east of State Highway 566 is shown in Figure B4-6. The mill site lies near the contact between the Dilco Coal Member and the Upper Gallup Sandstone. The strata in the uppermost 200 feet underlying the tailings impoundment and north of the tailings impoundment are shown in the three sections in Figures B4-7A and B4-7B. Like the rest of the Colorado Plateau, the local stratigraphy reflects marine marginal sedimentation.

The surface at the mill site is covered with talus and soil composed of eroded Dilco Coal Member of the Crevasse Canyon Formation, or Mancos Shale. At the site, the soil or talus is up to three feet thick, but thickens toward the valley walls to 100 feet or more. This material overlies the Dilco Coal Member of the Crevasse Canyon Formation or the Upper Gallup Sandstone.

Although the mine shaft collar penetrates the upper members of the Crevasse Canyon Formation (part of the Cretaceous Mesa Verde Group), and the surrounding mesas are capped by these units, the mill complex rests on the Dilco Coal, the lowermost member of the formation. The Dilco Coal Member represents fluvial and paludal depositional environments. The formation, up to 100 feet thick near the mill site and 300 feet thick at the mine shaft, consists of three units. These are, in descending order:

1. A sandstone, siltstone, and shale member;
2. A massive or cross-bedded sandstone; and
3. A lowermost carbonaceous shale, coal, and sandstone unit.

This lowermost unit, underlying the alluvial valley at the mill site, contains sandy or silty gray shales interbedded with yellowish to gray fine-grained sandstones. Two relatively continuous, one- to two-foot-thick, shaly coal seams occur in this unit, as well as a petroliferous zone that varies in its stratigraphic position within this member.

Recent drilling and geophysical logging at the UNC site has indicated the presence of the Torrivio Sandstone of the Upper Gallup Sandstone Formation. Earlier investigations had, for the most part, identified this sandstone as part of the Dilco Coal Member (Billings, 1981). The Torrivio Sandstone occurs between the base of the Dilco Coal Member and the unit designated as Zone 3 of the Upper Gallup Formation. It is present in some areas at the site but has been eroded elsewhere. Investigations related to the continuing GWDP studies at the site are providing more definitive data on the extent and thickness of this sandstone. For clarity the Torrivio Sandstone is referred to as the Dilco/Torrivio where there has been a sandstone unit identified near the base of the Dilco Coal Member.

The Dilco Coal interfingers with the underlying Cretaceous Gallup Sandstone. This unit represents coastal and paludal deposition coincident with the regression of the Mancos sea. The Gallup Sandstone occurs as an Upper and Lower Member, with the Upper D-Cross Tongue of the Mancos Shale lying stratigraphically between the two members. The Upper Gallup Sandstone including the Torrivio Sandstone outcrops at several locations in the vicinity of the mill site. In the sections shown in Figures B4-7A and B4-7B, the Upper Gallup Sandstone below the Torrivio Sandstone is divided into three zones. These are:

- Zone 3 - Uppermost; a coarse-grained, gray, arkosic sandstone unit, containing thin beds of gray shale; sandstones are cross-bedded and poorly cemented; very thin coal beds occur in the the lower part of this unit; thickens to northeast; and a westerly increase in grain size is evident north of the tailings area in the valley.

- Zone 2 - Middle; shale, coal, and underclay; sharp contact with overlying strata; 15 to 20 feet thick; coal increases to the north of the tailings area.

- Zone 1 - Lowermost; fine-grained sandstone and argillaceous sandstone; gradational with overlying unit; includes the beds of carbonaceous shales and coal; increasing clay and shale with depth as the unit grades into the Mancos Shale.

In the immediate vicinity of the mill, the Upper Gallup Sandstone may reach over 150 feet thick (Figures B4-7A and B4-7B). The underlying Upper D-Cross Tongue of the Mancos Shale is not exposed at the site. It is a thin- to medium-bedded shale with small amounts of silt, representing a marine transgression in this region. Underlying Cretaceous and earlier strata are shown in Figure B4-4.

B4.2.2.3 Surficial Deposits Underlying the Tailings Impoundment Area

The Pipeline Canyon alluvial valley contains loose sediments, ranging in age from Pleistocene to Recent. The thickness of the alluvium varies widely in short distances. Generally, the thickness increases in the

valley north and south of the tailings impoundment. Locally up to 135 feet may be present. The alluvium overlies the Dilco/Torrivio Member of the Crevasse Formation near the mill site. The alluvium/talus/soil contact with the underlying formations is considered to be the pre-Pleistocene valley floor.

Detailed sedimentological and stratigraphic investigations of the alluvial deposits in the Pipeline Canyon were begun as part of the tailings impoundment design (SH&B, 1974, 1976a, 1976b). Cross sections based on test borings in the alluvial valley are shown in Figure B4-8. The deposits are usually cross bedded, composed of sandy and silty clays of low to moderate plasticity, silty sands, sandy silt, and clayey sands. Highly plastic clays occur in isolated lenses. The degree of cementation varies considerably and, depending on the water content of the alluvium, their consistency varies from soft to hard, with the relative firmness described as moderately firm to firm (SH&B, 1974, 1976a, 1976b). Cross-sections (Figure B4-8) reflect the results of SH&B borings taken in the area. The alluvium thickens toward the middle of the valley, reaching about 80 feet near the south end of the tailings disposal area. Elsewhere, it may be as thick as 130 to 140 feet (SAI, 1981e).

B4.2.2.4 Site Structure

The site is within the province of three structural features, in addition to the overprint of regional structures. These three structural features are:

- o Pipeline Canyon lineament
- o Fort Wingate lineament
- o Pinedale monocline

The Pipeline Canyon lineament trends east-northeast from the northern margin of the Zuni Uplift. It is believed to be a monoclinal fold. The monoclinal fold is believed to have been formed by the passive

bending or draping of the young sediments over the structural relief generated by faulting of basement rocks deep beneath the surface. The Pipeline Canyon lineament is interpreted to be a result of a no longer active tectonic system. An inspection of stream beds exposing Pleistocene sediments revealed no offsets, which implies any ancient faulting in basement rocks has not been activated in geologically recent epochs. The Fort Wingate lineament is similar to the Pipeline Canyon lineament in origin (SAI and Bearpaw, 1980).

The Pinedale Monocline passes to the northeast of the site. It is a doubly hinged monocline, with structural relief of the upper surface of the Dalton Sandstone between 60 and 125 feet. Most of this structural relief is compensated by thickening in the Gibson Member. The age of the Pinedale Monocline is upper Cretaceous. As noted earlier, local, very small faults have formed in brittle sandstone beds as the result of local extension across the monoclinal hinges, but are not continuous through the interbedded shales (SAI and Bearpaw, 1980).

B4.3 SEISMOLOGY

The Church Rock site lies in the seismically quiet Colorado Plateau. Historically, the seismic activity of this region has not been monitored as extensively as other more active regions.

The majority of the seismic activity in the region is concentrated along the borders of the Colorado Plateau Province which are 70 miles or more from the site. As shown in Figure B4-9, earthquake epicenters are concentrated in the Rio Grande Rift (near Albuquerque and to the south) and along the southern Shear Zone (southwest New Mexico to northeastern Arizona). Table B4.1 shows recent earthquakes within 125 miles (200 kilometers) of the site. No earthquakes of magnitude greater than 5.7 (Richter) have been recorded in this area. The Magnitude 8.0 earthquake in northern Mexico (Figure B4-9) is over 500 miles from the site. This event may have been related to the intersection of the southern shear zone and the Texas lineament, features which are not pertinent to

the site. Nearer the site, within the Colorado Plateau Province, seismic activity appears to be concentrated upon pre-existing basement faults resulting in shallow focus earthquakes. Within the region, the projected maximum seismic event may occur in the southern Rio Grande Rift. Here, the 1906 Socorro quake, 160 miles from the site, is estimated to be 6.0 to 6.5 on the Richter scale. A maximum 7.0 event is projected for this area (CSI, 1980). The Albuquerque Basin is the nearest seismically active zone to the site. It experiences frequent microseismic activity and is most active at the northern and southern ends of the basin. A maximum 6.5 event is projected for the entire Albuquerque Basin (CSI, 1980). At UNC's site, the maximum projected earthquake magnitude is 5.75 to 6.0 along Pipeline Canyon lineament, but the event is considered unlikely (CSI, 1980). The site is in Zone 2 of the Uniform Building Code Seismic Risk Map. This suggests that damage to quality buildings due to seismic activity would be negligible. Damage to all other buildings will be slight to moderate due to likely seismic events in the area.

B4.4 COMPARISON OF DATA

CSI (1980) suggests a seismic loading coefficient of ten percent of the acceleration of gravity (0.1 g). This value is used in seismic analysis of structures to determine the inertial force on a mass due to an earthquake. According to SH&B (1978), a coefficient of 0.1 g would result from a highly unlikely 5.0 magnitude event in the immediate vicinity of the site. No earthquakes of this magnitude have been recorded within 50 miles of the site. According to SH&B (1978), the maximum values for the site are more likely to be 0.02 g to 0.05 g. The tailings structure is designed for structural stability and against liquefaction at values greater than considered likely.

C.1.0

C1.0 MINING AND MILLING

This section describes mining and milling activities at the Church Rock operation. The sections on mining are for informational purposes; not for the purpose of regulation.

C1.1 MINING ACTIVITIES

UNC Mining and Milling's Church Rock operations lie on the western edge of the Grants Mineral Belt. UNC is currently operating two mines at the Church Rock operation, NECR and OCR. Production at NECR is currently taking place on Sections 34, 35 (Township 17 North, Range 16 West), and Section 3 (Township 16 North, Range 16 West). OCR is producing from Section 17 (Township 16 North, Range 16 West). The host rock for uranium mineralization at the Church Rock operation is the Westwater Member of the Morrison Formation. The average thickness of the ore-bearing member in the Church Rock area is 225 feet and is of Jurassic Age.

C1.1.1 Northeast Church Rock

NECR operates two mining shifts and three ore haulage shifts per day, five days per week. The current mine production is about 1,250 tons per day at an average ore grade of 0.120 percent U_3O_8. The primary mine shaft (Church Rock I) is a 14-foot-diameter, concrete-lined shaft 1,788 feet deep. The shaft is separated into three compartments, two for ore hoisting and one for men or materials. The Church Rock II shaft is located in the southern portion of the mine and used primarily as an intake shaft and secondary escapeway.

Ore production is achieved in the active areas using a modified room-and-pillar mining method. Ore is accessed using a double-entry system of intake and exhaust drifting. Trackless development throughout the mine is primarily Loader Haulage Drifting (L.H.D.). Trackless drifting and pillar extraction are accomplished by jackleg drilling and subsequent blasting in the ore zones. Ore haulage is achieved using a combination of two yard loaders, four-ton trucks, and drum slushers. Once

blasting is completed, the broken ore is loaded into the truck with the front-end loader and hauled to strategically placed ore passses. Diesel locomotives pulling five-ton side dump ore cars haul the ore from the bottom of the ore pass to the trench. Ore at the trench is then hoisted to the surface, sampled, assayed, and sent to the mill.

About 750,000 cubic feet per minute of fresh air is drawn into the mine by six surface exhaust ventholes, through Church Rock I, Church Rock II, and Venthole 5. The mine ventilation systems provide underground personnel with fresh air while removing radon gases, diesel fumes, and blasting gases through a complex intake and exhaust network.

Mine waste is used whenever possible underground to backfill depleted stoping areas. In many cases, when physical underground backfilling is not possible, tailings sand is used to backfill previously caved areas. Moistened mine waste is used as fill to extend the level land area in the vicinity of the mine. After consolidation and revegetation, this land will become a permanent part of the landscape.

C1.1.2 Old Church Rock

OCR operates two production shifts per day, five days per week. The current mine production is 430 tons per day at an average grade of 0.119 percent U_3O_8. OCR was abandoned and flooded by Phillips Uranium in about 1956. Mine dewatering began by UNC Mining and Milling in October of 1978 with production beginning in the spring of 1981. The primary production shaft is a 10-foot-diameter, concrete-lined shaft 815 feet deep. OCR also uses a 7-foot-diameter shaft as an alternate escapeway and exhaust shaft. The mine ventilation system at OCR is similar to NECR. Fresh air is drawn into the mine through the main production shaft, with exhaust through the secondary shaft and small-diameter venthole.

OCR has been developed on the 485-, 645-, and 812-foot levels. Primary ore production is currently coming from the 645-foot level. The 812-foot level is currently in a development mode and the 485-foot level was totally extracted by Phillips in 1956. The ore body at OCR is very narrow in plan view but thick in cross-sectional view.

The mining method used at OCR is very similar to NECR. OCR uses conventional room-and-pillar mine design with ore haulage via rubber-tire equipment on the stoping levels and locomotives on the track level.

C1.2 MILLING PROCESSES

C1.2.1 External Appearance of Mill

Figures C1-1 and C1-2 are plan views of the mill operations showing the mill building, the seven outside thickeners, the solvent extraction and leaching equipment, the garage and shop, the administration building, and the ore storage areas. The mill facility is in a remote location, approximately 16 miles northeast of Gallup, New Mexico.

C1.2.2 Mill Circuit

Currently, during normal operating conditions the mill has a throughput capacity of 4,000 TPD but currently the throughput is less than 2,500 TPD. Figures C1-3 and C1-4 illustrate the mill flowsheet sequence for the production of yellowcake from raw ore. Tables C1.1 and C1.2 present the material balance values at the mill and Table C1.3 shows the airborne effluents from the mill and storage pile. Figure C1-5 depicts the quantitative input and output of the mill process under maximum throughput capacity of 4,000 TPD. Also shown are the composition of flow streams at each major step in the milling process.

The generalized process by which uranium is extracted from Church Rock ore and is made into yellowcake is as follows (Figure C1-2 area references are given in parentheses). Ore from UNC's two nearby underground mines is transported to the mill by truck and dumped in the ore storage

areas (No. 10). Ore is delivered continuously to the grinding mill building (No. 9) ground in a water medium forming a slurry, and then piped to the leach tanks (No. 1). At the leach tanks the ore slurry is brought in contact with sulfuric acid and sodium chlorate to dissolve the uranium. This solution is delivered to the countercurrent decantation tanks (No. 2) where the dissolved uranium solution is separated from the ore solids. The solids are disposed of at the tailings pond, and the uranium-bearing solution is pumped to the solvent extraction tanks (No. 7) for mixing with an organic solution composed of kerosene, isodecanol, and an organic amine. Uranium complexes with the organic solution while the water solution, which carried the uranium to the solvent extraction section, is pumped back to the countercurrent decantation tanks (No. 2) for recycling. The uranium-bearing organic solution is piped to the stripping section where a solution containing ammonium ions re-extracts uranium into a water solution. In the precipitation section, ammonia is added to the uranium/water solution, precipitating the uranium as uranyl hydroxide. This product is dried, driving off water and ammonia, resulting in the final product, U_3O_8 concentrate (commonly referred to as yellowcake), which is packaged and shipped off-site.

Each major step in the extraction of uranium from ore and the processing of uranium into yellowcake is detailed in the following sections and is shown in a simplified flow diagram (Figure C1-6).

C1.2.2.1 Ore Handling and Storage (Figure C1-6, Nos. 1, 2)

Uranium-bearing ore is delivered by truck from the mines (Figure C1-6, No. 1) to the mill facility. The ore is weighed and then dumped on the 30,000-ton ore pad (Figure C1-6, No. 2). A 4.5-cubic yard front-end loader transfers the ore from the pad to a receiving hopper equipped with a belt feeder and a grizzly. Ore is fed at a constant rate to the grinding section via a conveyor belt.

C1.2.2.2 Grinding Section (Figure C1-6, Nos. 3, 4)

The grinder (Figure C1-6, No. 3) is a semiautogenous mill, 18 feet in diameter and six feet long. About 167 tons per hour (TPH) of ore are fed to the grinding mill and mixed with about 500 gallons per minute of water. Periodically, mine water (Figure C1-6, No. 4) is substituted for neutralized tailings solution return water in the grinding process. This minimizes the quantity of liquids which must be disposed of at the tailings disposal site. Discharge from the grinding mill is directed to a cyclone which separates coarse material from the finer solids. Coarse solids are returned to the grinding mill while finely ground solids are piped as a slurry to the leaching section.

C1.2.2.3 Leaching Section (Figure C1-6, No. 5)

The leaching section consists of a sulfuric acid (H_2SO_4) storage tank, a sodium chlorate ($NaClO_3$) batch mixing tank and a storage tank, and eight ore leaching tanks.

The leaching section combines the slurry from the cyclone with sulfuric acid and sodium chlorate to dissolve the uranium from the ore. Sulfuric acid moderates the pH level and sodium chlorate regulates the oxidation potential.

Complete dissolution of the uranium requires about 90 pounds of sulfuric acid and two pounds of sodium chlorate per ton of ore. The leaching solution is heated with steam equivalent to 36 gallons of water per minute. The mixture of uranium-bearing ore, sulfuric acid and sodium chlorate, is passed from tank to tank by the force of gravity and is retained a total of ten hours in the eight leaching tanks. The discharge from the final tank is at pH of 1.2 and contains 50 percent solids. The next step is to separate the uranium from the solids.

C1.2.2.4 Countercurrent Decantation (CCD) Section (Figure C1-6, No. 6)

The uranium-bearing slurry from the leaching section is introduced into the countercurrent decantation (CCD) section where the uranium is

separated from the solid fraction of the slurry by passing the slurry in the opposite direction of a wash solution flow, called raffinate. The uranium-bearing slurry is introduced in the first of the CCD thickener tanks, and the raffinate is input to Tank No. 7. Raffinate flows toward the first tank, stripping the uranium from the solids flowing towards the seventh tank. The pregnant aqueous solution containing the uranium exits the CCD section at the first tank and is diverted to the solvent extraction section via a two-step clarification circuit. The underflow, containing 50 percent solids and largely depleted of uranium, is disposed of at the tailings piles (Figure C1-6, No. 13).

The thickeners are each 125 feet in diameter and designed to provide a settling area of 0.4 square foot per ton of inflow in a 24-hour period. The suspended solid content of the overflow from the first thickener is less than 400 milligrams per liter. The underflow from the last thickener contains approximately 10 milligrams per liter of U_3O_8 in solution and approximately 0.007 percent U_3O_8 in the solids. The only chemical addition in the CCD section is 0.2 pound of polyacrylamide flocculant per ton of ore used to accelerate settling.

One of the CCD thickeners is called a high-capacity thickener which is 35 feet in diameter and allows for an additional washing stage. The main function of the high capacity thickener is to provide washing as needed at any of the seven washing locations with minimum rearrangement of piping. Currently, the high-capacity thickener is operating as the last cleaning tank of the CCD section.

C1.2.2.5 <u>Clarification Circuit (Figure C1-6, No. 7)</u>

The overflow from the No. 1 thickener is the uranium-bearing solution which passes through four sand filters comprising the clarification system. The sand filters are backwashed and the backwash water returned to the No. 1 thickener at about 17 gallons per minute. The fourth filter of identical construction to the others is the backup system. Three

sand filters operate at all times. The clarified pregnant aqueous solution flows into a holding tank from which it is pumped to the solvent extraction section.

C1.2.2.6 Solvent Extraction and Stripping Sections (Figure C1-6, Nos. 8 and 9)

The uranium-bearing solution from the CCD section is pumped to the solvent extraction section (Figure C1-6, No. 8) where it is mixed by countercurrent flow with organics. The uranium complexes with the organics resulting in a uranium-depleted aqueous solution and an organic mixture rich in uranium. The uranium-bearing organic solution is piped to the stripping section where the uranium is re-extracted into water containing ammonium sulfate and then passed on to the precipitation and washing section.

The solvent extraction section consists of four mixer-settler units with the mixers 380 cubic feet in volume and the settlers 1,800 square feet in area. The solution from the clarification circuit containing approximately 0.5 gram of U_3O_8 per liter of solution is mixed with the organics in the first tank. The organic phase consists of kerosene with approximately 2.5 percent each of organic amine and isodecanol. After settling in the first tank, the aqueous solution is pumped to the remaining three tanks in series. The organic extraction solution is recycled between each settler and the mixer unit at 1,900 gallons per minute. At the fourth tank, the acidic solution which carried the uranium into the solvent extraction section is depleted of uranium down to approximately 0.005 gram of U_3O_8 per liter of solution, and the organic extraction solution is enriched to approximately 1.5 grams of U_3O_8 per liter of solution. This solution leaves the extraction section at approximately 700 gallons per minute. The depleted acidic solution (raffinate) is returned to the CCD section to retrieve more uranium or is disposed of at the tailings area.

The next stage of the uranium purification process following solvent extraction is the stripping section (Figure C1-6, No. 9). "Pregnant" organic solution is piped from the extraction section to the stripping section where it is mixed with ammonium sulfate in water, stripping the uranium from the organic solution and redissolving the uranium in a water medium.

The stripping section consists of four mixer-settler units each with a mixer volume of 380 cubic feet and a settler area of 500 square feet. There are 230 grams of ammonium sulfate per liter of water, flowing at about 30 gallons per minute into the mixer-settler units. The stripping process is capable of concentrating uranium about 20 fold to 35 grams of U_3O_8 per liter of stripping solution. The enriched solution is pumped to the precipitation and washing sections.

Barren organic solution is recycled to the extraction section after it has been strengthened and purified. Approximately 0.5 gallon of kerosene, 0.1 pound of amine, and 0.2 pound of isodecanol must be added to the organic solution per ton of ore processed in the stripping section. The organic solution is purified by a soda ash (sodium carbonate) scrub mixer/settler. The soda ash and the organics are mixed and allowed to separate in the settler. The spent soda ash is disposed in the tailings and the purified organic solution is recycled back to the solvent extraction circuit.

C1.2.2.7 <u>Precipitation and Washing Sections (Figure C1-6, No. 10)</u>
The uranium-bearing water/ammonium sulfate solution is pumped to the precipitation section where gaseous ammonia is added to the solution causing the precipitation of uranium hydroxides and ammonium diuranate (ADU). The precipitate is separated from the water and impurities in a two-stage yellowcake thickener section. Slurry from the precipitators is pumped to a primary yellowcake thickener which is 30 feet in diameter. The underflow, containing about 33 percent solids, is mixed with wash water and transferred to the second thickener which is 17 feet in

diameter. A centrifuge at the second thickener provides dewatering for the underflow. Water from the centrifuge is returned to the second yellowcake thickener and the uranium-bearing slurry is passed onto the final section of the uranium extraction process via a horizontal screw conveyor.

C1.2.2.8 Drying and Packaging Section (Figure C1-6, Nos. 11, 12)

The moist yellowcake is fed to a rotary tray dryer (Figure C1-6, No. 11) and heated to approximately 650 degrees Fahrenheit. At this temperature, some of the ammonia and most of the water will be driven off. Dried yellowcake is reduced to a powder and transported to a 15,000-pound capacity storage bin prior to packaging.

The yellowcake is placed in 55-gallon drums (Figure C1-6, No. 12) and vibrated to ensure complete filling of the drums. Once filled, the drums are sampled, weighed, and sent by roller conveyor to storage until being shipped. Based on the maximum input of ore at 4,000 TPD, the Church Rock Mill is capable of drying 18,000 pounds of yellowcake per day at grades higher than current feed.

C1.2.3 Sources of Mill Wastes and Effluents

The solid and liquid wastes from mill operations are combined for disposition at a single location. Gaseous effluents from each process are treated as necessary and discharged from several stacks. The generation and composition of these solid, liquid, and gaseous effluents are discussed in the following sections. Release rates and activity associated with the effluents are described in more detail in Section C4.0, Radiological Impacts.

C1.2.3.1 Solid and Liquid Wastes

Solid and liquid wastes from the mill process are pumped to the tailings pond. Since uranium occurs in nature as a small percentage of the ore, about 99.8 percent of the material removed from the mine becomes tailings. In addition, the use of chemicals in the extraction and purification of the uranium adds other constituents to the liquid wastes.

About 900 gallons of tailings slurry per minute are pumped from the mill to the tailings area. Fifty percent of this is in solid form. Ordinarily, the slurry is processed through cyclones to separate coarse materials for mine backfilling. The overflow of the cyclones, containing most of the very fine solids and liquid, is discharged into the tailings area for settling. Intermittently, unseparated tailings are discharged into the settling area.

The chemicals in the tailings liquid originate from the mill process. Representative quantities are presented in Table C1.2 and shown in Figure C1-5. The mill process uses sulfuric acid to dissolve the uranium in the ore. Consequently, the primary by-product is calcium sulfate with some production of hydronium and sulfate ions. Most of the hydrogen ions react in the process with carbonate in the ore to yield water and carbon dioxide. The remaining hydrogen ions, as well as the sulfate ions, are discharged into the tailings area. Sodium chlorate, an oxidizing agent, is reduced in the process to sodium chloride and discharged into the tailings area. Ammonia is used in the precipitation stage and combines with the sulfuric acid to form ammonium sulfate.

Polyacrylamide, the flocculating agent, enters the tailings area in its original chemical form and decomposes. Kerosene, isodecanol, and amine are recycled in the mill process. Some loss of these materials occurs because of their emulsification and dissolution with aqueous solutions. Therefore, minor amounts of these organics are discharged to the tailings area. Separation of these materials has not been observed in tailings of other currently operating uranium mills. It is believed that these chemicals decompose in place, though some of the more volatile components may evaporate. The uranium content of the tailings solids is approximately 0.007 percent.

C1.2.3.2 Gaseous Effluent

The major sources of radiological airborne effluents are presented in Table C1.3. Most emissions result from stack effluents associated with

drying, packaging, and grinding operations. The stack emissions include approximately nine pounds per day of ammonia and one pound per day of ore dust. Minimal airborne emissions result from wet operations or areas such as the tailings area. The radiological emissions are described and presented in Section C4.0 related to calculation of the radiological impacts to the environment.

C1.2.4 CONTROL OF MILL WASTES AND EFFLUENTS

C1.2.4.1 Gaseous Effluent Control

The ore stockpile and ore handling conveyors are sprayed with water as necessary to minimize dust. Since the grinding operation generates dust, neutralized solution is added to the ore before it is ground. In addition, the grinding area is serviced by a wet scrubber and an exhaust stack, which also services the leaching section. Stacks from the mill are provided with sampling ports for air sampling.

The yellowcake precipitator and dryer are vented through an impingement-type scrubber while the yellowcake packaging area is ventilated through a wet venturi-type scrubber. This high-efficiency wet scrubber consists of a series of impingement baffle plates wetted from above. The air drawn in from the bottom of the scrubber is accelerated as it passes through holes in the plates, imparting kinetic energy to both the particulates and scrubber solution. This process separates the water into tiny droplets to more efficiently capture particulates in the air. The air and water streams then impinge on small plates mounted above holes in the baffles. By coalescing the droplets, this impingement provides efficient dissolution of soluble gases. A fixed-blade moisture eliminator is mounted at the top of the scrubber to ensure that water droplets are not carried out the stack with the cleaned air.

C1.2.4.2 Fume and Dust Collection System

Another impingement scrubber described above is installed to handle not only the yellowcake processing area but also services the exhaust drawn from three other sources of fumes and dust in the mill process area. This operates as a single system drawing from the leach, grinding, and

grizzly areas in the mill (Figure C1-7). The fan has a volume capacity of 11,500 cubic feet per minute and operates at a quoted static efficiency of 61 percent. The fan suction duct work removes dust and fumes utilizing the following piping system:

1. One 12-inch duct extends the length of the ore conveyor tunnel removing dust from the belt conveyor transfer points (Duct 1).

2. Two 10-inch ducts intersect the entire set of leach tanks removing fumes and any residual dust in the interior catwalk over the leaching system (Ducts 2 and 3).

3. One 12-inch duct intersects the ball mill area and removes dust and fumes from the enclosed area at the base of the building (Duct 4).

5. Ducts 1, 2, and 3 feed into a Y-branch with Duct 4 and are routed directly into the air scrubber described above with a single 24-inch duct.

6. The 11,500-cubic-foot-per-minute fan draws air through the scrubber with a single 24-inch duct and the effluent is released to the atmosphere.

The scrubber manufactured by W. W. Sly Company has a design capacity of 11,850 cubic feet per minute with maximum water and slurry withdrawal rates of 25 gallons per minute each. The separation efficiency is 99.9 percent with a three psi pressure drop per dry standard cubic foot.

C1.2.4.3 Boiler Stack Effluent

Process steam and some building heat are provided by two boilers fired by No. 6 fuel oil. A single exhaust stack 70 feet high and 57 inches in diameter serves both boilers. Input to each boiler is about 225,000 million BTU per year and therefore does not require a specific state air quality permit. State regulations are applicable only to units with an input of 10^6 million BTU per year. The expected emission from the stack is about 0.5 percent sulphur at a stack flow rate of 40,000 cubic feet per minute, based on similar equipment emission factors (EPA, 1972). Impacts from the effluent are described in Section C.5.

C1.2.4.4 Liquid Effluent Control - Tailings Area

Mill tailings, including all process liquid effluents, are pumped to an on-site tailings area located in the southeastern half of the property. The operation and controls involved are described in other sections and in the GWDP.

C1.2.4.5 Sanitary Wastes

Sanitary wastes from the mill are treated by screening, aeration, secondary clarification, and chlorination in a package type, aerobic digestion treatment plant approved by the National Sanitation Foundation. This plant is located on the east edge of the mill area (Figure C1-2). The plant is capable of 80 percent BOD reduction and provides a secondary treatment type of effluent.

Protective clothing worn for yellowcake handling operations is laundered and the wastes returned to the process for uranium reclamation.

The small volume of liquid wastes from the supporting chemical laboratory are discharged into the tailings area. This effluent contains small amounts of laboratory reagents.

C1.2.4.6 Solid Wastes

Solid wastes such as construction debris, office wastes, lunchroom wastes, and packaging materials are disposed of in a landfill at the NECR mine.

C1.2.4.7 Storm Water Runoff

The mill area is paved except in the ore storage pile areas. Rainfall runoff inside the mill process areas drains into the CCD pumphouse basement and is returned to the process stream. Runoff from the outer parts of the mill and nonprocess areas flows in a perimeter ditch and ends up in the storm water retention basin pond (Figure C1-2, No. 21) east of Pipeline Canyon arroyo.

Runoff from the ore storage areas can collect in the immediate mill area, percolate into the soil, or run into the off-site storm water collection area (Figure C1-2, No. 21) through a culvert near the north end of the property.

C-20

C2.0 EXISTING TAILINGS MANAGEMENT SYSTEMS

C2.1 INTRODUCTION

This section describes the operational history and tailings management procedures presently in use at the UNC Church Rock tailings disposal facility.

C2.2 PREVIOUS INVESTIGATIONS

Engineering assessments of the UNC Church Rock tailings disposal facility can be divided into three major groups:

1. Tailings disposal and construction operations to July 16, 1979,
2. The breach of the tailings impoundment structure, and
3. Postbreach cross dike design and construction activities.

A major source of information for each of the sections is GWDP-152 prepared by SAI (1980a) and a set of geotechnical investigations on the breach by SH&B (1979), Jacobs Engineering and Wahler and Associates (1979). In addition to these sources, several other documents contain valuable information on engineering aspects of the tailings facility. These include a report on North Cell Tailings Storage by Raney Geotechnical (Raney, 1981), Water Budget Analysis from September 1980 to Present (UNC, 1981a), and an earlier original design report by Kaiser Engineers (Kaiser, 1976).

GWDP-152 contains a description of the complete operational history of the tailings facility and various engineering aspects of tailings disposal, including stability assessments conducted after the breach. General information on the operations history is also presented by Raney (1981) and SH&B (1979).

Stability analyses and site investigations are presented by Kaiser (1976) for the original design, by SH&B (1979), Jacobs Engineering and

Wahler and Associates (1979) for the breach, and by SAI (1980a) and Raney (1981) for engineering assessments of the cross dikes built since the breach. Detailed cross sections, boring logs, and material properties data are provided above. Information from the above reports is summarized in the following sections.

C2.3 SITE DESCRIPTION

The UNC Church Rock tailings disposal site is located in Section 2, Township 16 North, Range 16 West, in McKinley County, New Mexico. The layout of the disposal area is shown in Figure C2-1. The tailings area was originally designed to occupy approximately 200 acres after 15 years of operation (Kaiser, 1976).

The original design was prepared by Kaiser Engineers (Kaiser, 1976) and included a 5,700-foot-long earthen embankment referred to as the starter dam (embankment). The starter embankment ranged from a height of 12 feet at the northern end to 38 feet at the southern end. The completed crest elevation was 6963 feet with a crest width varying from 40 to 60 feet. Figure C2-2 is a typical cross section through the starter embankment as it appeared in the original design report.

The starter embankment was the initial tailings structure for impounding mill tailings. Its life was approximately two operating years. A planned second phase of construction was to increase its height for long-term tailings deposition. Construction of the second phase was approved by state regulatory agencies, and construction was in progress at the time of the breach.

After the occurrence of the breach on July 16, 1979, a small dike was constructed directly upstream from the breached zone in order to contain spillage. At that time, tailings disposal operations and the second phase of construction were suspended in the south and north ponds and subsequent disposal occurred in the central area (Figure C2-1). This area was isolated from the other parts of the pond by the construction

of two major cross dikes. In addition, a 1,000-foot-long section of the main embankment was raised. These changes provided containment on the east side of the starter dike in the central area at an elevation of 6980 feet. The layout of the central area of the tailings area is shown in Figure C2-3.

In addition, two borrow pits were formed to provide construction material for the tailings dam. They are located approximately 2,000 feet east of the main embankment and occupy about 23 acres. These are referred to as Borrow Pit 1 and Borrow Pit 2. At present, Borrow Pit 1 is also referred to as the slimes area. Borrow Pit 2, also known as the east pit, is being used as a liquid collection area. From the east pit, a portion of the tailings liquids is recycled to the mill by pumping.

C2.4 OPERATING HISTORY

C.2.4.1 Introduction

The Church Rock tailings disposal facility began operations on May 16, 1977. Disposal proceeded nearly continuously until July 16, 1979, when a major breach in the extreme southern portion of the starter embankment interrupted milling operations. Following the breach, tailings were not deposited in either the north or south pond areas until recently. Presently, most of the tailings are being deposited in the isolated central area. This area was developed in conjunction with the construction of two cross dikes (north and south) as shown in Figure C2-4.

Unless specifically referenced, information on the operations history, as well as current and planned discharge schemes, was extracted from reports by SH&B (1979) and SAI (1980a, 1981), each of which has already been submitted to NMEID.

C2.4.2 Tailings Disposal and Construction Operations to July 16, 1979

Construction of the starter embankment was completed in October 1976. In June 1977, the mill began operations. Initially, unseparated

(spigotted) tailings were deposited at the extreme southern end of the pond in a borrow pit which had been previously used for construction. An auxiliary tailings pipeline was also placed near the center of the embankment at the point where the main line from the mill crossed the embankment. During the first six months of operations, tailings disposal continued nearly uninterrupted.

In December 1977, longitudinal cracks were observed in the starter embankment. At that time, they were considered associated with differential settlement within the foundation soils due to differential wetting. The cracks, ranging from nearly hairline to about four inches in width at the surface, were grouted with a bentonite-diesel fuel slurry during February 1978. Shortly after the appearance of the cracks, the south pond was divided into two nearly equal sections by the construction of an earthen dike. The liquids and some slimes from the southernmost pond were pumped into the northern half of the south pond. After the completion of the remedial grouting, tailings deposition continued in the most southern area of the pond. Intermittant spigotting in the northern section of the south pond produced an area of sands which extended eastward, effectively dividing the southern pond into two sections. Maintenance of the separation of the southern pond area by spigotting from the earthen dike was discontinued due to the relatively slow advance of the sands. With the buildup of the sands, the tailings pond had been effectively divided into three sections by March 1978.

In October 1978, longitudinal cracks observed on the upstream face of the most southern section of the starter embankment were also grouted.

During December 1978, cyclone deposition was started in the northern area of the south pond and was maintained sporadically due to weather conditions. Spigotting was continued on an intermittant basis. Initially, the cyclone overflow was deposited within the southern pond with the sand underflow being placed on the downstream face between the starter embankment and the toe dam.

In March 1979, the cyclones were moved to the most southern end of the embankment but cycloning control proved difficult due to increased pump head resulting from large line losses. Following two more changes in cyclone location, the cyclones were again moved on May 24, 1979 to the east side of the central pond area with both overflow and underflow being directed there. On June 16, 1979, cycloning operations were moved to the east berm of the pond with overflow being directed into the south pond and underflow retained on the hill slope. After July 4, 1979, the cyclones were operated from near the east end of the south pond cross dike but with overflow and underflow being directed to the south pond. This operation continued until July 16, 1979.

C2.4.3 Breach

On July 16, 1979, a breach occurred about 150 feet from the southern abutment of the starter embankment resulting in the release of approximately 1,100 tons of solids and 93 x 10^6 gallons of tailings liquids. A detailed analysis of the breach and the possible conditions which may have led to the failure are provided by SH&B (1979), Jacobs Engineering and Wahler and Associates (1979), and SAI (1980a).

Immediately after the breach a temporary dike was constructed to contain further spillage from the pond. Figure C2-1 provides an aerial view of the breach area, the remedial upstream dike, and the clay buttress.

C2.4.4 Postbreach Construction and Operation

After the breach, milling operations were suspended. At that time, construction activities in the central tailings pond were initiated. The breach area was repaired in 1980 by constructing a new section of embankment and clay buttress according to NMEID and State Engineer's approval (Figure C2-5). The new section consisted of an impervious clay core containing an inclined drainage system in its downstream section. The repaired section has a crest width of approximately 100 feet and a crest elevation of 6965 feet.

The central area has been the primary disposal area since the breach. The central area comprises approximately 47 acres and was developed through the construction of the two major cross dikes along with the raising of the main embankment. As-built construction is illustrated in Figure C2-4. The first dike, which is referred to as the south cross dike, had originally been constructed by dumping and packing tailings solids on top of spigotted tails and was enlarged from a crest width of 15 to 20 feet and an elevation of 6965 feet to a crest width of 60 feet and an elevation of 6980 feet. The dike is approximately 900 feet in length and trends northwest-southeast. The second dike, known as the north cross dike, trends west-northwest and east-southeast and is approximately 700 feet in length (Figure C2-3). The main embankment which forms the western boundary of the central area, was raised approximately 15 feet to a consistent elevation with the cross dikes. Details and construction specifications for the cross dikes are documented in SH&B (1980).

Milling and tailings disposal operations were resumed on October 28, 1979.

C2.4.5 Present and Planned Disposal Operations

Prior to April 1981, both spigotted and cycloned tailings were discharged into the central area which was subdivided into a western and eastern cell by a crescent-shaped dike. Since that time, milling has been proceeding at an average throughput of about 2,500 TPD. The mill is currently operating two and one-third days per week. Cyclone underflow is deposited in the central area (Figure C2-3). Liquids drained by gravity into the slimes area (Borrow Pit 1) are collected on the easternmost side of the pit and pumped into the east pit (Borrow Pit 2). The cyclone overflow was previously directed to the western and southern areas (Figure C2-3) with the liquid fraction of the overflow draining overland to the collector trench and pumped into the east pit. Now that the west cell of the central area has been filled to capacity, the cyclone overflow is directed to the west side of Borrow

Pit 1 and deposition is advanced easterly as the embankment crest elevation is readied to 6980 feet. The liquid and fine slimes that reach the east boundary of Borrow Pit 1 are pumped to Borrow Pit 2. Overflow is deposited at several locations with surface drainage of the liquid towards the east side of Borrow Pit 1. The drainage system arrangement is shown in Figure C2-3. Use of the drainage collection trench has been discontinued as the west cell has been filled to capacity.

Spigotted tailings are periodically discharged into the central area with liquids eventually draining into the slimes area via the collection trench and pumped to the east pit. The pumping station which recycles liquid tailings to the mill was moved to the east pit in September 1980.

Cyclone underflow is used for subgrade disposal as mine backfill. It was originally expected that a peak backfill usage of approximately 2,800 dry TPD and a mine production of 3,600 dry TPD would be reached by summer or fall of 1981. However, the NMEID has limited this backfill to an average of 12,000 TPM. At the present time, backfill is being obtained from the cyclone underflow which is deposited in the southern section of the central pond area (Figure C2-1). The backfill is loaded onto trucks and hauled to one of two sandfill plants located near the mine site where it is reslurried and pumped underground. Detailed discussion of backfilling operations is presented in Section C3.2.

Presently, cyclone overflow is being spigotted from the north and south cross dikes, with the liquid fraction migrating eastward toward the slimes area and east pit as previously described.

UNC has recently received approval from NMEID to embark upon neutralization procedures for tailings disposal. This will involve the use of the entire tailings disposal area to its maximum capacity. The neutralization scheme is described in Section C3.3.

UNC plans to utilize the existing disposal facility until it has reached maximum capacity. As originally designed, the tailings disposal area

was planned to have a storage capacity of about 365 million cubic feet (Kaiser, 1976). To date, about 70 million cubic feet of tailings have been deposited in the area.

C2.5 TAILINGS AND STABILITY

C2.5.1 Introduction

Original design investigations for the Church Rock tailings impoundment structure were conducted by Kaiser Engineers beginning in 1974 (Kaiser, 1976). Preliminary geotechnical investigations at the site were conducted by Hemphill and Shelby Drilling Company (Hemphill, 1968) and SH&B (1974, 1976a, 1976b). The final design, entitled "Design of Tailings Disposal System," was approved by the State Engineer's office on April 7, 1976. Construction of the starter embankment began in March 1976 and was completed in October of that year.

Stability analyses were conducted by Kaiser (1976) and SH&B (1976a, 1976b) for the original design and by SH&B (1979) for the breach repair and cross dike raising. A later report by Raney (1981) provides stability analyses for the north cell dry tailings disposal.

C2.5.2 Stability Analyses

Table C2.1 summarizes the construction activities at the Church Rock tailings facility which required approval from the appropriate state agencies.

The original starter embankment design was completed by Kaiser Engineers (Kaiser, 1976) based on NRC Regulatory Guide 3.11 for factors of safety of 1.5 for static stability and 1.1 for pseudostatic stability (0.1 g earthquake loading). A typical cross section used in the design stability analysis is shown in Figure C2-2.

In late 1978, SH&B (1978) investigated the proposed raising of the embankment to 7,004 feet. The program included exploratory drilling and

laboratory investigations of selected locations within the embankment and foundation soils. Analyses were performed to conform with NRC Regulatory Guide 3.11. The testing and design studies were approved by the State Engineer on April 26, 1979. Construction of the raise began shortly thereafter. However, the breach which occurred in July 1979 postponed construction activities and buildup to the 7004-foot elevation has not been reinitiated.

After the breach, a series of geotechnical studies were carried out by SH&B (1979). Included in these studies were stability analyses which attempted to reconstruct the conditions at the time of the breach. It was concluded that, at the failed section, the embankment possessed a factor of safety of 2.81 against static failure compared to NRC's required 1.5 factor of safety. Figure C2-5 shows the as-built breach repair. A "reconstructed" cross section at the breach showing the critical failure surface and calculated factor of safety are shown in Figure C2-6.

In order to continue tailings disposal, two major cross dikes (north and south) were constructed, creating the central pond area (Section C2.4.4). Figure C2-3 shows the two cross dikes and the area of postbreach construction activity. As-built construction drawings of the cross dikes are shown in Figure C2-4. The cross dike construction was approved by the State Engineer on January 29, 1980.

Recently, attention has focused on the potential dry tailings storage capability of the north pond (cell). Raney (1981) recently conducted a series of stability analyses for the north pond (cell) (Figure C2-1). Figure C2-7 shows a cross section through a selected section of the north pond (cell) that was used in the stability analysis. Also shown are existing and projected conditions for additional tailings tonnages. The stability analyses conducted by Raney showed relatively higher factors of safety--5.77 and 3.56 for static and pseudostatic loading conditions, respectively. These analyses were based on the weakest

foundation material properties. The north pond (cell) disposal procedure was approved by the State Engineer and NMEID in June 1981.

C2.6 EVAPORATION PONDS

No specific evaporation ponds are part of the existing or anticipated tailings disposal plan.

C2.7 TAILINGS MANAGEMENT

Recent changes in the Radiation Protection Regulations require applicants to:

> "plan and provide for inspections of tailings or waste retention systems at least daily by a qualified engineer, scientist or management representative"

(NMEID Radiation Protection Regulations, Section 3-300P, 11/09/81)

UNC maintains a tailings management plan as part of its normal operational mill activity. This plan is in the process of being finalized for submission to NMEID for review. The plan includes a provision for daily inspections of tailings by someone with the above qualifications.

C30

C3.0 ALTERNATIVE TAILINGS MANAGEMENT SYSTEMS

Recent changes in Radiation Protection Regulations provide for an analysis of alternative tailings management methods, including:

- o Alternative Site Study
- o Below-grade disposal in mines
- o Neutralization and recycling of tailings liquid
- o Below-grade disposal in pits or trenches
- o Dewatering of tailings material
- o Any other method proposed by applicant

In the course of its operations, UNC has conducted an alternative site study, has been actively engaged in the analysis of an alternative method, and has taken steps to incorporate many of the methods specified in its ongoing tailings management system. These include below-grade disposal in pits and mines, neutralization of tailings liquids, and recycling of tailings liquids.

Below-grade disposal in trenches has been studied, but UNC does not propose to use this method for the reasons described below. UNC proposes recycling and neutralization rather than dewatering, since dewatering merely moves the liquid to another place.

C3.1 ALTERNATIVE SITE STUDY

C3.1.1 Introduction

Recent amendments to the Radiation Protection Regulations of the New Mexico Environmental Improvement Board provide for an alternative site analysis, preliminary in nature (Section 3-300K.1). In selecting among alternative tailings disposal sites or judging the adequacy of existing tailings sites, at least the following factors are considered:

- o Remoteness from populated areas
- o Hydrologic and other natural conditions that contribute to the continued isolation of pollutants from useable groundwater

- o Location where long term geologic stability exists and gully erosion is not a hazard

- o Engineered and natural site characteristics shall be such that the site is so well protected from flood damage that any transport of radionuclides, and the resulting radiation exposure to the public therefrom, as a result of damage from a flood of such magnitude that could be expected to occur once in one hundred years, shall not exceed the standards provided in Part 4

- o Protection from wind erosion of tailings

- o Suitability for long term reclamation and minimal continued maintenance and monitoring

- o Location where seismic risk is within acceptable limits

- o Locations which minimize conflicts with archeological, wildlife, and recreational values, and

- o Economic and technological feasibility

UNC completed and submitted to NMEID a preliminary evaluation of alternative sites in 1980 (Pace, 1980).

C3.1.2 Previous Investigations

The 1980 alternative site study was conducted to evaluate potential tailings disposal areas for future consideration related to the Church Rock operations. The report includes a regional site survey using existing data to evaluate several potential disposal sites. Disposal site evaluation was based on a relative rating system employing 13 environmental parameters and 13 economic factors. The environmental parameters considered were:

- o Remoteness from habitation
- o Resistance to erosion
- o Strata permeability
- o Remoteness from groundwater
- o Distance from the mill
- o Use of water resources
- o Impacted archeological sites
- o Active faulting

- o Current land use
- o Mineral resources
- o Wildlife impact
- o Aesthetics
- o Noise pollution

The 13 economic factors were:

- o Pipeline crossings
- o Excavation requirements
- o Drilling and blasting
- o Reclamation
- o Lining
- o Pipeline distance
- o Road, power line, and pipeline relocation
- o Power line availability
- o Drainage diversion
- o Building relocation

Although site-specific data were not collected, a program for how to acquire the necessary site-specific data was also included.

The Pace study ranked a total of 13 sites. The preliminary evaluation indicated two sites would be superior to the other 11 and of these two, one site was indicated superior from the economic assessment. This site essentially consists of Section 1 adjacent to the existing UNC property. Access to this section has been pursued by UNC. Negotiations to obtain an option for conducting further detailed investigative steps are currently in progress. Until access to the land is available, no detailed assessment of its suitability can be made.

C3.1.3 Comparisons

The Pace report is preliminary in nature, and does not include any detailed on-site testing or study. Each site was rated on a scale of 1 to 10 for particular characteristics, such as remoteness from habitation, resistance to erosion, etc. The lower the rating, the higher the preliminary estimate of impact for the particular characteristic considered.

A weight factor was then assigned to each characteristic. The higher the weight factor, the more important the characteristic. For example, resistance to erosion was assigned a weight factor of 10, while noise was assigned a weight factor of 0.5. For each site considered, the site rating for each characteristic was then multiplied by the weight factor for the particular characteristic. This system resulted in a comparison of the sites. The system of ratings was primarily based on what was at that time, NRC proposed mill licensing regulations. New Mexico adopted a different set of regulations. Because of the system used, sites with small drainage areas and high elevation were given many evaluation points. Because remoteness (depth) from groundwater was judged to a large extent on elevation, sites with relative high elevation were given many points.

Since New Mexico has adopted flood protection on the basis of a 100 year reoccurrence event during active operations and a 200 year reoccurrence event after stabilization, and since engineering protection can be considered under New Mexico regulations, the scoring advantage of high elevation sites would diminish. For example, most of the sites, including the current site, can be readily protected against 100- and 200-year reoccurrence flood events.

Another important factor to consider is that the rating system is not based upon detailed testing. For example, a site that falls within the area of the Mancos outcrop may have received a high rating as to strata permeability. However, onsite testing may disclose that unweathered Mancos shale in fifty or more feet below the surface, and that the apparent advantage can only be accomplished at great expense.

The individual characteristics being rated must also be understood. Remoteness from habitation has a relatively high weight factor of 7. Most of the sites studied are remote from the nearest population center, Gallup, and would have somewhat similar ratings in that sense. The study breaks down habitation on a much more localized basis.

Engineering factors were not considered. Since most of the sites can be engineered to meet the radiological release standards, the differences between the sites considered can be generally equalized as to this characteristic.

UNC believes the Pace report provides a preliminary evaluation of alternative sites with the above understandings. The Pace report does not rate sites in terms of ownership, an important consideration once favorable sites are identified.

C3.1.4 Existing Sites

A large body of information has been accumulated concerning the present site, and almost no direct testing has been done at the alternative sites examined in the Pace report. Thus, a direct comparison of alternative sites to the present sites on an "equal information" basis is not possible. Some general comparisons can be made.

C3.1.4.1 Remoteness from Populated Areas

The present site is remote from the nearest center, Gallup, and is approximately equivalent to, or better located, than any of the alternative sites studied in this respect. In terms of the immediate local population, the present site appears about as desireable as the alternative sites. The land ownership pattern is such that additional residences could be constructed in the vicinity of any new site in any event. Alternative sites 6 and 4 may have less local populations than other areas. Site 11 has a relatively good rating in this respect because it assumes the local residences are removed.

C3.1.4.2 Groundwater

On a preliminary basis, several of the alternative sites may afford better groundwater protection if it is assumed the site is constructed in unweathered Mancos shale or lining is used. Only detailed investigation could determine this characteristic at individual sites. The neutralization program, recycling, and collection wells are engineering

features or practices at the present site which provide groundwater protection. As to the period after stabilization, seepage should not be a significant factor. The present site is not near any wells used by others.

C3.1.4.3 Geologic Stability and Gully Erosion

The features at the present site provide protection against gully erosion, as discussed elsewhere in this report. The embankment generally parallel to the Pipeline arroyo is 100 feet wide or more, and after stabilization will have a relatively gentle slope of 5H:1V. Some of the alternative sites with relatively high elevation may, in the long run, be more subject to headcutting because of the relief involved. Elevated sites with small drainage have some advantage. In terms of geologic stability, the present site and the alternative sites do not contain active faults. All of the sites are favorable in terms of earthquakes.

C3.1.4.4 100-Year Flood

The present site is easily protected against a flood of such magnitude that could be expected to occur once in a hundred years. No transport of radionuclides would occur from the present site in such an event. Likewise, no significant impact on the embankment results from a 100 year flood event (See Section B3.1).

C3.1.4.5 Wind Erosion

Wind erosion protection after proposed stabilization at the current site is discussed in Section C9.0. More than 200 year protection is provided against wind erosion by the stabilization proposed. During current operations, the tailings deposited in the south cell are subject to wind blow because no liquid discharge is currently occurring in the south cell. The neutralization program should result in additional liquid present in the south cell, which will reduce wind blowing of tailings during operations. The current site is below the level of the surrounding terrain on three sides. This configuration is

less subject to wind blow than an elevated tailings pile, other factors being equal. The current site is at a relative topographic low, and is better protected against wind erosion than a naturally elevated site.

C3.1.4.6 Suitability for Long Term Maintenance and Monitoring

The present site has a very favorable slope in terms of the deposited tailings. With the proposed stabilization, the maximum slope over tailings will be 6 percent, with the majority of the slopes over tailings at even a gentler grade. The relatively steeper slopes that will exist after stabilization will be the embankment itself, with a maximum slope of 5H:1V. The embankment is not over the tailings themselves, the embankment will have substantial thickness on a line perpendicular to the slope of the embankment and the tailings after stabilization (See Section C9.0). Elaborate monitoring stations already exist at the site, many of which are adaptable for long term usage.

The present site is easily protected from both 100-year and 200-year flood events (See Sections B3.1 and C9.0). If damage to the embankment from larger flood event occurs, the New Mexico Continued Care Fund contributions and earnings would be available to remedy any damage.

C3.1.4.7 Seismic Risk

Section B4.0 contains a discussion of the seismic characteristics of the site. Seismic risks at the site are low.

C3.1.4.8 Archeological, Wildlife and Recreational Values

The archeological content of the general vicinity of the Rio Puerco of the West is very rich. Section C5.2.3 discusses site SA21152 near the tailings which was excavated by the Gallup Museum of Indian Arts, supported by UNC.

The impact on wildlife would be to displace wildlife from the immediate area (See Section C5.2.2). This would be approximately the same result of any alternative site.

There are no particular recreational activities at the current site or in the immediate vicinity that are disrupted.

C3.1.4.9 Economic and Technological Feasibility

Detailed testing will be required to determine the economic and technological feasibility of any alternative site. However, any alternative site will necessarily involve large capital expenditures. Land acquisition cost, testing expense, and construction cost would be involved. The actual cost would depend upon the site and system proposed. All alternative sites are less favorable in this respect than the current site. Technological feasibility of any alternative site would depend upon more detailed investigation, but several alternative sites are technically feasible at some cost.

C3.2 BELOW-GRADE DISPOSAL

C3.2.1 Introduction

The capability to backfill has been addressed under UNC's GWDP-63 (UNC, 1979). Since 1979, a total of approximately 200,000 tons with an average of 8,773 TPM of sandfill has been added to abandoned underground workings. Table C3.1 shows monthly backfill volumes from November 1979 to the present.

The sections which follow describe the backfilling operation presently underway at the NECR facility and provide some general information on the characteristics of the backfill relative to the overall mill tailings and mine water treatment and disposal systems.

C3.2.2 Backfill Operations

At the present time, cyclones are being used to separate tailings in the southern section of the central area of the tailings impoundment (Section C2.4.4). The coarse fraction (cyclone underflow) is deposited and allowed to drain typically for two weeks to two months, depending on other operational factors. The sand is then loaded into trucks by

front end loaders and transported to either of two stockpiles, two of which are located adjacent to two sand plants in the NECR mine area. Approximately 20,000 tons of tailings sands are stored at the sand plants, providing a continuous supply of slurry feed. In the event of depletion of the two major stockpiles, approximately 5,000 tons are held in an interim storage area located nearly midway between the two sand plants.

Figure C3-1 is a schematic representation of the backfilling system. At the sand plant, the drained coarse tailings sands with a seven to ten percent moisture content are mixed with recycled water from the mine settling ponds. They yield a slurry of approximately 65 percent solids. The slurry is pumped underground in a three-inch-diameter, rubber-lined steel pipe installed in the shaft or as a cased borehole. At the working levels, the backfill slurry travels through a three-inch-diameter, high-density-polyethyelene (HDP) pipe to areas designated for backfilling. Drain walls are constructed to confine the slurry pumped through a polyvinyl chloride (PVC) pipe. The HDP and PVC pipes are joined outside the drain wall, enabling the less expensive PVC to be left behind as the room fills. Over a 24- to 48-hour period, about 35 percent of the slurry fraction is drained through the walls and is collected and returned to the mine water treatment system.

The decant solutions commingle with natural mine water and are pumped to the surface and discharged in accordance with UNC's NPDES Permit.

C3.2.3 Physical, Chemical, and Radiological Characteristics of Tailings Backfill

The solids and slurry used in backfilling operations have been analyzed for radionuclides and other constituents and are shown in Tables C3.2 and C3.3. The results of a sieve analysis are also shown in Table C3.2. The analyses indicate that the composition and radionuclide content of the tailings sands are highly variable. This may be due to the variability of the constituents in the ores and milling process. A

detailed description of the laboratory procedures is presented in Appendix A of UNC's document "Uranium Mill Tailings Backfill - Environmental Report, Northeast Church Rock Mine" (UNC, 1980).

UNC and NMEID are currently investigating the long term effects of mine backfilling on the groundwater system; in particular, the geochemistry of the fluids in the slurry as they react with natural water and solids in the Westwater Canyon Formation. This program of investigation was requested by NMEID in 1981 and was initiated by UNC in July 1981. The phased study was established with input from each phase, allowing decisions to be made related to continuing the study.

The first phase activities include laboratory studies of tailings solids and fluid commingled with natural formation rock and fluid. This is currently being done. Depending on the results of the geochemical interaction laboratory work, migration of fluid and chemical transport will be modeled in subsequent phases.

The health, safety, environmental, and economic benefits of sand backfilling with tailings are set forth below.

Mine backfilling helps prevent the collapse of roofs in mine locations where backfilled. This has several beneficial effects. It protects the miner working nearby or in other portions of the mine. It also reduces the extent of, or prevents, surface subsidence and disruption of formations lying above the mine. Conventional means, such as roof bolting, will eventually fail. Backfilling with sand material is a more permanent form of ground support.

Backfilling removes tailings from the surface where erosional forces are a factor. The tailings used in backfill are permanently stored more than 1000 feet below the surface at Church Rock. Sand backfilling with tailings increases the stability of the ground, and allows more efficient extraction of the ore, and reduces dilution by waste rock.

The possible disadvantage of sand backfilling with tailings would be any contamination of groundwater which might result. The formation in which the ore is mined at Church Rock, and where backfilling occurs, is the Morrison. It is sometimes used as a water supply in the district. Longmire, Hicks, and Brookins (1981), discuss the geochemical considerations involved. The technique of backfilling with tailings has limitations in terms of volume, as the amount of backfilling is substantially less than the volume extracted during mining. It involves substantial costs, and is used where the benefits exceed cost.

The long term effect of backfilling on groundwater has been concluded by the UNC studies as not to be environmentally damaging to the groundwater at Church Rock. Briefly, the following sequence occurs. The tailings liquid which remains attached to the sand is partially neutralized and diluted by mine water. Precipitation of many of the heavy metals is accomplished by this neutralization. Once placed, entrained liquid in the tailings sands drains and neutralization by mine water begins; this process will continue for some period. The commingled water is pumped to the mine water treatment system. Remaining water from tailings sands will not be displaced rapidly, if at all, and residual soluable ions will be impeded because of low permeability. Heavy metals, not yet precipitated, will continue to be precipitated as neutralization continues. Soluable radium and uranium will be absorbed by the clays.

C3.3 RECYCLING AND NEUTRALIZATION

C3.3.1 Introduction

Recycling and neutralization have the following advantages:

- Recycling reduces the amount of liquid ultimately available for seepage
- Recycling conserves usage of water

- o Water conservation through recycling may reduce the volume of impounded water, depending upon the system used, thus reducing the potential of an accidental release and decreasing need for storage area

- o Neutralization will result in precipitation of a substantial amount of contaminants that are in a dissolved form in acid processes

- o Neutralization will make any accidental release substantially less significant.

The disadvantages of recycling are related to the cost involved, and, depending upon the method used, interference with the chemical processes in the mill and corrosion of mill equipment. More piping is usually involved, creating more pipe subject to leaks and breaks.

The disadvantage of neutralization are said to be the cost and, if hydrated lime is used, the physically larger volume of tailings material.

UNC has had a recycling program in effect since 1979. As a part of that program, significant volumes of tailings returned to the mill as process water have been neutralized with anhydrous ammonia. The success of the program has resulted in a decision to neutralize all discharge from the mill. Neutralization will be with hydrated lime.

C3.3.2 <u>Recycling Tailings Liquids</u>

Approximately two-thirds of the liquids discharged to tailings are ultimately returned to mill process. UNC proposes to continue its recycling program, and enhance it with neutralization by hydrated lime as described below. At some point, tailings return water use may have to be supplemented with quantities of fresh water.

The current program uses anhydrous ammonia in neutralizing significant volumes of tailings solutions returned to the mill as process water.

The success of the program has resulted in a decision to neutralize all tailings slurry discharged from the mill.

The modified tailings neutralization scheme has been developed as a further effort to minimize environmental impacts caused by milling and tailings operations. The proposed process requires all tailings residing in the entire tailings area be neutralized to a pH approaching 7.0 and, secondly, that all tailings deposited to the tailings area be neutralized, to the same level, prior to deposition. Hydrated lime slurry will be used in the neutralization process because it has been shown to be an effective precipitant for the Church Rock tailings solution.

Tailings slurry discharged from the mill will be mixed with hydrated lime slurry, neutralized, then deposited in the central and/or south cells. Tailings solution currently impounded will be incrementally neutralized during mill shutdown periods. This process will continue until all solutions impounded in the tailings area are neutralized.

The north tailings cell will be used for impounding neutralized tailings solutions. These solutions will be returned to the mill as process water. UNC's modified program is illustrated in Figures C3-2 and C3-3.

The modified neutralization program, when combined with recycling, provides substantial environmental benefits. The neutralization program represents UNC's prime option for minimization of any contamination resulting from migration of tailings liquids.

The technological evaluation of the modified neutralization plan is contained in materials submitted to NMEID in conjunction with the Discharge Plan, including the report of Dr. Arpad Torma. UNC has analyzed the economic impact of the neutralization program in cost per ton produced. The figures are company confidential; however, NMEID may request that they be provided under separate cover.

C3.4 BELOW-GRADE DISPOSAL - PRESENT SITE

In UNC's existing tailings disposal system, deposition of tailings is for the most part, below grade. The portions that are not deposited "below grade" on all sides and are deposited lower than the surrounding terrain on three sides. Since the breach of the tailings impoundment structure in July 1979, deposition has primarily taken place in the central cell area. A substantial portion of the tailings migrate by gravity flow to the two below-grade pits. This is particularly true of tailings liquids and slimes. The exception to complete below-grade disposal in UNC's current tailings disposal system is the deposition of the relatively viscous coarse tailings sands near the tailings embankment on the west. In conjunction with disposal of mill tailings at the tailings area, below-grade disposal of coarse tailings by backfilling of coarse tailings has been employed at the Church Rock mine since November 1979.

UNC does dispose part of the tailings completely below grade at the site in borrow pits. An advantage is that the soil itself serves as the retaining wall. A disadvantage is that pits or trenches place tailings adjacent to formations which will transmit liquids. From an economical and technological point of view, however, the borrow pits have a limited capacity. Borrow Pit No. 1 (the slimes pit) is nearly filled and the capacity of Borrow Pit No. 2 is being gradually reduced due to the settling out of suspended solids from the tailings. Accordingly, UNC has developed a plan to be used in conjunction with its tailings neutralization program to increase capacity by utilizing the north and south pond areas. Below-grade disposal of tailings will necessarily expose subsurface formations to contaminants. UNC has implemented a number of measures to reduce the potential for consequent contaminant migration. Borrow Pit No. 2, which is utilized primarily for tailings liquids, has been fully lined with clay to reduce permeability. Neutralization, by precipitation of contaminants before deposition of liquids sub-grade, is particularly designed to address the problem. Moreover, the self-sealing effects of deposition

of highly impermeable slimes at the bottom of the pits tend to reduce the amount of liquid migration from the pits.

C3.5 BELOW-GRADE DISPOSAL IN TRENCHES - DIFFERENT SITE

A method of uranium mill tailings disposal strongly advocated by NRC has been disposal in trenches or pits which are below the natural grade in all directions. The argument in favor of this system advanced by NRC is largely the concept that such a system will be more resistent to the long term effects of erosion. It is believed NRC's experience in certain areas of Wyoming strongly influenced NRC's views. It is apparent that whether below-grade disposal in trenches provides better very long term erosion protection is entirely site specific. Below-grade disposal in pits does not protect against arroyo head-cutting.

When applied to many areas in the Grants Uranium Belt, the NRC concept has very questionable validity. In the region between Ambrosia Lake and Gallup, the sedimentary rocks outcrop in a pattern nearly parallel to I-40 and the Santa Fe Railroad tracks; that is, along an E-W line. The sedimentary beds generally dip to the north. The sedimentary beds contain various types of sandstone, shale, and limestone. As a general rule, the sandstones are more resistant to erosion, and form the caps of mesas. The shales are less resistant to erosion, and the main drainages occur in the shales. Below-grade disposal in trenches on sandstone mesa caps would be elevated, and ultimately subject to cutting. Further, the sandstones will generally transmit any seepage far more readily than shale. Thus, any seepage of liquids into the sandstone units have, potentially, a more extensive pathway. Further, the sandstone units are more likely than shale units to be used as a water supply.

Below-grade disposal in shale may effectively preclude any seepage. However, surface drainage systems tend to form in the shales, thus making such locations potentially subject to water erosion. The discussion above is of a very general nature of necessity, since

conditions vary at each site. It is intended to discuss the problems of applying a general concept to a specific region.

There is one potential advantage to completely below-grade disposal in trenches that was not emphasized by NRC but is appealing in the New Mexico uranium region. This potential advantage is that the below-grade trenches will presumably not be subject to an embankment failure. This advantage would only be fully present if both solid and liquid storage is completely below grade. For example, if the solids are placed in below-grade trenches, which are dewatered by underdrains, the liquid must be stored elsewhere. Unless the evaporation pond is also below grade, this advantage is greatly reduced.

A recognized disadvantage of below-grade disposal in trenches at many sites relates to placing material against geologic zones that transmit liquids. This problem can be lessened through use of liners; either of shale, clay, or plaster.

If a leak does develop in a liner, it will be difficult to repair. Below-grade disposal in trenches in thick shales, such as the Mancos shale, would reduce the negative consequences of such a system.

Cost is a major factor to be considered. The cost of excavation is significant. If the side walls of the trench are steep, the clay lining may sluff off. If plastic lining is used, a small hole or leak in the seam may develop, and create difficulties. If the side walls of the trench are made more gentle, larger excavation costs are involved. Further, most trench systems ultimately involve separate evaporation ponds, which may increase the area effected.

The arguments in favor of the system of below-grade disposal in trenches are usually based on a claim that radon emanating from tailings is a significant hazard. UNC and others consider the NRC claims concerning conceivable health hazards of radon emanations from tailings grossly exaggerated.

UNC has considered the feasibility of using a dragline burial system for disposal of the tailings. The study report (Pace, 1979) identified several alternative locations at which the burial could conceivably take place depending on nine economic factors:

- o Topsoil removal
- o Drilling and blasting
- o Dragline excavation
- o Clay lining and cover
- o Soil leveling and reclamation
- o Tailings pipeline and instrumentation
- o Thickening of Robinsky slurry
- o Neutralization and recycle of decant liquor
- o Evaporation pond (300 acres)

The concept involves subgrade disposal in trenches with a dragline operating as the vehicle for removal of overburden after topsoil has been scraped away. Subsequent to burial, a clay cover and drain system would be used to isolate and dewater the tailings, respectively. This report was submitted to NMEID in 1980. At this time, no further activity is anticipated due to lack of suitable land available proximate to the mill area, problems involved in transporting tailings to a possible trench site, and extremely high cost. Neutralization and recycling are considered by UNC a more effective manner of treatment.

C3.6 DEWATERING OF TAILINGS MATERIAL

Dewatering of tailings can technically be accomplished by several methods. One method uses gravity drainage to separate liquids from solids in a more or less horizontal sense. This does occur using the present system. Other methods include an underdraining system and a belt filter system.

The advantage of dewatering is the reduction of phreatic surface at certain points and quicker consolidation of solids. However, the liquids obtained in the dewatering process must be evaporated to the extent not recycled. Thus, dewatering will usually only shift any problem with the liquid elsewhere. At certain sites, this may have advantages. In certain configurations, dewatering may reduce the

driving head for seepage. For this reason, underdrain systems are often associated with the concept of disposal in below-grade trenches.

Mill tailings slurry can be dewatered by use of a belt filter consisting of slotted or perforated belt supporting a filter fabric. The slurry can be deposited at one end of the belt. It can then be moved over a suction box. This will produce a relatively dry solid. However, the liquid must then be stored for evaporation or recycled.

NRC acknowledges belt filteration "can be expensive for many uranium ores". The initial cost estimate for a belt filter system at Church Rock is on the order of $6,000,000. The proposed system of lime neutralization and liquid recycling is deemed by UNC to be much more advantageous than a belt filteration system. Liquid disposal would have to be provided for even if a belt filter was used.

Another method of dewatering tailings is the use of underdrains. The liquid must then be piped elsewhere for evaporation or recycling. The system might vary with the site. It may be coupled with below-grade disposal in trenches to lessen the hydraulic drive against the sidewalls and bottom to reduce seepage. Usually an impermeable bottom clay liner is envisioned, with gravel packed perforated drain pipes installed above the clay liner. The sidewalls are usually proposed to be lined. If the pipe does not resist corrosion, the system would become inoperative. This system usually envisions a somewhat uniform mixture of sand and slime fractions; otherwise drainage will be impeded. This system cannot be physically installed at UNC's present site. Neutralization appears a more effective program, as underdrains will require the liquid to go elsewhere in any event.

C4.0 RADIOLOGICAL IMPACTS

This section addresses the impact of radionuclide releases to the environment, related to airborne emissions from the mill and tailings disposal area, and accumulations identified in soil and vegetation. In addition, this section addresses the dose to man and the population and occupational doses to workers in the mill environment.

Normal operation of UNC's Church Rock facility produces liquids, gases, and solids that contain small quantities of radioactive and other chemicals. The operation of the facility, as described in Sections C1.0 and C2.0, results in releases as low as are reasonably achievable and practicable related to applicable standards of NMEID.

The monitoring program addressed in Section C8.0 illustrates the extent to which both occupational and environmental programs have been established to confirm the release rates are within specified guidelines.

C4.1 SOURCES AND PATHWAYS OF ENVIRONMENTAL RADIATION

Figure C4-1 illustrates the pathways by which uranium milling operations may contribute to the radiation dose received by an individual from the environment. The MILDOS code described in Section C4.2 is used to calculate doses due to air particulate and radon gas source terms. The sources contributing to air particulate and radon gas releases at a mill site are: stack releases, dust and radon gas from tailings, dust and radon gas from ore piles, transportation of ore from mine to the mill, and dust from ore-crushing operations.

C4.2 PREDICTIVE MODELING FOR AIRBORNE EFFLUENTS

The Nuclear Regulatory Commissions's (NRC) most recent dispersion model (NRC, 1981) has been used to predict the transport of radionuclides and doses to individuals and the population in the mill vicinity. This model may overestimate dose. The following sections describe the input related to sources, receptor locations, and results of the program.

C4.2.1 MILDOS Input

The MILDOS computer code calculates environmental radiation doses due to atmospheric air particulate and radon gas transport from radionuclide sources emitted during uranium recovery operations. MILDOS was developed by Argonne National Laboratory (ANL) and the NRC and is used for estimating radiological doses due to milling operations. The reader may refer to NRC's documentation of the code (Strange and Bander, 1981) for an in-depth explanation of MILDOS.

The input to the MILDOS code falls into the following categories:

1. Meteorological Parameters
2. Radionuclide Sources
3. Food Chain Parameters
4. Population Parameters
5. Receptors.

In addition, planned changes in mill operations are introduced into the code through a time-step function which adjusts source strengths.

This section describes the assumptions made in the compilation of raw data for the mill site analysis. Where input is necessary in MILDOS and no raw data are available, the assumptions or references used in determining an acceptable estimate are given. Two MILDOS runs were required in the analysis. The first considers only the yellowcake dryer stack, yellowcake packaging stack, and ore piles as sources for the receptor dose calculations relating to newly adopted Section 3-300 m of the Radiation Protection Regulations (NMEID, 1981). This regulation provides for dose exclusive of mill tailings and radon and its daughters. The second considers all radionuclide sources including mill tailings, Rn-222 gas, and its daughter products for calculation of air and ground concentrations and the total population dose. This run was made related to the 500 mrem limit of Part 4 of the Radiation Protection Regulations (NMEID, 1980).

The UNC Mill and Mine and the location of nearby population centers are shown in Figure B1-1.

The next UNC Mill license renewal period is for 5 years. For calculation purposes, it was assumed the mill will operate for 20 years followed by a 5-year period during which reclamation activities would take place. Therefore, the MILDOS time steps were chosen at 5, 20, and 25 years of mill operation. Mill tailings are assumed to be the only source of exposure after mill shutdown. Thus, after 20 years, the stack and ore pile source strengths are set at zero since the mill will no longer be in operation. Sections C4.2.1.1 through C4.2.1.5 discuss input components used in the MILDOS runs. Results are summarized in Section C4.2.2.

C4.2.1.1 Meteorological Parameters

MILDOS requires characteristic annual average fractional frequency of wind occurrence in 16 wind directions, 6 wind speed classifications, and 6 atmospheric stability categories. These data were obtained from the U.S. Department of Commerce (1981) based on measurements made at the Gallup Airport, approximately 16 miles southwest of the mill. Table B2.1 gives the Gallup wind frequency data for the period from January 1976 to December 1980. Figure B2-1 shows the 1976 to 1980 Gallup wind rose, which is a pictorial representation of the wind frequency data.

The second meteorological parameter required is the average annual mixing height (DM). It is defined as the harmonic mean of the measured morning and evening DM's. At Gallup, the morning and evening DM's are 370 and 2,680 meters, respectively, the average DM is then:

$$DM = (2)\ (370)\ (2{,}680)/(370 + 2{,}680) = 650 \text{ meters.}$$

C4.2.1.2 Effluent Sources

The sources of airborne radionuclide effluents at the UNC site fall into the following three categories:

- The yellowcake dryer and packaging stacks,
- The ore piles and ore dust, and
- The tailings and sandfill areas.

For each source, MILDOS requires the user to supply:

- o The position of the source center and the source area, except for mill stacks which have zero area;
- o Either the release rate in curies per year or the specific activity in picocuries per gram for Radionuclides U-238, Th-230, Ra-226, and Pb-210;
- o The particle size distribution in one of three ranges of particle sizes defined by MILDOS;
- o The release rate in curies per year for Rn-222 gas; and
- o The product of the exit stack velocity and the stack inside diameter in square miles per second.

Finally, source strength may be defined during each time step by the array QADJUST in MILDOS.

The position of each source relative to the origin at the base of the yellowcake dryer stack is given in Figure C4-2. Table C4.1 gives the coordinates of the sources and their areas.

Particulate concentrations and emission rates from the yellowcake dryer stack are presented in Table C4.2 and for the yellowcake packaging stack in Table C4.3. The yellowcake dryer packaging stacks do not operate continuously even when the mill is at full production. Based on estimates given by UNC, the stacks are now in operation about 25 percent of the year. Since the stacks were monitored while in operation, the total annual average release rate of radionuclides from the stacks is conservatively estimated at 25 percent of the average monitored value. The stack emission data used as input to MILDOS are 25 percent of the values presented in Tables C4.2 and C4.3. MILDOS also requires input of the product of the stack exit velocity and inside diameter for both the yellowcake dryer and packaging stacks. The following parameters were calculated using the average measured flow rate for each of the stacks:

	EXIT VELOCITY (m/sec)	INSIDE DIAMETER (m)	PRODUCT (m^2/sec)
Yellowcake Dryer Stack	4.46	0.8509	3.79
Yellowcake Packaging Stack	7.63	0.2857	2.18

The Rn-222 release in stacks was not monitored and was considered to be negligible in the Final Generic Environmental Impact Statement (GEIS) on Uranium Milling (NRC, 1980) as well as in both MILDOS runs.

For the MILDOS run, which includes tailings sources, the tailings area was divided into six sectors as shown in Figure C4-2 with coordinates and areas as given in Table C4.1. Each section has an area of less than 0.1 square kilometer as required by MILDOS. The bulk-specific activities and average bulk-specific activities are given in Table C4.4. These average values were used for all tailings sections in MILDOS via the PACT array. The resulting release rates are given in Table C4.5. The Rn-222 release rate for uncovered tailings was obtained from the GEIS (NRC, 1980) and a value of 70 curies per year for tailings covering an area of one square kilometer. The Rn-222 release rate for the UNC tailings is scaled according to the area of each tailings sector, i.e., a tailings area of 0.1 square kilometer has a release rate of 0.1 times 70 equals 7.0 curies per year. The sandfill areas are considered to be a tailings source. Their data were compiled as above and are shown in Table C4.4.

No radionuclide data were available for the ore piles. However, since the uranium extraction process will not generally affect the concentration of Th-230, Ra-226, and Pb-210, the same bulk-specific activity of these radionuclides is assumed in the ore piles as in the tailings sections. The U-238 bulk-specific activity is calculated from the average ore grade of 0.12 percent U_3O_8 in the ore by the formula:

$$\text{U-238 Bulk Specific Activity} = (0.0012)\left(\frac{714\text{g U}}{842\text{g } U_3O_8}\right)\left(6.77 \times 10^{-7}\ \frac{\text{curies}}{\text{g U}}\right)^{(1)}\left(10^{12}\ \frac{\text{picocuries}}{\text{curie}}\right)$$

$$= 688\ \frac{\text{picocuries U-238}}{\text{g ore}}\ .$$

The rate of release of Rn-222 from the ore piles was not measured. The GEIS (NRC, 1980) gives the release rate of Rn-222 as 68 curies per year for a model mill with 2,000 TPD capacity. Since the UNC Mill proposed maximum operation of 4,000 TPD, the release rate of Rn-222 is set at 2 times 68 equals 136 curies per year. This value also takes into account Rn-222 released during transport of the ore to the mill and dust released in mill operation.

C4.2.1.3 Food Chain Parameters

The MILDOS food chain parameters include fractional feed requirements of locally grown pasture grass and hay for grazing animals and the food production rate of vegetables, meat, and milk around the site. No data exist on the proportion of local to imported feed that is consumed by domestic animals so the assumption is made that 100 percent of the annual feed requirement is satisfied by locally grown pasture grass.

The calculation of the food production in the area of the mill is more involved. Tables C4.6, C4.7, and C4.8 give the average yields for principal crops, sheep and cattle, and milk for the state of New Mexico. The average yield values shown in these tables are conservative estimates of production values for the area near the mill because the state average values include for many irrigated and intensively managed agricultural areas.

---

(1) The conversion constant 6.77×10^{-7} curies/g U was obtained from Footnote 4, Appendix B, 10 CFR 20.

From Table C4.6, the average vegetable production for cultivated land is 8,436 kilograms per acre per year equivalent to 2,084,507 kilograms per square kilometer per year. According to an areal survey, five garden plots are cultivated within an eight-kilometer radius around the mill. The average garden size is estimated to be 4,000 square meters so that the total area of cultivated land in the study area is 0.02 square kilometer. The total vegetable production for this area may then be calculated to be 0.02 times 2,084,507 equivalent to 41,690 kilograms per year. The total area of the eight-kilometer radius study area is 201 square kilometers. The average vegetable production per square kilometer is then 41,690 divided by 201 or 207 kilograms per square kilometer per year.

The total New Mexico cattle and sheep herds and the five-year average weight and number of slaughters is given in Table C4.7. From the data given, an average of 100 times 544.2 divided by 1,584 is equivalent to about 34 percent of the New Mexico cattle herd slaughtered each year. The average weight per head is 533,271 divided by 544.2 equals 980 pounds (445 kilograms). Although the entire animal is not consumed, 980 pounds gives a conservative estimate of meat consumption. The eight-kilometer study area contains portions of Districts 14 and 16 of the Navajo Nation. District 14 had a total of 1,834 cattle (Henderson, 1981) during 1979 and 1980. The land area of District 14 is approximately 972 square miles (2,517 square kilometers). The average cattle and calf population per square kilometer is then 1,834 divided by 2,517 equals 0.73 head per square kilometer.

District 16 had a total of 423 cattle (Henderson, 1981) during 1979 and 1980 on a land area of approximately 1,080 square miles (2,797 square kilometers). The average cattle population in District 16 is then 423 divided by 2,797 equals 0.15 head per square kilometer. The average cattle density in the study area is then 0.15 plus 0.73 divided by 2 equals 0.44 head per square kilometer. Thus, the estimated number of cattle in the study area is 0.44 head per square kilometers times 201 square kilometers equals 88 heads, and the estimated meat production for cattle per square kilometer in the study area is then 88 heads times

34.4 percent heads slaughtered per year times 445 kilograms per head per 201 square kilometers equals 67 kilograms per square kilometer per year.

From Table C4.7, the average weight of slaughtered sheep and lambs is 9,818.2 pounds (4453 kilograms) divided by 87.1, or 51 kilograms per head. Since the entire animal is not eaten, 51 kilograms per head is an estimate of meat consumption that is higher than actual. The total number of sheep and lambs in the Navajo Nation in 1975 was 587,674 (Barres, 1981). The population of the Navajo Nation in 1975 was 140,000 (Barres, 1981). The average number of inhabitants per Navajo household in 1970 was 5.5 (Faich, 1981). Therefore, there are approximately 140,000 divided by 5.5 equals 25,455 households in the Navajo Nation. The rate of slaughter of sheep and lambs in the Navajo Nation is approximately one slaughter per household per month (Barres, 1981) so that the number of slaughters per year is 25,455 times 12 equals 304,455 slaughters per year, which constitutes 52 percent of the total herd each year. District 14 had a total of 11,102 sheep during 1979 and 1980 (Henderson, 1981). The average sheep population per square kilometer in District 14 is 11,102 heads per 2,517 square kilometers equals 4.4 heads per square kilometer. District 16 had a total sheep population of 1,904 heads during 1979 and 1980 (Henderson, 1981). The average sheep population per square kilometer in District 16 is 1,904 heads per 2,797 square kilometers equals 0.68 head per square kilometer. Finally, the average sheep and lamb density for the two districts is 4.4 plus 0.68 divided by 2 equals 2.54 heads per square kilometer. The estimated number of sheep and lambs in the study area is then 2.54 heads per square kilometer times 201 square kilometers equals 511 heads, and the estimated annual meat production per kilometer of land in the study area is then 511 head times 0.52 times slaughters per year times 51 kilograms per head divided by 201 square kilometers equals 67 kilograms per square kilometer per year. From the preceding analysis, the total average annual meat production in the area of the mill is 67 kilograms per square kilometer per year (cattle) plus 67 kilograms per square kilometer per year (sheep and lambs) equals 134 kilograms per square kilometer per year.

Finally, the milk production for cows in the area was calculated. Table C4.8 gives the milk production for cows in New Mexico during 1976 through 1979. The average, 6,253 kilograms per cow per year, is an estimate of milk production in the study area that may be higher than actual because the state average includes many highly productive areas and feed-lot production methods. District 14 had a total of 1,308 cows during 1979 and 1980. Three percent of these are conservatively assumed to produce milk for human consumption (Henderson, 1981). The land area of District 14 is approximately 2,517 square kilometers. The average number of milk-producing cows per square kilometer in District 14 is then 1,308 cows times 0.03 divided by 2,517 square kilometers equals 0.02 cow per square kilometer. District 16 had a total of 296 cows (Henderson, 1981) during the count period. The land area of District 16 is approximately 2,797 square kilometers. The average number of milk-producing cows per square kilometer in District 16 is 296 times 0.03 divided by 2,797 equals 0.003 cow per square kilometer. The average density of milk-producing cows in the two districts is 0.02 plus 0.003 divided by 2 equals 0.01 cow per square kilometer. The estimated number of milk-producing cows in the study area is 0.01 cow per square kilometer times 201 square kilometers equals 2 cows, and the estimated milk production in the study area is 2 cows times 6,253 kilograms per cow per year divided by 201 square kilometers equals 62 kilograms per square kilometer per year.

The production of goat milk is estimated to equal 1,341 kilograms per doe per year (Ells, 1981). District 14 had a total of 4,539 does during the count period, 3 percent of which are assumed to produce milk for human consumption (Henderson, 1981). Therefore, the average number of milk-producing does is 4,539 does times 0.03 divided by 2,517 square kilometers equals 0.05 doe per square kilometer. District 16 had a total of 1,588 does during the count period. Therefore, the average number of milk-producing does is 1,588 times 0.03 divided by 2,797 square kilometers equals 0.02 doe per square kilometer. The average density of milk-producing does in the two districts is 0.05 plus 0.02

divided by 2 equals 0.035 doe per square kilometer. The estimated number of milk-producing does in the study area is 0.035 doe per square kilometer times 201 square kilometers equals 7 does. Thus, the estimated milk production in the study area is 7 does times 1,341 kilograms per doe per year divided by 201 square kilometers equals 47 kilograms per square kilometer per year.

The total estimated milk production from both goats and cows in the study area is 62 kilograms per square kilometer per year plus 47 kilograms per square kilometer per year equals 109 kilograms per square kilometer per year. Table C4.9 shows the food chain parameters and the values used for the MILDOS input.

C4.2.1.4 Population Parameters

MILDOS requires enumeration of the population in each radial sector surrounding the mill site origin as well as projections of population growth corresponding to the MILDOS time steps. Details of the compilation of population data and figures showing population in each radial sector are given in Section B1.2. The radial sector diagrams in Figures B1-3 and B1-4 provide the necessary population data used as input for the population array in MILDOS. Based on the population growth in McKinley County during 1975 through 1980, population growth was estimated for the area of the mill during MILDOS time steps (Table C4.10). These estimates are based on population projections developed in 1979. Since that time, a decline in employment in the mining and milling industry has occurred. As a result, the estimates appearing in Table C4.10 may be high.

C.4.2.1.5 Receptors

Dose and total dose measurement calculations at a number of receptors near the mill site were made. A map and a table giving receptor locations with respect to the yellowcake dryer origin is shown in Figure C4-3. The nearest downwind resident and nearest downwind community were identified assuming predominantly southwest to northeast wind direction

as may be seen from the meteorological data in Table B2.1. The nearest permanent resident is north of the mill in a trailer park where UNC employees on 24-hour call for the mining and milling operation are located. The "nearest" grazing area is not an actual grazing area but a location near the tailings area where cattle have on occasion broken through the UNC fence to wander and graze. The nearest actual permanent grazing site is on the Navajo Reservation. The site is located about 0.6 mile (one kilometer) northeast of the mill site origin.

C4.2.2 MILDOS Output

This section presents the results of the two MILDOS runs. The most important results and highest doses are given in Tables C4.11 and C4.12. In all but one location, doses predicted for inhabitants near the mill were within the limits set by state law. The impact to residents of large communities in the area was found to be very small.

The 40 CFR 190 regulatory dose in New Mexico is the dose received by an individual at a receptor location exclusive of the dose from tailings, Rn-222, and its daughter products. In order to calculate the required 40 CFR 190 doses, a MILDOS run was made using only the yellowcake dryer stack, yellowcake packaging stack, and ore pile sources. The calculated 20-year doses were scanned to determine the individual (infant, child, teenager, or adult) and organ (whole body, bone, average lung, liver, kidney, or bronchial tubes) which receives the highest annual 40 CFR 190 dose. The highest doses were usually to the child's bone. The 40 CFR 190 dose to the child's bone, lung, and bronchial tubes is given in Table C4.11. The highest overall dose was about 46 mrem per year at the north UNC boundary receptor; however, no one resides at this location. The greatest dose at a residence is that received by a child's lung at the nearest resident location. That exposure, 54 mrem per year, exceeds the regulatory limit of 25 mrem per year in Section 3-300 m of the Radiation Protection Regulations (NMEID, 1981). UNC is in the process

of developing a sampling and monitoring program to determine if the MILDOS predictive data is substantiated by actual monitoring results. This program is planned to begin in early 1982.

The maximum allowable dose at a receptor due to all radionuclide sources, including tailings and Rn-222 and its daughter products, is 500 mrem per year as provided in Part 4 of the Radiation Protection Regulations (NMEID, 1980). The second MILDOS run includes all those sources. The predicted values show again that the greatest organ doses would be received by the bronchial tubes, kidney, bone, and lung of a child. Table C4.12 gives the total annual dose predicted for the organs of a child. Doses at all receptor locations are within the 500-mrem-per-year limit.

Annual <u>population</u> dose calculations were provided by the second MILDOS run which included tailings contributions, Rn-222, and its daughter products. Table C4.13 gives a summary of the total annual population dose predictions to individuals living within a 50-mile (80-kilometer) radius of the mill site origin by exposure pathway and organ. The maximum doses are calculated to be received by the bronchial tubes via the inhalation pathway.

Table C4.14 presents the individual receptor airborne and ground particulate concentrations predicted for each receptor. Each of the predicted airborne concentrations outside the restricted area may be compared with the maximum permissible concentration for release to unrestricted areas. That comparison indicates that the predicted airborne particulate concentrations at each of the receptors is within regulatory limits.

A complete copy of the input and output of both MILDOS computer runs is attached for reference in Appendix A.

C4.3 OCCUPATIONAL DOSE

UNC has gathered an extensive body of data over the past five years to monitor the levels of radionuclide exposure in and around its Church Rock uranium mill. This chapter discusses trends and anomalies in the data and compares the measured doses and exposure levels to permissible limits.

High- and low-volume continuous air monitoring results for Unat, Ra-226, and Th-230 for eight Church Rock Mill sites are presented in Appendix B, Figures B-1 through B-8. The eight sites included for the monitoring are as follows:

Site A - North of the mill site near the NECR trailer park.

Site B - 1.5 miles northeast of mill in Pipeline Canyon.

Site B1- The northeast corner of the Kerr-McGee administration building.

Site C - About 150 feet from the midpoint of the east boundary of the tailings impoundment.

Site D - Southeast margin of the tailings impoundment on the access road.

Site E - Near the south end of the tailings impoundment.

Site F - North of the tailings impoundment at the access road, 1,800 feet east of the intersection with Highway 566.

Site OCR/IX - Southeast corner of the IX treatment plant.

Springstead - Near the Springstead Trailer Park sewage treatment plant.

Sampling began in June 1977 at Sites A, B, C, D, and E. Monitoring at the other sites was not initiated until August 1980, and Site B was discontinued. The sampling frequency has been once a month except during mill shutdown between July and October 1979, during which time

there was no monitoring. Each of the measured air concentrations is a combination of radionuclides generated by mill operations and naturally occurring radionuclides.

Naturally occurring background concentrations are measured both upwind from the mill and at a reasonable distance from the mill. The combination of both criteria helps to ensure that the measured background concentrations are not influenced by mill operations. Springstead is about six miles southwest from the mill. Being both upwind and distant from the mill, the Springstead values have been accepted by NMEID as background in the area. The net concentrations of each radionuclide can then be calculated by subtracting the background concentrations from the observed concentrations at each monitoring location. The net concentration can then be considered a result of mill operations and compared with the maximum permitted concentration in air of unrestricted areas.

Figures B-1 through B-8 in Appendix B graphically present the measured concentrations in air for each radionuclide at each monitoring site. Appendix B, Tables B.1 through B.3, present the mean concentrations, standard deviations, and number of observations for each radionuclide by year. Net concentrations which result from the subtraction of back-background concentrations from observed values are likewise presented in the tables.

For the purposes of Tables B.1 through B.3, background radiation was taken as:

$7.47 \times 10^{-13} \pm 1.63 \times 10^{-12}$ μci/ml for Unat
$6.04 \times 10^{-15} \pm 1.09 \times 10^{-14}$ μci/ml for Th-230
$3.50 \times 10^{-15} \pm 4.33 \times 10^{-15}$ μci/ml for Ra-226

Appendix B, Tables B.1 through B.3 show that the annual average concentrations for Unat, Th-230, and Ra-226 are within the maximum permissible concentrations (NMEID, 1980, Appendix A) at all sites.

In addition to its perimeter air monitoring, UNC performs low-volume air monitoring of its Church Rock Mill and uses both thermoluminescent dosimeters (TLD) and a Ludlum gamma scintillometer to measure direct gamma radiation.

The scintillometer results are displayed in Appendix B, Figures B-9 through B-23. These data show relatively constant concentrations at most sites. The countercurrent decantation ground floor and the yellowcake drum storage areas show the highest measurements on the order of 1,000 μrem per hour (one mrem per hour). However, these peaks occurred in 1979 and early 1980, and have not recurred in late 1980 or 1981.

Appendix B, Table B.4 presents the average air concentrations for ten sites as computed from the low-volume monitoring of gross alpha, gross beta, and Unat.

The mill area working levels are monitored monthly at five sites and randomly at several other sites. Annual statistics for the five frequently monitored sites are given in Appendix B, Table B.5, and they are shown in Figures B-24 through B-28. The working levels (WL) are consistently less than 0.2. At the Grizzly Sump, four measurements of 0.8, 7.0, 0.7, and 0.5 WL were made in July and August 1977. The 7.0 value is believed to be a sampling error. A value of 0.4 WL was also made in 1981 when measurement methods changed from the Kusnetz's method to the instant WL meter. These were the only dates when the values exceeded the MPC of 0.33 WL at any of the monitoring locations.

Not only is the general environment at the Churck Rock Mill monitored, but UNC monitors individual employees to determine their radiological doses. The results of analyses for inhalation exposure to uranium are presented in Appendix B, Figure B-29. These histograms show the number of employees at varying levels of inhalation exposure for 1978 though 1980.

For inhalation exposure, all employees are within exposure limits, with the worst case being one employee at 36 percent of the maximum allowable exposure in 1978. The high percentages occur in the same employees each year. Appendix B, Table B.6 shows the eight employees with the highest exposure levels each year. The exposure to these employees has decreased since 1978, whereas the mean of all employee exposures has remained constant at less than four percent of the annual limit.

Appendix B, Figure B-30 presents histograms of the uranium concentration in the urine of employees for 1977 through 1980. Examination of Figure B-30 shows a decline in the concentration from an average of 0.034 milligram per liter in 1977 to 0.023 milligram per liter in 1980.

Whole body doses, as measured by TLD's, are shown in Appendix B, Figure B-31. Although the average exposures have increased since 1977, from about 36 to 109 mrem, the overall exposure has remained relatively constant. The high average in 1980 is due to one employee with a dose of 525 mrem being averaged with only ten other workers, all of whom measured at less than 250 mrem, with most less than 100 mrem.

C4.4 OTHER ENVIRONMENTAL IMPACTS

Radiological impacts on environmental conditions may also be assessed from vegetation and soil monitoring data. Because no remedial action is ordinarily taken on area soils and vegetation, radiological effects on soils and vegetation might be expected to show an accumulation of mill- and tailings-related contaminants, or some degree of increased concentration relative to preoperational soil and vegetation samples. The data presented here are somewhat ambiguous and do not permit a definitive impact assessment for vegetation and soils.

C4.4.1 Vegetation

Appendix B, Figures B.32, A through D, show long term trends in radiological impacts on vegetation (1975 to 1978). The 1975 and 1976 samples provide preoperational concentrations. At all four sites, measurements

fluctuate considerably, particularly with respect to gross beta at Sites 1 and 2, and in all five parameters, gross alpha and beta, total uranium, Ra-226, and Th-230, at Sites 3 and 4.

At Site 1, northwest of the mill, data show a large increase in beta activity in 1977. This sample may have had a higher potassium content than other samples. This phenomenon may be better attributed to the species selected for analysis more than on the collection of vegetation during the growing season since the September 1978 data show no similar trend in beta activity. The long term trends in all parameters, except total uranium, show generally increasing activity through the 1975 to 1978 period.

Site 2 is east of the mill and not far from the tailings area. Data collected at this site show a general trend of increasing activity of all parameters through the sampling period. The gross beta results may be due to the same factors that occurred at Site 1.

Site 3 lies southwest of the mill. Long term trends show small increases in all measured parameters, except for uranium. At this site, the highest gross beta concentration in 1977 is accompanied by peaks in alpha, uranium, and Th-230 concentrations. These elevated values could possibly result from the use of sagebrush in the samples since the sagebrush tends to be dustier than grasses.

Site 4, north and west of the mill, shows long term trends of increasing activity with respect to all parameters. Uranium concentrations show a seven-fold increase from preoperational data (1975 to the final sample, 1978) although only a two-fold increase from December 1976 to September 1978. Other parameters increase by smaller factors. All measured parameters reveal a distinct increase in August 1977. This could possibly be a result of the conditions discussed at Site 3.

After the 1979 breach, the 1975 to 1977 vegetation sampling program was changed. For 1979, vegetation was sampled along the Pipeline Canyon arroyo and the Rio Puerco. These samples were taken at five-mile intervals downstream beginning at the point of the breach. These data are plotted in Figure C4-4. Th-230 concentrations show the most variations, although all parameters (gross alpha and beta, total uranium, Ra-226, and Th-230) show decreasing activity downstream with a marked peak in activity in the 15- to 25-mile stretch downstream from the spill. This is probably not due to the spill but to exposure of the Morrison Formation in the "hogback" area near Gallup. The Morrison Formation is the main uranium ore bearing unit in the area and exposure of ore grade occur in this area.

In summary, the impact of the mill operation on vegetation has been to increase most of the radiological parameters studied (gross alpha and beta, total uranium, Ra-226, and Th-230) in nearby vegetation. These increases appear to be generally small over the long term. The increased activity of most parameters after operations began occurs in all directions from the mill.

C4.4.2 Soils

Appendix B, Figures B-33A through B-33F, show variations with time in radiochemical accumulations in soils near the Church Rock Mill. Background concentrations of five parameters were evaluated after the July 1979 breach in the cooperative UNC-NMEID sampling program for soils in the Pipeline Canyon. The 1975 and 1976 analyses also provide preoperational values of soil radiological characteristics. During this sampling program, samples were collected at two depth intervals (zero to two inches and two to four inches). Some samples were analyzed with the separate intervals homogenized into one sample. Uncontaminated soils should show little difference between these intervals; precipitation of airborne particulates might be expected to increase surface layer contamination relative to deeper layers, particularly in arid regions with little percolation of rainwater.

From 1975 through 1978, trends shown in the data are highly variable in many cases. Site 1, downwind of the No. 3 mine ventshaft (northwest of the mill), shows some of surficial layer contamination prior to mill operations. A gradual decline in alpha, beta, and uranium is evident, suggesting the nearby mill has not had any impact on these radiological parameters in the soil. Both Ra-226 and Th-230 concentrations increase through the sampling period although the values are within the standard deviations of analyses for background samples collected in 1979.

Site 2, to the east of the mill, also displays highly variable results although all five parameters increase over the period 1975 to 1978. Preoperational total uranium in the soil is greater than the mean of the background samples. Also, the subsurface layer from two to four inches in 1975 was higher in Utot, gross alpha, Ra-226, and Th-230 than the surface layer although only Utot is consistently higher in the subsurface than at the surface during the preoperational period. These facts may suggest a subsurface source for the original activity. After operations began, the surficial layer contained the greater concentrations and activity for all parameters. Ra-226 activity has increased most markedly overall from about 1.5 pCi/g in 1975 and 1976 to about 9 pCi/g. The other parameters increased overall by factors of two or less. These trends suggest some radiological impact on soil has occurred at Site 2, which is close to the tailings impoundment in Pipeline Canyon.

Site 3, southwest and upwind from the mill, shows consistent decrease in most parameters through the preoperational period. After mill startup, most parameters show slight peaks (1977) followed by declines in activities in 1978. The trends after operations began are not consistent with what would be expected after milling began. Disturbance is a possible explanation.

Site 4 lies northwest of the mill site. The preoperational gross alpha and beta and Utot display decreasing activity during the preoperational period in 1975 and 1976. Ra-226 and Th-230 show little change. During

the operational period in 1977 and 1978, gross alpha and beta, Ra-226, and Utot show varying degrees of increased activity over the preoperational data. Gross alpha and beta concentrations show the greatest increase in Site 4 soil, being more than four times greater in October 1978 than immediately before the mill started operating. Other parameters increase by smaller factors over this period. The Th-230 data display no definite trends. The increased activities in Ra-226 and Utot in the top two to four inches might be explained if settled particulate matter may have subsequently dissolved and percolated into the deeper soil layers with rainwater.

Site 5 is northeast and downwind of the mill. Only two samples are available of which the second is a homogenized sample of the zero-to two and two-to-four inch depth samples. Both samples are preoperational. Utot is high in the 1976 sample. All samples display greater activity in the two- to four-inch-depth sample than in the zero- to two-inch sample depth.

In 1979, soil samples were collected within Pipeline Canyon as part of of the environmental impact assessment for the July 1979 breach. These data, their means, and standard deviations are shown in Appendix B, Figures B-33A through B-33F, as a comparison for soil impact assessment. The regular soil monitoring did not occur in 1979.

In summary, the radiologic impact of mill operations on soils is slight and is most evident at Sites 2 and 4. Site 2, which appears to have a naturally high activity of some measured parameters, shows long term increases in all parameters. Site 4 shows long term increased activities in soil as well although the measured activities at Site 4 are lower than at Site 2. These two sites are downwind of the tailings or mill facilities, and the result is expected. Site 1 displays inconsistent trends among the five parameters measured so that impacts of the mill are uncertain at this site. At Site 3, the operations at the mill

appear to have caused an immediate, marked increase in the activity of most measured parameters. The subsequent, gradual decline in activity is not consistent with expectations after milling began.

C5.0 NON-RADIOLOGICAL IMPACTS

C5.1 PLANT EMISSIONS

C5.1.1 Boiler Stack Emission

Mill process steam and some building heat are supplied by two boilers fired by No. 6 fuel oil. Both boilers are vented through a single 57 inch diameter stack which is 70 feet tall. The boilers consume about 1,710,000 gallons of No. 6 fuel oil annually.

Calculated boiler emissions data are presented in Table C5.1 and are based on an estimated sulfur content of 0.34 weight percent and nitrogen content of 0.1 weight percent for the No. 6 fuel oil. The stack emissions for sulfur dioxide and nitrogen oxides are not regulated by state air quality standards because the combined input of the boilers is less than 10^6 million BTU per year.

C5.1.2 Non-Radiological Dryer and Packaging Stack Emissions

Non-radiological emissions from mill stacks related to the milling and yellowcake packaging process and laboratory stacks are summarized in Section C1.2.3.

C5.1.3 Non-Toxic Solid Waste

Non-toxic solid waste, such as construction material, trash, garbage, and 55-gallon drums, is disposed of in landfills within the mine property. Each landfill is a trench constructed approximately 105 feet long by 45 feet wide by 10 feet deep and is used until full. This generally takes about one year, and then a new trench landfill is constructed. The amount of material disposed is estimated at about 47,250 cubic feet per year.

C5.1.4 Sanitary Wastes

Sanitary wastes are processed at an on-site treatment plant using screening, aeration, secondary clarification and chlorination. The aerobic digestion treatment plant reduces the BOD by 80 percent. About 20

gallons per minute of effluent from the treatment plant is discharged to the tailings pond via the CCD circuit; however, this effluent is used to water plants at the mill site during summer. Laundry waste is recycled into the mill process in order to reclaim uranium. Laboratory wastes are discharged directly to the tailings storage.

C5.1.5 Stormwater Runoff

Rainfall that falls into the various chemical and storage tanks and onto the pavement surrounding much of the mill is returned through the mill cycle. Tanks containing chemicals are surrounded by dikes to impound stormwater and washdown water. This water is also recycled in the system. Other stormwater runoff from the ore storage area in the mill complex is directed to the stormwater retention basin east of Pipeline Canyon Arroyo, through a culvert. Section C1.2.4.7 includes further details of the stormwater runoff management.

C5.2 PHYSICAL AND BIOLOGICAL SYSTEMS

C5.2.1 Vegetation

Physical alterations of the mill site in Pipeline Canyon due to mill construction and the tailings area were summarized in the applicant's original Environmental Report (UNC, 1976). The mill occupies about 20 acres with current tailings storage occupying about 100 acres. The mill lies in an alluvial valley predominated by pinon-juniper type vegetation. The tailings impoundment lies in the same types of vegetated areas, as well as sagebrush-grassland. The native vegetation in these areas has been disrupted. As described in Section C9.0, a revegetation program in both the mill and tailings disposal areas has been initiated.

C5.2.2 Wildlife

Wildlife has been displaced from the mill site and tailings impoundment. The impact of the operation has been to displace wildlife from the immediate area. The high percentage of open land of a similar nature to that occupied by the mill means that most displaced individuals and species have probably moved to nearby areas.

C5.2.3 Archeology

An archeological site (SA 21152) called The Poor House Ruin was excavated by the Gallup Museum of Indian Art, supported by UNC, in 1980. The site lay to the east of the tailings impoundment on a ridge north of Ram Mesa. Recovery of artifacts was very small, although a nine-room masonry dwelling and kiva were uncovered. The occupancy dates were established as 1050-1120 A.D. (Davis, 1980). As noted in the Applicants's original Environmental Report (UNC, 1976) archeological clearance was granted for the site.

C5.3 NOISE

The mill operation generates noise at the site that can be heard in the immediate vicinity. The mill is designed to limit noise to acceptable occupational health and safety levels. A noise survey on October 21, 1981, showed average noise levels to be 82.96 dB in the boiler room and 92 dB, maximum, on front end loaders (FELs). This compares with the maximum allowable noise exposure of 115dBA (30CFR57.5).

C5.4 DUST

The Mine Health and Safety Administration (MSHA) monitors airborne dust in the mill complex twice annually. Five samples are taken, one each at the ore pad, the loader, the scale house, the grinding building and in the CCD. The samples are analyzed for silica content and particle size. The hazardous particle size range is <10 μm. UNC is notified by MSHA of any violation of standards or of any health risk only if any are found. MSHA has not found any violations at the mill.

C5.5 SOCIOECONOMIC IMPACTS

This section describes the social and economic benefits and costs of the UNC mining and milling operations. Mining operations are addressed because they are dependent upon continued milling operations; if

the UNC mill were to cease operations, UNC would likely close the mines as well.

C5.5.1 Benefits of Mining and Milling Operations

As indicated in Section B1.2.3 and Table B1.3 mining and milling activities occupied 4,685 people in McKinley County during 1980. This represented just under 25 percent of the total county civilian labor force and almost 16 percent of the total state mining labor force. UNC mining and milling operations occupied 669 hourly and salaried employees in 1980 (Table C5.2). This constitutes 14.3 percent of the counties 1980 mining and milling labor force and 2.3 percent of the states total. The hourly and salaried employees at UNC mining and milling operations in 1981 (mostly at Church Rock) is about 542 (Table C5.2).

An estimate of the total number of people that are currently supported directly by the UNC payroll can be obtained by multiplying the number of mining and milling employees in 1981 (542) by 3.86, the average number of people per household in McKinley County in 1979 (University of New Mexico, 1981). This method, which assumes that the UNC employee is the only income earning member of the family, indicates that approximately 2,092 people are supported by direct income from the UNC mining and milling operations. Using this method, 2,582 people were supported by UNC in FY80.

By dividing the total annual UNC mining and milling payroll (approximately $22.8 million in 1980) by the number of people estimated to be supported by the mine and mill operations during 1980, (2,582) it may be estimated that the 1980 per capita personal income of individuals supported by UNC mining and milling employment equaled $8,830. This compares with 1979 per capita personal income statistics of $5,393 for McKinley County and $7,482 for New Mexico. The average annual earnings for about 373 UNC hourly employees is estimated to be $24,925 and the average for about 169 salaried employees is $29,260. It is evident that mining and milling wages and salaries are above the McKinley County

average. The Cooperative Extension Service of the U.S. Department of Agriculture (Coppedge, 1981) reports that in New Mexico every job in a basic industry such as mining and milling generates 0.74 supporting jobs. Furthermore, it is estimated that each basic industry job generates 1.12 households, 0.04 retail trade establishments, 1.07 passenger car registrations, 0.91 school children and 3.59 additional people in the region. Using these values and the current direct UNC employment of 542 persons, it can be estimated that UNC mining and milling operations currently support 401 indirect jobs in the region. It can also be estimated that the UNC operations account for 607 households, 22 retail trade establishments, 580 passenger car registrations, 493 school children and 1,946 additional people in the region.

The Gallup Chamber of Commerce estimates that in Gallup, each dollar of revenue earned in a basic industry generates approximately seven dollars income to businesses supplying supporting goods and services. Of the current 542 UNC employees, 376 (69 percent) live in McKinley County and 253 (47 percent) live in Gallup. Assuming that 69 percent of the employees also lived in McKinley County in 1980, as much as $110 million in indirect or secondary revenue was generated in the Gallup/McKinley County region in 1980 as a result of UNC mining and milling operations. Most of the remaining UNC employees reside in Cibola County.

The taxes paid to the state and federal governments by UNC and its employees are itemized in Table C5.3. The 1980 and 1981 average annual tax burden of UNC and its employees is estimated to be $11.9 million. The greatest individual taxes are federal income tax withholdings and the state severance tax. Of the total $11.9 million paid in taxes by UNC and its employees, $6.0 million, or 51 percent of the total, is paid to the federal government and $5.9 million, or 49 percent of the total, is paid to the State of New Mexico. In addition to these taxes, taxes paid by other jobs and businesses generated by UNC activities should be considered when evaluating the economic impacts of UNC operations.

The importance of continued UNC employment at Church Rock is emphasized by the different conditions in the uranium industry in northwest New Mexico. The comments of the Uranium Environmental Subcommittee and Kerr-McGee Nuclear Corporation in the matter of Proposed Amendments to the Radiation Regulations before the Environmental Improvement Board of the State of New Mexico, August 7, 1981, reflected the following mine, mills or projects which had been closed, mothballed or postponed:

(1) Anaconda Jackpile open pit mine, once the largest producer in the country - closed;

(2) Kerr-McGee Rio Puerco mine - closed;

(3) Bokum Resources mine and mill at Marquez closed before production achieved after more than $60,000,000 spent;

(4) United Nuclear St. Anthony mines - closed;

(5) Kerr-McGee Nuclear Section 24 mine - closed;

(6) Exxon in situ project, Marquez - not started;

(7) Homestake Section 15 mine - closed;

(8) Kerr-McGee Nuclear Section 17 mine - closed;

(9) United Nuclear Sandstone mine - closed;

(10) Phillips Nose Rock Project - mothballed ($140,000,000 spent, no production achieved);

(11) United Nuclear Ann Lee mine - closed;

(12) Gulf Mineral - San Mateo mill - no decision made to build;

(13) Homestake Section 32 mine - closed;

(14) Conoco-Wyoming Mineral Crownpoint project - mothballed.

During the hearing itself, the Sohio Western mining and milling operations were closed, throwing 300 more out of work:

"Asked if any workers would be transferred to other operations, Sam Shaw, Vice President of Uranium

Operations, said there are no other operations to which to go."

Since the UES comments were filed, the Homestake Section 13 mine has closed, announcement has been made of the closure of the Anaconda mill this coming Spring, employment has been reduced at Gulf Mineral, and the end of the Ranchers' Johnny M is in sight. Unemployment in this industry is very great.

Social benefits resulting from UNC mining and milling operations include corporate donations to local and regional charities, public service organizations, park improvement efforts, etc. During the year beginning November of 1980, UNC donated over $15,000 to these kinds of organizations. The company has also contributed building materials to Red Rock State Park, the Navajo Tribal Fair Grounds, and to the Thoreau Cemetery.

C5.5.2 Costs of Mining and Milling Operations

The costs incurred by the City of Gallup and McKinley County to provide services to the population supported directly and indirectly by the UNC operations are itemized in Table C5.4. Total annual city and county governmental expenditures resulting from the presence of UNC are estimated to equal $4.2 million. About 52 percent of this total is expended by McKinley County; however, this figure is inflated by the fact that there is a consolidated city-county school system in the county.

Social costs associated with the presence of the UNC operations include public services such as schools, fire and police protection, waste water treatment and other similar services. Recreational facilities, fire protection and waste water treatment facilities are generally adequate in the area and the presence of UNC causes no excessive demand for these services. Schools in the county are generally operating with enrollments below capacity. Only two

of the twenty-seven schools in the city-county consolidated system have enrollments exceeding design capacity.

C5.5.3 Net Benefits of Mining and Milling Operations

An estimate of the net benefits resulting from UNC operations can be made by comparing the statistics presented in the two previous sections. The direct UNC payroll, minus the estimated required governmental expenditures, indicates a net direct economic benefit of about $18.6 million annually. This does not include estimated indirect revenue and taxes paid by UNC and its employees.

Social benefits are more difficult to quantify; however, UNC operations are responsible for lower unemployment rates in McKinley County. UNC operations also can be seen to have a stabilizing effect on local social conditions.

6.0 IMPACTS TO WATERWAYS AND GROUNDWATER

C6.1 SURFACE WATER

C6.1.1 Introduction

This section provides an analysis of possible impacts to the surface waterways near the Church Rock Mill. The impacts produced from normal mill operations as well as potential large-scale accidents are discussed. Additional mill-related accidents are discussed in Section C7.0.

C6.1.2 Surface Water Bodies

The Church Rock Mill and tailings are located within Pipeline Canyon, a tributary of the North Fork Puerco River. Flow in the canyon is naturally ephemeral. However, treated mine water from UNC and Kerr-McGee mining operations currently flows down the arroyo. These flows generally are less than 12 cubic feet per second (Public Health Service, 1980). Additional flows result from infrequent rainfall events during summer thunderstorms and on occasion from snowmelt. The North Fork Puerco River is an ephemeral or intermittent to perennial arroyo whose drainage extends to the Continental Divide to the east of the mill area. Flows in the Puerco River are derived primarily from base flows of infiltrated rainfall and snow melt. The Puerco River does not respond as rapidly to thunderstorms as the Pipeline Canyon arroyo does because of the larger size of the Puerco River channel and the large watershed area. However, local flash flooding may occur in the Puerco River as well as in Pipeline Canyon.

No ponds or lakes have been identified downstream of the mill site. Several small stock watering ponds exist upstream of the mill site in Pipeline Canyon but are not affected by mill runoff.

C6.1.3 Sources of Contamination

The principal radiological contaminants that are mobilized by mill operations include natural uranium (U-Nat), U-235, Th-230, Ra-226,

Pb-210, and Po-210. Contamination of surface waterways may be caused by minor losses of radionuclides in either particulate or dissolved forms. The particulate forms which may be lost to the atmosphere are reduced by impingment-type scrubbers within the mill processes and by stabilization of tailings to prevent wind and water erosion and transport. However, collection by impingement-type scrubbers and stabilization of tailings is not completely effective and small amounts of radioactive contaminants are lost to the atmosphere. These particulates, after falling on land surfaces, can collect in surface waterways by overland flow following precipitation. The impacts of these concentrations are minimal because small quantities of material are diluted by large volumes of water and sediment. There is no indication that particulate releases have increased radionuclides in surface water to levels even approaching regulatory limits.

Liquids containing radionuclides also present a potential impact to surface waterways. Minor spills might occur from coupling leaks, faulty valves, crushed pipes, and other occurrences. The emergency solvent dump pond, the storm water retention basin, the CCD emergency storage pond, and downstream storage pond, as shown in Figure C1-2, are provided to contain spills of this type.

Extraordinary circumstances could result in some radionuclides from minor spills entering the Pipeline arroys. These overflows would be transported downstream by the flow of the mine water in the Pipeline arroyo. However, two processes would occur which would render minor spills insignificant in terms of health when gauged against NMEID's Part 4 release standards on average annual levels. Any radionuclide concentration in a minor spill would be rapidly diluted by the mine water flow in the arroyo. The amount of dilution would depend on the volume of the spill compared to the arroyo flow, and a larger spill would take more time to be diluted than a smaller spill. In addition to dilution, sorption could reduce the radionuclide levels resulting from a minor spill. It can be predicted with confidence that a minor spill

would not result in a threat to health in surface water because of the observations made in connection with the major spill at the time of the breach. In that incident, radionuclide levels in surface water dropped below annual MPC limits in a matter of a few days.

A potentially more hazardous type of contaminant source would be an event that releases large amounts of radionuclide contaminants to the surface waterways. While considerable engineering design is employed to reduce the possibility that events would occur, analysis of their impacts will help in planning for remedial action. Large scale events could include a breach in the tailings structure, rupture of the tailings disposal pipe or rupture of thickener or leaching tanks.

A tailings breach occurred in July 1979. The extent of contamination and areas/users contaminated will be discussed in the following section to focus on the examination of real impacts rather than projected impacts.

C6.1.4 Impacts of Tailings Breach

C6.1.4.1 Extent of Contamination

The breach of the tailings containment structure on July 16, 1979, resulted in the release of an estimated 93 million gallons of tailings liquid and 1,100 tons of solid waste into the Pipeline Canyon arroyo (Udall, 1979). A large portion of the solids was captured in a catchment basin at the base of the tailings structure while most of the solids that entered the arroyo were deposited within a few miles downstream. Generally, the solids were deposited in the backwaters of adjacent arroyos or on upper terraces of the arroyos where the velocity of the liquids was reduced. The liquid portion of the release traveled down the arroyo to the Puerco River, then downstream to a point near Sanders, Arizona about 25 miles from Arizona-New Mexico border. Total distance of the movement was approximately 100 miles (Hann, 1979).

The height of the flow allowed the flooding of several minor terraces in the streambeds as well as the confluences of the adjacent arroyos along the path of the flow. As the liquids flow progressed downstream, this height was reduced as the volume of water was reduced by storage in backwater areas or seepage into the banks and streambed. Thus, downstream flows were more confined to the streambed area and eventually the flow was reduced to a trickle that seeped into the bed.

C6.1.4.2 Areas/Users Impacted

The liquids from the spill were confined to the channel and immediate terraces within the Pipeline Canyon arroyo and the North Fork Puerco River. The Puerco River Valley is sparsely settled (approximately 15 persons per square mile), and only 32 family groups were residing within two miles of the arroyo and the Puerco River between the mill site and Gallup. None of these families use surface water as a drinking water source, although livestock utilize the treated mine effluent water as it flows down the waterways. Because of the acidic nature of the tailings liquid, it was assumed that livestock would not drink from the waterways immediately following the spill. Drinking water was provided by UNC for both human and livestock consumption (Hann, 1979).

Numerous water and sediment samples were taken by UNC and NMEID immediately following the incident. Sampling and analyses have continued to the present. The sample locations extend along the Puerco River into Arizona.

Table C6.1 provides a summary of the maximum concentrations of dissolved radionuclides encountered along the Puerco River during the sampling period (Public Health Service, 1980). With the exception of U-238, all radionuclide concentrations were at a maximum level within 48 hours of the breach. The maximum U-238 concentration was detected 16 days after the tailings pond release. Gross alpha concentrations were also highest on the day following the incident. Most of the radionuclide concentrations in Puerco River water returned to background levels with-

in approximately 20 days following the spill. However, samples taken in late August 1979, revealed above background concentrations of Pb-210. This was probably caused by the decay of U-238 to Pb-210 with time. Results of the sampling program could not be used to establish a clear relationship between radionuclide concentrations and either elapsed time or distance from the breach. However, the results from the sampling program indicates the following:

- o Radionuclide concentrations appear to have flucu-ated in a similar manner at all sampling sites with respect to time following the spill.
- o While concentrations of most radionuclides decreased with time, the rates have decreased differently among particular radionuclides.
- o Certain stations tended to have comparatively high concentrations of specific radionuclides, although these stations were not necessarily the the ones closest to the tailings pond.

These trends are what would be expected in a watercourse that suspends, dissolves, and redeposits sediments dissolution as a function of changing water levels.

Table B3.8 provides more recent sampling results downstream from the mill. These data show fluctuations in radionuclide levels following the stabilization of the waterways after the spill, but the levels of radionuclides remain below state standards.

Sediment radionuclide levels also varied widely over the length of the watercourse and with time following the spill. Concentrations of U-238 showed no consistent pattern with respect to sampling distance from midstream. Concentrations of Th-230 levels were generally higher in samples from the bank than from the streambed, while concentrations of both U-238 and Th-230 were highest in the areas of crystalline precipitation found along the river bank. Concentrations of Ra-226 and Po-210 were measured in some of the sediment samples. Core samples were

taken between September 27 and October 5, 1979. With the exception of U-235 concentrations, levels in both surface and core samples showed no consistent relationship between radionuclide concentration and location in either the first or second terrace away from the active streambed. Concentrations of U-235 were generally higher in samples taken from the first terrace than they were in those taken from the more distant second terrace. Likewise, no clear trends existed for any of the radionuclides with respect to depth of the sample or distance from the tailings area.

Concentrations of Th-230 and Pb-210, daughters of U-238, in the stream system tended to be above levels measured in background samples, and certain samples exceeded the background by a factor of ten. Less than 50 percent of the samples had levels of either Ra-226 or U-235 that exceeded background measurements, and samples that exceeded background concentrations did so by less than a factor of two for both radionuclides.

In the cleanup operations immediately following the spill, UNC workers shoveled the tailings from areas showing higher concentrations of Ra-226 and Th-230. Sediment samples taken after the monitoring and cleanup program indicated that Th-230 concentrations from most sample sites in the Puerco River had dropped to levels less than the established NMEID cleanup level. However, several areas of elevated Th-230 concentrations remained for several months after the spill. Most of these areas showed evidence of raffinate pooling with deposition of white and yellow crystalline material.

Six human subjects living in the area (as selected by the Church Rock Chapter House of the Navajo Nation) underwent whole-body counting at the Los Alamos Scientific Laboratory to search for the presence of selected radionuclides. No detectable activity of any of these isotopes were found in any of the subjects. Analysis was also performed on two sets of urine samples collected from these same six individuals. The gross alpha activity and gross beta counts were not statistically different from controls or detection limits.

Several types of livestock (cows, sheep, and goats) that had been exposed to the spill, as well as control animals from areas not affected by the spill, were slaughtered and analyzed for radionuclide levels in bone, muscle and major organ tissue. Generally, the exposed animal showed higher concentrations of radionuclides in all three body areas when compared to the control animals. However, there was evidence that the higher concentrations in the exposed animals was caused by background radiation, inhalation of naturally occurring radioactive particles, and drinking of mine effluent water that contained dissolved radionuclides. These sources may have occurred either singly or in combination. Thus, the animals may not have been affected by the spill in the time that they were exposed to it. In any event, concentrations in the animals were too low to constitute a health threat to either humans or animals.

Sediment sampling in the Puerco River has been continued by UNC as described in Section C8.1.4. Results of the most recent sampling done at 124 sites to a distance of about 24 miles downstream, indicate U-238, Ra-226, and Pb-210 are at background levels (BPNL, 1981). The Th-230 data and all other data are less than the NMEID individual sample criteria established in October 1980.

In summary, it can be stated there was no adverse health effect on either humans or animals as a result of the breach. In addition, continued monitoring of water and sediment quality indicates that the incident has not permanently impacted the waterways below the Church Rock Mill.

C6.2 GROUNDWATER

C6.2.1 Introduction

UNC is continuing its investigation of the hydrogeologic regime in the vicinity surrounding the tailings pond. These current investigations are continually updating both hydrogeologic and hydrochemical data at

the site. Much of the information collected to date has been compiled and is still being evaluated in light of additional work. The major thrust of the work has been related to the GWDP for the site.

The original GWDP submitted in December 1980, has been updated with data submissions to NMEID weekly and monthly as well as with several status and progress reports. The latest of these progress reports was submitted to NMEID in August 1981. Data from these reports and the ongoing investigations will be assessed in UNC's documents related to obtaining GWDP approval. Included in this Mill License Renewal Document is an overview of the results of the investigations that have been assessed to date. More detailed assessments are intended to be included in future submissions related to the GWDP.

This groundwater impacts section also relates to radionuclide concentrations in the five groundwater wells associated with the monitoring related to the license. Additional information related to radionuclide levels in other wells and some general water quality data is also included. This latter information has already been submitted related to the GWDP.

Over 200 monitoring wells have been installed at the site to measure water levels and collect water quality samples for the assessment of the extent of contamination. Figure C6-1 provides the location of these wells. Additional wells are currently being installed at the site. The expected locations of these wells and the zones in which they will be completed are also shown on Figure C6-1.

C6.2.2 <u>Formations</u>

The hydrogeology of the study area was discussed in Section B3.2. The principal formations in the study area potentially affected by the movement of contaminants include the alluvium, the Dilco/Torrivio Sandstone, and Zone 3 and Zone 1 of the Upper Gallup Sandstone.

The general geology underlying the UNC Church Rock tailings site is shown in Figures B4-6, B4-7A, and B4-7B and is discussed in Section B4.0. The alluvium is from approximately 20 to 135 feet in thickness and consists of clays, silts, and sands. The units underlying the alluvium consist of sandstones, shales, and coal of the Upper Cretaceous Mesa Verde Group; in particular, the Dilco Coal Member of the Crevasse Canyon Formation, the Upper Gallup Sandstone including the Torrivio Sandstone, and the Upper D-Cross Tongue of the Mancos Shale. The Upper Gallup sandstone underlying the Torrivio Sandstone has been subdivided into three zones: Zone 1, sandstone; Zone 2, shale; and Zone 3, sandstone.

The hydraulic gradients associated with each of these units are currently being evaluated. Wells have been installed in all of the zones. Gradients and flow directions in the zones are variable as a result of many factors such as recharge from the tailings pond area, dip of the bedrock and saturation in the alluvium from mine water effluent, any pumping from nearby interceptor wells, and normal seasonal fluctuations.

C6.2.3 <u>Sources of Contamination</u>

Prior to the breach on July 16, 1979, mill tailings were deposited in the north, central, and south pond areas (Figure C2-3). Since the breach, tailings have been primarily deposited in the central pond area. This area was isolated through the construction of two major dikes, labeled the north and south cross dikes. Earth fill used in construction of the cross dikes was excavated from two borrow areas located to the east of the central pond area. These pits (Borrow Pit No. 1 and Borrow Pit No.2) are also known as the slimes area and the east pit, respectively, and are presently used for the storage of slimes and liquid tailings (Figure C2-3).

Presently, separated (cycloned) and unseparated (spigotted) tailings are being deposited in the central pond area. As the coarse fractions are isolated by gravity, the fine tailings and liquids flow to the east via

a series of diversion trenches. The liquids and fine tailings flow into the slimes area from which the liquids are pumped into the fully clay-lined east pit. A portion of the liquids isolated in the east pit is then recycled to the mill.

The movement of tailings contaminants in the groundwater is controlled by factors or phenomena which are important to both general hydrologic flow and chemical transport. Factors affecting flow movement include:

- o Fracture density of the rock;
- o Permeability (and permeability contrasts) within the units;
- o Stratigraphy and structure of the underlying rock units; and
- o Density stratified flow.

Factors affecting chemical transport include:

- o Groundwater condition (chemistry, Eh, pH) and temperature;
- o Solubility of the contaminated compound;
- o Stability of the dissolved complex; and
- o Sorptivity and dispersivity of the dissolved species.

Details related to the various factors critical in transport of contaminants are being assessed as part of the GWDP investigations.

The solubility of many of the metals and radionuclides present in the tailings liquid generally increases in acid solutions. Since the pH of the tailings pond is between one and two, as the liquid seeps into the various geologic zones, the pH tends to rise and some of these materials tend to precipitate. In addition, many of the organic and mineral phases contained in the soil and rock along the flow path retard the transport of materials dissolved in the liquid. Thus, the concentration

of most radionuclides in the contaminated liquid tend to be decreased significantly as the liquid moves through the geologic system. Other elements such as sulfate, however, are less susceptible to these retardation effects and are transported more readily along the flow paths.

UNC's proposed neutralization system was developed in part to reduce the potential for contaminant migration from the tailings ponds. With the pH in the tailings pond approaching 7, a greater amount of precipitation of metals and radionuclides will take place in the pond area. This in turn will reduce migration of some of the materials away from their source.

C6.2.4 Contaminants

The tailings liquid contains elements capable of contaminating local groundwater resources. These parameters include pH, TDS, SO_4, various metals and heavy metals, and several radionuclides. The evaluation of contaminant migration at the Church Rock Mill is continuing with UNC conducting extensive field work and data analysis. Review of available data including TDS, pH, SO_4, Mo, Co, U, Fe, and Al, suggests TDS, pH, and SO_4 are indicators of migration. However, localized zones of naturally occurring oxidized pyrite are found in varying concentrations in formations at the site which decrease the pH of groundwaters and naturally produce a heavy metal suite similar to that found in the tailings liquid. In addition, varying amounts of gypsum ($CaSO_4 \cdot 2H_2O$) are found in various formations at the site and could cause local increases of both TDS and SO_4. Additional evaluation of the non-radionuclides is being addressed in the continuing GWDP activities. The radionuclides Thorium-230, Lead-210, Radium-226, and Radium-228 were also evaluated to determine their potential migration from the tailings pond area.

C6.2.5 Extent of Contamination

A progress report of the Church Rock tailings seepage control program

was submitted to NMEID in August, 1981 (SAI, 1981e). This report summarized preliminary analysis of the geologic, hydrologic, and geochemical data gathered up to that time and assessed these data with respect to the migration of contaminants, effects of the seepage control system, and recommendations related to additional work at the site.

The assessment incuded a review of all drilling data including drill cuttings and geologic logs, geophysical logs, and selected rock cores to define mappable stratigraphic horizons. The resulting well construction summaries and structural contour maps along with static water level measurements from individual wells were used to assess, as closely as possible, the effective geologic unit or units that each well was screened or otherwise completed in. The bulk of the data for the over 200 wells can be used to provide an overall assessment related to water quality at the well locations in the assigned units. In some cases, because of variations in well development and screening techniques, wells could not clearly be assigned to a single geologic unit. These wells were classified as "composite" wells.

Following the assignment of the wells to particular geologic units, the water quality data were averaged for each monitoring well plotted on maps, with a separate map generated for each parameter and for each geologic unit. Analysis of these maps revealed the TDS, pH, and SO_4 were the most reliable indicators of contamination. Similar attempts to correlate dissolved metal, radionuclide and trace element concentrations with tailings solution migration were less successful, with the maps showing inconsistent distribution patterns. This discrepancy may result from the chemical interactions occurring between dissolved materials and solids along the flow path. Variations are less likely to be obscured when analyzing solvent components which occur in abundance (SO_4, TDS, pH). In contrast, the concentration of trace-level components (U, Se, Fe) will be highly sensitive to solid-liquid interactions.

The migration of SO_4 is included in the document to illustrate the results of preliminary data suggesting the extent of contamination near the tailings disposal area. It is emphasized that UNC's continuing work at the site is targetted at updating this preliminary evaluation. Figure C6-2 shows the averaged concentrations of SO_4 in wells completed in the alluvium and Dilco/Torrivio aquifers. Figure C6-3 shows average concentration in the Zone 3 and Zone 1 aquifers. Figure C6-4 provides the average concentration in the composite wells. Review of data in the August, 1981 GWDP progress report (SAI, 1981e) for averaged concentration zone maps, as well as time histories of water quality and water level trends and the operational history of the tailings disposal areas suggests the following:

- The area of greatest concern with respect to excursion of SO_4 liquid into groundwater exists in the area immediately to the northeast of the tailings disposal facility (exampled by well TWQ-124). The magnitude and history of water quality deterioration in this area indicates contamination of the Dilco, Zone 3 units, and possibly Zone 1 (SAI, 1981e). (Figures C6-2 through C6-4 show SO_4 concentrations as high as 12439 mg/l in this area).

- The water quality and water level information which was reviewed indicates that little contamination, as evidenced by SO_4 migration, is present in either Zone 3 or Zone 1 in areas north of and including the 400 series pumping wells. The limited number of wells and piezometers which are completed in the Dilco in this area also suggests no contamination of this unit; however, anomalous water quality trends in piezometer TWQ-115D suggest the need for additional investigation of the Dilco in areas adjacent to and south of TWQ-115D (SAI, 1981e). (Four additional wells are planned for completion in the Dilco/Torrivio to the north and east of the north pond to provide this information (Figure C6-1).)

- A trend of improving water quality as one moves on a line from east to west along the north dike and in the 400 series extraction wells indicates that the Pipeline Canyon channel alluvium is a recharge source of high quality water to the Dilco, Zone 3

and Zone 1 units to the northwest of the tailings area. Piezometric surfaces for this area further support this observation. This recharge source is providing diluton of natural and/or induced poorer quality water in these units and restricts contamination movement to a northeast trend (SAI, 1981e).

- The areas immediately north and east of borrow pits 1 and 2 show variable degrees of contamination. Many of the 300 series wells completed directly north of the borrow pits show trends of deteriorating water quality, which indicate a north/northeast component of contaminated groundwater movement. The variability of water quality trends in this area is likely due to time histories of extraction well pumping in this area (well 323A), and "sliming" or fine-grained tailings aggradation in the bottom of the borrow pits tending to reduce seepage rates and proximity to the borrow pit source area. Those wells and piezometers completed to the east or eastern perimeter of the borrow pit area display contamination, but to a lower and decreasing degree than those wells and piezometers to the north of the borrow pits. This lowered degree of contamination along the eastern perimeter of Borrow Pit 2 suggest that:

  (a) shallow alluvial recharge from the east may be providing both a hydraulic head barrier and/or dilution of contaminated water from the borrow pit area, or

  (b) natural attenuation or buffering of contamination from the borrow pit area (SAI, 1981e).

- The magnitude and trends of water quality deterioration to the west and southwest of the tailings area (exampled by GW-1) indicate the potential for some degree of contaminant migration from the central cell or south pond tailings areas or from the dam breach. The incisement of and ultimate filling with alluvium of Pipeline Canyon complicates the conceptualization of potential flow paths across this channel. Limited geologic information in this area indicates that the Dilco and Zone 3 geohydrologic units have been eroded in this area. The trend of water quality deterioration coupled with the lack of more thorough understanding of the potential geologic and hydrologic

> flow systems in this area indicates a need for additional investigation in this area (SAI, 1981e). (Figure C6-1 shows the location of wells that are presently planned in this area to provide additional information.)

Tables C6.2 to C6.6 provide radionuclide concentrations for wells completed in the alluvial, Dilco, Zone 3, and Zone 1 wells and the composite wells. Inspection of these values shows variations in adjacent wells in each zone. The number and type of these variations make the formation of conclusions as to migrational activities difficult. In general, the highest levels of radionuclide concentrations exist on the borders of the central pond area, especially the northern border of the east borrow pit. There is no indication that migration of radionuclides is more extensive or follows pathways that differ from the migration of SO_4. There is no indication that radionuclides have migrated as far as SO_4 in the northeasterly direction from the north pond. As discussed in Section C6.2.3 above radionuclides are not expected to migrate to the same extent as SO_4 since they tend to be removed from the liquid by coprecipitation with metals, sorbing onto clay particles or metal complexes.

As described in Section B3.2.8, the five monitoring wells sampled as part of UNC's environmental monitoring program (Wells GW-1, GW-2, GW-3, GW-4, and GW-D1) have been consistently less than the MPC's for radiological constituents (Tables B3.11 through B3.21).

C6.2.6 Groundwater Use

None of the formations affected by the contaminant migration are presently being used to a distance of at least two miles from the site vicinity. The alluvial aquifer of Pipeline Canyon downstream of the mill is used for stock watering and domestic use but only at a distance of ten miles from the mill.

Section B3.2 and Tables B3.22 through B.26 presented data related to radiological parameters in five alluvial wells which were sampled both by UNC and the Public Health Service. These alluvial wells were located within 200 feet of the Puerco River. The results of the groundwater sampling as reported by the Public Health Service (1980) were as follows:

- Samples taken on July 18 had gross alpha concentrations between 1.7 and 5.0 pCi/l, gross beta concentrations between 2.8 and 8.9 pCi/l, and sulfate concentrations between 32 and 448 mg/l. These preliminary data indicate no early contamination of groundwater by the river system.

- Measurements taken in September, 1979 from one NMEID test well suggested seepage from the contaminated river into groundwater, as sulfate and uranium concentrations showed increases over previous background levels. These concentrations of uranium and sulfate returned to background levels by October, however.

- Subsequent public well samples have shown no indication of groundwater contamination as of May 2, 1980. Gross alpha, gross beta, and sulfate concentrations for the more recent samples have remained within the ranges reported for July 18, 1979.

Thus, even a spill such as occurred on July 16, 1979 has not had an impact on groundwater use of the alluvial aquifers.

C6.2.7 Projected Impact

At present, contaminant areas occur in the immediate area of the tailings disposal area, as might be expected. High concentrations of radionuclides were found in the wells immediately adjacent to the north pond and the borrow pits. Thorium-230 was especially high with concentrations reaching 5000 to 14000 pCi/l at wells near the north and south of the central cell. However, the radionuclides have not migrated as far as the sulfates due to precipitation,

coprecipitation, and adsorption. The contaminant migration to date has not affected any groundwater users nor is it expected to in future.

The proposed neutralization system is expected to effectively reduce the potential for migration of radionuclides and metals from the tailings disposal area. In addition, continuing efforts by UNC to more exactly define the hydrogeologic and hydrochemical regime in the area will provide further data to identify any other mitigating measures that may need to be taken at the site.

C7.0 ENVIRONMENTAL EFFECTS OF ACCIDENTS

This section addresses consequences of accidents potentially occurring during milling operations, for example:

- Accidents involving radioactivity at the mill;
- Nonradiological accidents at the mill; and
- Transportation accidents involving radioactive and nonradioactive materials, on-site and off-site.

C7.1 MILL AND TAILINGS ACCIDENTS INVOLVING RADIOACTIVITY

C7.1.1 Trivial Accidents

Small leaks or overflows of solutions containing potentially elevated levels of radionuclides are considered to be trivial occurrences that would not result in significant environmental effects because of the low level of radionuclides in the materials handled and because small volumes of solutions released would be totally confined to the mill site. Spills resulting from human error during the filling and emptying of tanks, and failure of valves and piping may occur in uranium mills as frequently as several times per year according to the U.S. Nuclear Regulatory Commission (U.S. NRC, 1977).

C7.1.1.1 Minor Spills

Vessels containing solutions in the grinding and yellowcake precipitation circuits are enclosed in the processing buildings. Spills from the semiautogenous grinder, cyclones, and associated piping system would be collected in floor sumps. The floors of the grinding circuit building are steeply inclined to facilitate collection and washdown. Spilled liquids would be pumped back into the grinding circuit if they are of significant volume. The floors of the building in which yellowcake is precipitated are also sloped and designed to facilitate the control and cleanup of spills.

All leach tanks, counter-current decantation (CCD) tanks, clarifloccu-lator tanks, clarified pregnant solution tanks, raffinate tanks, and solvent extraction tanks are located outdoors as shown in Figure C7-1. Small leaks from these tanks are confined to the immediate vicinity. The area around the tanks is paved and drains to the CCD basement pump-house (sump). This allows spills or washdown material to flow to the drains and then to either be discharged to the holding ponds or to be reprocessed in the mill circuit.

The leach tanks are located within a large recessed area with paved sloping floors which drain to a sump. Leach tank spills would be col-lected from the sump and returned to the process. Spilled material from a rupture of any of the CCD tanks would be retained in the CCD pumphouse basement or the emergency dump pond. Spills would then be returned to the CCD process.

The clarifloccculator and raffinate tanks are located south of the pre-cipitation building. Drainage of any spills would be to the CCD pump-house basement and returned to the CCD process. The tank containing clarified pregnant solution is located immediately west of the precip-itation building. Accidental spills from this tank would drain to a floor sump at the sand filter area and would be reprocessed.

Solvent extraction tanks are located west of the precipitation building and adjacent to the pregnant solution tanks. The concrete floor around these tanks is curbed on all sides and sloped to drain sumps. This area, plus the lined emergency solvent dump pond, to the west is suf-ficiently large to accommodate the entire volume of three of the extraction tanks.

Another example of a minor spill is a solution spill in an ion exchange (IX) facility. UNC has operated the IX facility at the NECR facility since 1977 and at the OCR facility since 1979. Since the operations began, one spill has occurred at the NECR facility resulting

in the release of about 250 gallons of pregnant solution, 20 gallons of H_2SO_4 acid, and 250 gallons of water. Of these amounts, 150 gallons were contained in a downstream trench, 150 gallons collected in the Radon tank sump, 190 gallons were discharged into the mill circuit feed pump, and 10 gallons were released into the stream. The total amount of uranium (U_3O_8) released was about three pounds into the stream (UNC Internal Memorandum, 1979). A radiation survey in the IX building showed no residual levels above background.

Changes in the NECR drainage system have been made. Currently, if any spill occurs, it will be entirely directed to the sump area within the IX building.

C7.1.1.2 Pipeline Rupture

A pipeline transports slurried tailings from the mill to the tailings area, which is located approximately one-half mile east of the mill. The main pipeline is equipped with alarms, automatic shutoff controls and containment features designed to minimize the effects of any release.

The slurry is discharged from the tailings dike crest or from a cyclone on the far east side of the impoundment. Part of the slurry water is decanted and returned to the mill for neutralization and reuse. Released tailings would tend to accumulate in the immediate spill vicinity. The liquid effluent released would flow towards and be collected in the seepage collection ditch between the embankment and the outward dike and in the emergency pond downstream. Liquid effluent released by a rupture in the decant water pipeline would exhibit similar flow behavior. Released solid tailings and liquid effluent would be recovered and deposited in the tailings pond. The soil in the site vicinity is of an alkaline nature and would tend to neutralize the acidity of the liquid effluent. Any soil and vegetation contaminated by this type of release would be removed and deposited in the tailings pond.

Accidents involving leaks, overflows, or ruptures of vessels containing radioactive solutions and pipeline ruptures on site are considered to be "trivial" by the U.S. NRC (1980) and not worthy of a detailed analysis.

Accident probabilities for these occurrences are not discussed in the U.S. NRC's Final Generic Environmental Impact Statement on Uranium Mining and Milling (U.S. NRC, 1980).

C7.1.2 Accidents Resulting in Small Releases of Radioactivity

Small releases of radioactivity could result from failures of the air pollution control equipment at the yellowcake drying and packaging building, or from a fire or explosion in the solvent extraction circuit. These types of accidents are described in the following sections.

C7.1.2.1 Air Pollution Control Equipment Failure

The dust collection equipment is divided into two separate units:

1. Dust collection for the dryer, and
2. Dust collection for the packaging operations.

The dust collection pick-up point for the dryer dust collection system is at the top of the dryer. The hot dryer gas is passed through a wet dust collector equipped with a set of impingement plates and four sprayers under the impingement plates. The captured and entrained yellowcake dust is dropped at the plenum chamber and recirculated via a sump pump to the second wash thickener feed. Fresh water is added at the impingement plates at approximately ten gallons per minute, and a mixture of eight gallons per minute of fresh water and of two gallons per minute of recycle solution from the collector is added at the sprays for a total flow of 20 gallons per minute feed. Solids are removed from the recycle flow with a dual strainer. One strainer can be cleaned while the other is in service. The gas volume handled by the impingement plate collectors is 7,000 cubic feet per minute.

The dust collection pick-up points for the packaging system are from the yellowcake bin discharge point and the top of the yellowcake bin. The dust collector for this system is a venturi type collector. Feed to the

collector is 15 gallons per minute of collector recycle water augmented by five gallons per minute of fresh water. The flow is introduced tangentially to the collector for mixing with the incoming dust bearing air flow. Approximately 2,000 cubic feet per minute of gas passes through the venturi collector.

A series of interlocks is built in the circuit so that operations stop instantaneously if there is any component malfunction. Consequently, there is little danger of discharging excessive stack emissions. For example, if an exhaust fan stops, it would trigger dryer flame-out. This would also stop the centrifuge operations, screw conveyor, dryer tray rotation, and lump breaker rotation. The same is true with intermediate components. If one goes out of service, operations would cease. Visual and audio annunciators are located in the operator's control room and the dryer flame-out alarms are located in the vicinity of the dryer and at the packaging room. Consequently, the operator would be immediately aware of circuit shutdown.

The U.S. NRC considers the failure of the dust collection system described above to result in only a small release of radioactivity. The two types of failures envisioned by the U.S. NRC are:

- Sudden Total Failure:
  According to NUREG-0706 (U.S. NRC, 1980), quantitative information on this type of failure is unavailable. The probability of such a failure, however, is considered to be extremely remote.

- Gradual Failure:
  A gradual system failure is much more likely to occur than sudden total failures and would be readily identifiable during operational inspections. Probability estimates for this type of failure are not considered to be necessary and are not evaluated by the U.S. NRC (1980) in NUREG-0706.

C7.1.2.2 Fire or Explosion in the Solvent Extraction Circuit

The solvent extraction circuit is outdoors and may contain as much as 10,000 pounds of uranium in solution. The solvent and oil storage building, and the solvent extraction circuit mixer-settlers contain dry water spray fire suppression systems that would be activated in the event of a fire. A wet-type water spray system would handle fires inside the tankage in the solvent extraction area.

From chemical industry data, the probability of a major fire is estimated to be 4×10^{-4} fires per plant year (BNWL, 1973). Two major solvent extraction circuit fires are documented in the literature (U.S. Atomic Energy Commission, 1974). There have been approximately 540 plant-years of mill operation in the United States. Thus, on a per plant basis, the likelihood of a major solvent extraction fire is 3.7×10^{-3} fires per plant-year.

C7.1.3 Events Resulting in Releases of Radioactivity

In the following examples radioactive materials might be released to the environment. Because dispersion characteristics are variable, released radioactivity would not impact the environment uniformly.

C7.1.3.1 Tornado

A tornado passing through the project site could potentially pick up volumes of solutions, ore, and tailings containing elevated levels of the radionuclides and other potentially toxic material and transport them before release. The pick up and release of metal, plastic, glass, and concrete could also result in physical damage to persons and structures in the surrounding area.

The probability of a tornado passing through the mill site during the operational lifetime of the project is extremely low. Using data developed by Thom (1963)for a site in the same general area of New Mexico, the annual probability of a tornado striking a given point in the mill site area was determined as 1.5×10^{-4} tornados per year

(Sohio, 1980). The recurrence interval of such an incident was estimated to be about every 6,700 years and is expected to be of a similar frequency for the UNC site.

C7.1.3.2 Release of Tailings Slurry

Release from the tailings slurry line has occurred on two occassions since 1977 at the site. Data on each of these releases was submitted to NMEID and corrective maesures taken. On September 27, 1977, the tailings line became plugged with tailings. During unplugging operations, the CCD operator inadvertently ran flush water to sections of uncoupled pipe. This resulted in about one ton of tailings and 900 gallons of liquid flowing to the north side of the tailings line, across the land surface towards the arroyo. Part of the flush water and the tailings slimes entered the arroyo. The coarse sand fraction settled on the land surface. Tailings were scraped from the land surface and deposited in the tailings pond. A small but unknown quantity of tailings was released beyond the property boundary in the arroyo.

The second release from the tailings line occurred on September 30, 1978, when a coupling failed and the line separated. About 300 gallons of slurry spilled into the seepage collection ditch. Although the material sprayed over the berm separating the ditch from the arroyo, there was no evidence of tailings flowing into Pipeline Canyon arroyo. The spill material was scraped from the spill area and deposited in the tailings pond.

C7.1.3.3 Tailings Structure Failure

On July 16, 1979, the tailings structure breached. The results of the failure, as well as the clean-up procedures that followed, are discussed in Section C6.1. Compliance with engineering specifications for the original embankment and rebuilding of the structure, at the breach, as well as rigid inspection and surveillance programs, have been part of engineering requirements at the site.

Failures can result from an exceptionally large precipitation event or earthquake. The Church Rock structure has been designed to contain upgradient runoff and has adequate capacity to accommodate the probable maximum flood (PMF) event from internal drainage without overtopping. The tailings area has a system of diversion ditches designed to collect and divert runoff due to heavy local precipitation. The tailings structure has also been designed to withstand the earthquake magnitudes most likely to occur at the site (Section B4.0). The project site is situated in an area characterized by low to moderate seismic activity, and historical earthquakes have generally been of low magnitude and intensity.

A relatively large release of tailings liquids and solids could occur if there was a failure of the embankment. The July 16, 1979, event provides some experience as to the environmental consequences of such an event. In terms of surface water impact, a combination of dilution, sorption and clean-up resulted in surface water concentrations returning to pre-breach levels in a short period of time. The neutralization program should significantly lessen the consequences of surface water contamination. A perhaps inconsequential difference may result from neutralization - in 1979 the acidic nature of the liquid released seemed to have resulted in livestock not drinking the water until pH increased (at which time contamination levels also decreased). Because surface water contamination levels dropped rapidly in 1979, even if livestock used the arroyo for drinking purposes for a short time after the release, there should be no significant consequence, as most water standards are set at levels that presume use at such levels for years, even decades.

Impact on groundwater is also possible. The sampling conducted in wells near the Rio Puerco by UNC since 1979 has not disclosed such impact as a result of the 1979 breach. Dilution and sorption may have played a significant role. The neutralization program should significantly reduce any threat of adverse impact on groundwater. The recycling

program started after the 1979 breach further decreases conceivable impact on both surface and groundwater, because less tailings liquid is present at the site.

The release of solids was confined to the arroyo (particularly at gradient breaks) and its benches, with backup into feeder arroyos. The local population has no constructed residences in such locations, and irrigation farming is not conducted in such locations in the area. In 1979, physical sediment removal was employed. The restricted locations precluded use of large earth-moving equipment. Thus, detailed surveys and sampling, and manpower and small equipment were used. This program appears at this time to have been successful, and no long-term, adverse effects are expected.

It is possible to imagine a huge flood of a highly speculative occurance causing a tailings release. The Applicant considers a pmf event extremely speculative. Even if one were to occur, the tailings liquid would seem an insignificant factor. Further, the huge amount of natural sediment carried and moved by the flood would result in very significant sorption of some elements. The effects on surface water quality would be very small, and the surface water would probably contain much more than 10,000 mg/l TDS in any event. The effect on groundwater would seem even less, because of the additional sorption and dilution involved.

The tailings solids behavior in such an event is not subject to precise quantification, because behavior would depend upon peak flow volume, amount of tailings, contribution from feeder arroyos and other factors. The mixing with other sediments carried by such a flood would be very great, but at least some of the tailings solids would be carried many miles. The mixing that occurs may reduce the tailings to an

insignificant factor. The consequence of such an event may not result in Part 4 standards being exceeded because of the mode of deposition.

Another conceivable but unlikely and highly speculative situation would be one in which the extreme precipitation was so localized that the tailings basin filled with water, resulting in failure. This would require an event larger than the probable maximum precipitation event. In this case, the tailings materials would still follow the course described above, but the distance of transport would be much shorter. In this case, the deposited materials would be more concentrated favoring identification and recovery after the accident.

The transport routes followed by material released as a result of a seismic event would be similar. Tailings released by an earthquake would probably travel a shorter distance due to the smaller amount of water available to help carry the tailings solution. An estimate of accident probability can be obtained from historical mill data contained in NUREG-0706 (U.S. NRC, 1980). The embankment is specifically designed so that failure due to slurry release from the pipeline system and subsequent erosion is considered extremely remote.

Table C7.1, which summarizes the U.S. NRC (1980) data, shows that the average release from tailings failure or from flooding was approximately 1.4×10^7 gallons of liquids and 3.2×10^7 pounds of solids. Eleven of 15 releases for various mills reached a watercourse. Of the 15 recorded incidents, 9 involved dam failure or flooding. Thus, considering the 430 mill-years of operation in the sample period, the likelihood of release from a tailings pond to a watercourse is about 1 to 2×10^{-2} per plant-year. Appendix C.1 contains UNC's contingency plan for a total failure.

C7.2 NONRADIOLOGICAL MILL ACCIDENTS

C7.2.1 Leaks, Ruptures, and Overflows in Chemical Storage Tanks

Various process reagents, including acids, oxidants, flocculants, and solvents are handled and stored at locations throughout the mill. Solution leaks and ruptures from surface chemical storage tanks will have no significant environmental effect because spilled solutions will be confined to the mill vicinity and recovered.

Overflows from chemical storage tanks will be collected by the designed drainage systems surrounding the storage tanks. Recovered solutions will either be stored, disposed of in the tailings ponds, or used in normal mill processes. Chemical explosions, such as those resulting from pressure buildup in the ammonia tank and chemical fires could release toxic material to the airborne environment. The likelihood of major chemical explosives and fires is small due to proper tank design and safety procedures.

C7.2.2 Ruptures in Undergound Water and Fuel Oil Piping

Steel water supply pipelines from the wells and steel fuel oil supply pipelines are buried underground at the site. Water supply pipeline ruptures result in only minor environmental effects because no toxic or radioactive materials are released by a failure in the water piping.

As required by Federal Regulation 40 CFR, Part 112, UNC developed two Spill Control and Countermeasure (SPCC) plans related to the containment of fuel oil or kerosene spilled in the mill site itself (Kaiser, 1977) or into surface waters in the vicinity of the site (SER, 1976). Both plans list the source materials, potential magnitudes and causes, spill containment measures, countermeasures, provisions for inspection, evaluation and instruction of the plan, and maps and drawings with pertinent facilities. Both plans form the basis for handling all types of potential spill-related activities at the site and surrounding vicinity. While they were specifically prepared for oil and petroleum based liquid spills, UNC follows the general approach to handling any spillage in the same manner.

C7.2.3 Other Nonradiological Accidents

Other credible nonradiological mill accidents include electrical power failure, steam boiler failure, overflows from process chemical storage tanks, and minor fires. Electrical power failures and steam boiler failures do not involve toxic materials. The temporary loss of electric power at the mill site would cause no incident more serious than temporary overflow of a tank or vessel. Boiler failure could release low-pressure steam, which could possibly cause injuries to workmen.

Minor fires could result from welding, faulty electrical equipment, or combustion of small quantities of combustible material but these fires would be extinguished quickly. An adequate supply of properly serviced and appropriate fire extinguishers is maintained at the mill site at all times to promote quick containment and arrest of fires. Personnel trained in fire protection and fire fighting are present on-site at all times. All electrical equipment is properly wired and grounded in accordance with the National Electric Safety Code (ANSI-C2).

C7.3 TRANSPORTATION ACCIDENTS

C7.3.1 Process Chemical Shipments to the Mill

Although several process chemicals are shipped to the plant facility, an accident involving an anhydrous ammonia spill is considered the "worst-case" condition for assessing the magnitude of environmental impacts resulting from this type of accident. Based on the annual truck shipment of anhydrous ammonia and the annual number of accidents involving these truck shipments, the estimated frequency of these accidents is approximately 4.3×10^{-6} accidents per mile for an average shipping distance of 350 miles (U.S. NRC, 1980). The data indicate that about 80 percent of the reported accidents involved an average release of ammonia of about 1,700 pounds. Approximately 15 percent of the reported accidents involving an ammonia spill resulted in an injury to the general public, principally to the driver. Using these figures and average pop-

ulation densities, the probability of an injury to the general public as a result of an ammonia shipment by truck is about 4.8×10^{-7} injuries per mile (U.S. NRC, 1980). Assuming that the mill will require 65 ammonia shipments per year from a distance of approximately 400 miles, the probability of an injury to the general public from shipments of anhydrous ammonia to the mill site is estimated to be 0.025 injury accidents per year or one every 80 years.

C7.3.2 Yellowcake Shipments from the Mill

The mill is capable of producing 18,000 pounds per day at full capacity. The yellowcake produced is shipped to Metropolis, Illinois, and Gore, Oklahoma, located about 1,200 and 900 road miles from the mill, respectively. Since the mill began operations in 1977, Metropolis has received about 50 percent of the yellowcake produced and Gore has received the other 50 percent.

Yellowcake is packaged for shipment in 55-gallon steel drums. These drums are considered to be Type A packaging according to 10 CFR Part 71 and 49 CFR Parts 171-189 (CFR, 1977a and b). Historically, about 90 truck shipments of yellowcake are made per year, half to Gore and half to Metropolis. The occurrence probabilities and environmental effects of yellowcake transportation accidents and remedial action to be taken in the event of a yellowcake accident, are discussed below.

The probability of yellowcake release to the environment during transport depends upon the number of shipments made per year, mileage traveled per shipment, and probability of truck accidents of sufficient severity to release the contents. The annual overall probability of a truck accident is estimated to range from 1.6×10^{-6} to 2.6×10^{-6} accidents per mile (U.S. NRC, 1979a). Based on the maximum probability rate of 2.6×10^{-6} accidents per mile, an accident involving yellowcake shipments to Metropolis would be expected about every 7.2 years (0.14 per year) and about every 9.6 years (0.11 per year) for shipments to

Gore. The probability of such an accident occurring within the boundaries of New Mexico would be once every 20 years (0.05 per year). These figures were calculated by multiplying the number of shipments, miles traveled during shipment, and the accident rate per mile.

The probability of occurrence of accidents that release yellowcake to the environment is much lower. Table C7.2 lists the fractional occurrence probabilities of truck accidents and package release fractions for eight accident severity categories developed by the U.S. NRC (1980). These probabilities and release fractions have been used by the U.S. NRC in the assessment of the probabilities and environmental impacts of yellowcake transportation accidents. The eight severity categories are distinguished on the basis of the combined impact, puncture, crush, and fire that could result from various transportation accidents. Two accident models for package release fractions are applied to the eight severity categories. Total loss of the drum contents is assumed for Model I releases, whereas, partial drum content loss based upon empirical data is assumed for Model II releases. According to the U.S. NRC (1980), the probability of an accident of sufficient severity to release yellowcake is estimated to be 0.45. The probability of a yellowcake transportation accident of sufficient severity to release yellowcake is therefore estimated to be 0.063 per year to Metropolis, 0.05 per year to Gore, and 0.025 per year within New Mexico. During the 20 years of mill life, the probability estimate indicates that a transportation accident releasing yellowcake would occur once during shipments to Metropolis and would not occur for shipments to Gore or within New Mexico. The probability of a direct yellowcake spill into a lake or stream for yellowcake transport to either destination would be extremely low due to the proportion of intersections of flowing streams or standing water bodies with the transportation routes.

The expected fractional release for a given yellowcake transportation accident is 0.45 for Model I and 0.03 for Model II (U.S. NRC, 1980). These fractional losses are determined by integrating the fractional

occurrences and release fractions of Table C7.2. Yellowcake releases of eight tons for Model I releases and 0.5 tons for Model II releases are estimated for UNC yellowcake transportation accidents based on 18-ton shipment size and the U.S. NRC fractional package loss estimates.

Yellowcake released from the rupturing of drums would likely be deposited directly on the ground. Some yellowcake could possibly be released to the atmosphere in the initial puff. Some of this may be transported from the scene of the accident by wind. Yellowcake released into a stream or a standing water body would become part of the suspended particle fraction and would tend to settle because of its insolubility and high density. The major exposure pathway to biota from released yellowcake would be by inhalation of airborne particulates due to its insolubility and low specific activity.

Battelle Northwest Laboratories has developed expressions for the dispersal of material similar to dry yellowcake to the environment based on actual laboratory and field measurements over several years (U.S. NRC, 1980). Assuming a wind speed of 10 miles per hour, 24-hour release time, and a low population density of 7.5 persons per square mile, the consequences of a truck accident involving a shipment of yellowcake from a mill would be a 50-year dose commitment of approximately 9 and 0.7 person-rems to the lungs of the general population for Models I and II (U.S. NRC, 1980). A 50-year dose commitment of 200 (Model I) and 14 (Model II) person-rem would be received in an area with a population density of 160 persons per square mile. In September 1977, a truck from a mill overturned and released an estimated 7,000 pounds of uranium concentrate to the truck trailer and ground. This accident was calculated to result in a release of 24 kg (53 pounds) of U_3O_8 and a consequence of 1.2 person-rem in the area where the population density was 2.5 persons per square mile (U.S. NRC, 1980).

If yellowcake is spilled on land, it can be detected with sensing equipment, isolated, and removed. Small amounts of topsoil and vegetation

may also need to be removed to ensure that radiation levels are comparable to background radiation levels. Yellowcake released into water bodies would be recovered, if not significantly dispersed. Significantly contaminated sediments would also be removed from the water body. Appropriate state and federal agencies would be immediately notified.

C.7.4 CONTINGENCY RESPONSE PLANS

Appendices C.1 and C.2 contain UNC's contingency response plans in the event of a tailings failure and a yellowcake transportation accident occurring in New Mexico, respectfully. The yellowcake transportation accident response plan has been developed in conjunction with two other uranium operators in the Gallup/Grants region.

C 4.0

6.0 IMPACTS TO WATERWAYS AND GROUNDWATER

C6.1 SURFACE WATER

C6.1.1 Introduction

This section provides an analysis of possible impacts to the surface waterways near the Church Rock Mill. The impacts produced from normal mill operations as well as potential large-scale accidents are discussed. Additional mill-related accidents are discussed in Section C7.0.

C6.1.2 Surface Water Bodies

The Church Rock Mill and tailings are located within Pipeline Canyon, a tributary of the North Fork Puerco River. Flow in the canyon is naturally ephemeral. However, treated mine water from UNC and Kerr-McGee mining operations currently flows down the arroyo. These flows generally are less than 12 cubic feet per second (Public Health Service, 1980). Additional flows result from infrequent rainfall events during summer thunderstorms and on occasion from snowmelt. The North Fork Puerco River is an ephemeral or intermittent to perennial arroyo whose drainage extends to the Continental Divide to the east of the mill area. Flows in the Puerco River are derived primarily from base flows of infiltrated rainfall and snow melt. The Puerco River does not respond as rapidly to thunderstorms as the Pipeline Canyon arroyo does because of the larger size of the Puerco River channel and the large watershed area. However, local flash flooding may occur in the Puerco River as well as in Pipeline Canyon.

No ponds or lakes have been identified downstream of the mill site. Several small stock watering ponds exist upstream of the mill site in Pipeline Canyon but are not affected by mill runoff.

C6.1.3 Sources of Contamination

The principal radiological contaminants that are mobilized by mill operations include natural uranium (U-Nat), U-235, Th-230, Ra-226,

Pb-210, and Po-210. Contamination of surface waterways may be caused by minor losses of radionuclides in either particulate or dissolved forms. The particulate forms which may be lost to the atmosphere are reduced by impingment-type scrubbers within the mill processes and by stabilization of tailings to prevent wind and water erosion and transport. However, collection by impingement-type scrubbers and stabilization of tailings is not completely effective and small amounts of radioactive contaminants are lost to the atmosphere. These particulates, after falling on land surfaces, can collect in surface waterways by overland flow following precipitation. The impacts of these concentrations are minimal because small quantities of material are diluted by large volumes of water and sediment. There is no indication that particulate releases have increased radionuclides in surface water to levels even approaching regulatory limits.

Liquids containing radionuclides also present a potential impact to surface waterways. Minor spills might occur from coupling leaks, faulty valves, crushed pipes, and other occurrences. The emergency solvent dump pond, the storm water retention basin, the CCD emergency storage pond, and downstream storage pond, as shown in Figure C1-2, are provided to contain spills of this type.

Extraordinary circumstances could result in some radionuclides from minor spills entering the Pipeline arroys. These overflows would be transported downstream by the flow of the mine water in the Pipeline arroyo. However, two processes would occur which would render minor spills insignificant in terms of health when gauged against NMEID's Part 4 release standards on average annual levels. Any radionuclide concentration in a minor spill would be rapidly diluted by the mine water flow in the arroyo. The amount of dilution would depend on the volume of the spill compared to the arroyo flow, and a larger spill would take more time to be diluted than a smaller spill. In addition to dilution, sorption could reduce the radionuclide levels resulting from a minor spill. It can be predicted with confidence that a minor spill

would not result in a threat to health in surface water because of the observations made in connection with the major spill at the time of the breach. In that incident, radionuclide levels in surface water dropped below annual MPC limits in a matter of a few days.

A potentially more hazardous type of contaminant source would be an event that releases large amounts of radionuclide contaminants to the surface waterways. While considerable engineering design is employed to reduce the possibility that events would occur, analysis of their impacts will help in planning for remedial action. Large scale events could include a breach in the tailings structure, rupture of the tailings disposal pipe or rupture of thickener or leaching tanks.

A tailings breach occurred in July 1979. The extent of contamination and areas/users contaminated will be discussed in the following section to focus on the examination of real impacts rather than projected impacts.

C6.1.4 Impacts of Tailings Breach

C6.1.4.1 Extent of Contamination

The breach of the tailings containment structure on July 16, 1979, resulted in the release of an estimated 93 million gallons of tailings liquid and 1,100 tons of solid waste into the Pipeline Canyon arroyo (Udall, 1979). A large portion of the solids was captured in a catchment basin at the base of the tailings structure while most of the solids that entered the arroyo were deposited within a few miles downstream. Generally, the solids were deposited in the backwaters of adjacent arroyos or on upper terraces of the arroyos where the velocity of the liquids was reduced. The liquid portion of the release traveled down the arroyo to the Puerco River, then downstream to a point near Sanders, Arizona about 25 miles from Arizona-New Mexico border. Total distance of the movement was approximately 100 miles (Hann, 1979).

The height of the flow allowed the flooding of several minor terraces in the streambeds as well as the confluences of the adjacent arroyos along the path of the flow. As the liquids flow progressed downstream, this height was reduced as the volume of water was reduced by storage in backwater areas or seepage into the banks and streambed. Thus, downstream flows were more confined to the streambed area and eventually the flow was reduced to a trickle that seeped into the bed.

C6.1.4.2 <u>Areas/Users Impacted</u>

The liquids from the spill were confined to the channel and immediate terraces within the Pipeline Canyon arroyo and the North Fork Puerco River. The Puerco River Valley is sparsely settled (approximately 15 persons per square mile), and only 32 family groups were residing within two miles of the arroyo and the Puerco River between the mill site and Gallup. None of these families use surface water as a drinking water source, although livestock utilize the treated mine effluent water as it flows down the waterways. Because of the acidic nature of the tailings liquid, it was assumed that livestock would not drink from the waterways immediately following the spill. Drinking water was provided by UNC for both human and livestock consumption (Hann, 1979).

Numerous water and sediment samples were taken by UNC and NMEID immediately following the incident. Sampling and analyses have continued to the present. The sample locations extend along the Puerco River into Arizona.

Table C6.1 provides a summary of the maximum concentrations of dissolved radionuclides encountered along the Puerco River during the sampling period (Public Health Service, 1980). With the exception of U-238, all radionuclide concentrations were at a maximum level within 48 hours of the breach. The maximum U-238 concentration was detected 16 days after the tailings pond release. Gross alpha concentrations were also highest on the day following the incident. Most of the radionuclide concentrations in Puerco River water returned to background levels with-

in approximately 20 days following the spill. However, samples taken in late August 1979, revealed above background concentrations of Pb-210. This was probably caused by the decay of U-238 to Pb-210 with time. Results of the sampling program could not be used to establish a clear relationship between radionuclide concentrations and either elapsed time or distance from the breach. However, the results from the sampling program indicates the following:

- Radionuclide concentrations appear to have flucuated in a similar manner at all sampling sites with respect to time following the spill.
- While concentrations of most radionuclides decreased with time, the rates have decreased differently among particular radionuclides.
- Certain stations tended to have comparatively high concentrations of specific radionuclides, although these stations were not necessarily the the ones closest to the tailings pond.

These trends are what would be expected in a watercourse that suspends, dissolves, and redeposits sediments dissolution as a function of changing water levels.

Table B3.8 provides more recent sampling results downstream from the mill. These data show fluctuations in radionuclide levels following the stabilization of the waterways after the spill, but the levels of radionuclides remain below state standards.

Sediment radionuclide levels also varied widely over the length of the watercourse and with time following the spill. Concentrations of U-238 showed no consistent pattern with respect to sampling distance from midstream. Concentrations of Th-230 levels were generally higher in samples from the bank than from the streambed, while concentrations of both U-238 and Th-230 were highest in the areas of crystalline precipitation found along the river bank. Concentrations of Ra-226 and Po-210 were measured in some of the sediment samples. Core samples were

taken between September 27 and October 5, 1979. With the exception of U-235 concentrations, levels in both surface and core samples showed no consistent relationship between radionuclide concentration and location in either the first or second terrace away from the active streambed. Concentrations of U-235 were generally higher in samples taken from the first terrace than they were in those taken from the more distant second terrace. Likewise, no clear trends existed for any of the radionuclides with respect to depth of the sample or distance from the tailings area.

Concentrations of Th-230 and Pb-210, daughters of U-238, in the stream system tended to be above levels measured in background samples, and certain samples exceeded the background by a factor of ten. Less than 50 percent of the samples had levels of either Ra-226 or U-235 that exceeded background measurements, and samples that exceeded background concentrations did so by less than a factor of two for both radionuclides.

In the cleanup operations immediately following the spill, UNC workers shoveled the tailings from areas showing higher concentrations of Ra-226 and Th-230. Sediment samples taken after the monitoring and cleanup program indicated that Th-230 concentrations from most sample sites in the Puerco River had dropped to levels less than the established NMEID cleanup level. However, several areas of elevated Th-230 concentrations remained for several months after the spill. Most of these areas showed evidence of raffinate pooling with deposition of white and yellow crystalline material.

Six human subjects living in the area (as selected by the Church Rock Chapter House of the Navajo Nation) underwent whole-body counting at the Los Alamos Scientific Laboratory to search for the presence of selected radionuclides. No detectable activity of any of these isotopes were found in any of the subjects. Analysis was also performed on two sets of urine samples collected from these same six individuals. The gross alpha activity and gross beta counts were not statistically different from controls or detection limits.

Several types of livestock (cows, sheep, and goats) that had been exposed to the spill, as well as control animals from areas not affected by the spill, were slaughtered and analyzed for radionuclide levels in bone, muscle and major organ tissue. Generally, the exposed animal showed higher concentrations of radionuclides in all three body areas when compared to the control animals. However, there was evidence that the higher concentrations in the exposed animals was caused by background radiation, inhalation of naturally occurring radioactive particles, and drinking of mine effluent water that contained dissolved radionuclides. These sources may have occurred either singly or in combination. Thus, the animals may not have been affected by the spill in the time that they were exposed to it. In any event, concentrations in the animals were too low to constitute a health threat to either humans or animals.

Sediment sampling in the Puerco River has been continued by UNC as described in Section C8.1.4. Results of the most recent sampling done at 124 sites to a distance of about 24 miles downstream, indicate U-238, Ra-226, and Pb-210 are at background levels (BPNL, 1981). The Th-230 data and all other data are less than the NMEID individual sample criteria established in October 1980.

In summary, it can be stated there was no adverse health effect on either humans or animals as a result of the breach. In addition, continued monitoring of water and sediment quality indicates that the incident has not permanently impacted the waterways below the Church Rock Mill.

C6.2 GROUNDWATER

C6.2.1 Introduction

UNC is continuing its investigation of the hydrogeologic regime in the vicinity surrounding the tailings pond. These current investigations are continually updating both hydrogeologic and hydrochemical data at

the site. Much of the information collected to date has been compiled and is still being evaluated in light of additional work. The major thrust of the work has been related to the GWDP for the site.

The original GWDP submitted in December 1980, has been updated with data submissions to NMEID weekly and monthly as well as with several status and progress reports. The latest of these progress reports was submitted to NMEID in August 1981. Data from these reports and the ongoing investigations will be assessed in UNC's documents related to obtaining GWDP approval. Included in this Mill License Renewal Document is an overview of the results of the investigations that have been assessed to date. More detailed assessments are intended to be included in future submissions related to the GWDP.

This groundwater impacts section also relates to radionuclide concentrations in the five groundwater wells associated with the monitoring related to the license. Additional information related to radionuclide levels in other wells and some general water quality data is also included. This latter information has already been submitted related to the GWDP.

Over 200 monitoring wells have been installed at the site to measure water levels and collect water quality samples for the assessment of the extent of contamination. Figure C6-1 provides the location of these wells. Additional wells are currently being installed at the site. The expected locations of these wells and the zones in which they will be completed are also shown on Figure C6-1.

C6.2.2 <u>Formations</u>

The hydrogeology of the study area was discussed in Section B3.2. The principal formations in the study area potentially affected by the movement of contaminants include the alluvium, the Dilco/Torrivio Sandstone, and Zone 3 and Zone 1 of the Upper Gallup Sandstone.

The general geology underlying the UNC Church Rock tailings site is shown in Figures B4-6, B4-7A, and B4-7B and is discussed in Section B4.0. The alluvium is from approximately 20 to 135 feet in thickness and consists of clays, silts, and sands. The units underlying the alluvium consist of sandstones, shales, and coal of the Upper Cretaceous Mesa Verde Group; in particular, the Dilco Coal Member of the Crevasse Canyon Formation, the Upper Gallup Sandstone including the Torrivio Sandstone, and the Upper D-Cross Tongue of the Mancos Shale. The Upper Gallup sandstone underlying the Torrivio Sandstone has been subdivided into three zones: Zone 1, sandstone; Zone 2, shale; and Zone 3, sandstone.

The hydraulic gradients associated with each of these units are currently being evaluated. Wells have been installed in all of the zones. Gradients and flow directions in the zones are variable as a result of many factors such as recharge from the tailings pond area, dip of the bedrock and saturation in the alluvium from mine water effluent, any pumping from nearby interceptor wells, and normal seasonal fluctuations.

C6.2.3 Sources of Contamination

Prior to the breach on July 16, 1979, mill tailings were deposited in the north, central, and south pond areas (Figure C2-3). Since the breach, tailings have been primarily deposited in the central pond area. This area was isolated through the construction of two major dikes, labeled the north and south cross dikes. Earth fill used in construction of the cross dikes was excavated from two borrow areas located to the east of the central pond area. These pits (Borrow Pit No. 1 and Borrow Pit No.2) are also known as the slimes area and the east pit, respectively, and are presently used for the storage of slimes and liquid tailings (Figure C2-3).

Presently, separated (cycloned) and unseparated (spigotted) tailings are being deposited in the central pond area. As the coarse fractions are isolated by gravity, the fine tailings and liquids flow to the east via

a series of diversion trenches. The liquids and fine tailings flow into the slimes area from which the liquids are pumped into the fully clay-lined east pit. A portion of the liquids isolated in the east pit is then recycled to the mill.

The movement of tailings contaminants in the groundwater is controlled by factors or phenomena which are important to both general hydrologic flow and chemical transport. Factors affecting flow movement include:

- Fracture density of the rock;
- Permeability (and permeability contrasts) within the units;
- Stratigraphy and structure of the underlying rock units; and
- Density stratified flow.

Factors affecting chemical transport include:

- Groundwater condition (chemistry, Eh, pH) and temperature;
- Solubility of the contaminated compound;
- Stability of the dissolved complex; and
- Sorptivity and dispersivity of the dissolved species.

Details related to the various factors critical in transport of contaminants are being assessed as part of the GWDP investigations.

The solubility of many of the metals and radionuclides present in the tailings liquid generally increases in acid solutions. Since the pH of the tailings pond is between one and two, as the liquid seeps into the various geologic zones, the pH tends to rise and some of these materials tend to precipitate. In addition, many of the organic and mineral phases contained in the soil and rock along the flow path retard the transport of materials dissolved in the liquid. Thus, the concentration

of most radionuclides in the contaminated liquid tend to be decreased significantly as the liquid moves through the geologic system. Other elements such as sulfate, however, are less susceptible to these retardation effects and are transported more readily along the flow paths.

UNC's proposed neutralization system was developed in part to reduce the potential for contaminant migration from the tailings ponds. With the pH in the tailings pond approaching 7, a greater amount of precipitation of metals and radionuclides will take place in the pond area. This in turn will reduce migration of some of the materials away from their source.

C6.2.4 Contaminants

The tailings liquid contains elements capable of contaminating local groundwater resources. These parameters include pH, TDS, SO_4, various metals and heavy metals, and several radionuclides. The evaluation of contaminant migration at the Church Rock Mill is continuing with UNC conducting extensive field work and data analysis. Review of available data including TDS, pH, SO_4, Mo, Co, U, Fe, and Al, suggests TDS, pH, and SO_4 are indicators of migration. However, localized zones of naturally occurring oxidized pyrite are found in varying concentrations in formations at the site which decrease the pH of groundwaters and naturally produce a heavy metal suite similar to that found in the tailings liquid. In addition, varying amounts of gypsum ($CaSO_4 \cdot 2H_2O$) are found in various formations at the site and could cause local increases of both TDS and SO_4. Additional evaluation of the non-radionuclides is being addressed in the continuing GWDP activities. The radionuclides Thorium-230, Lead-210, Radium-226, and Radium-228 were also evaluated to determine their potential migration from the tailings pond area.

C6.2.5 Extent of Contamination

A progress report of the Church Rock tailings seepage control program

was submitted to NMEID in August, 1981 (SAI, 1981e). This report summarized preliminary analysis of the geologic, hydrologic, and geochemical data gathered up to that time and assessed these data with respect to the migration of contaminants, effects of the seepage control system, and recommendations related to additional work at the site.

The assessment incuded a review of all drilling data including drill cuttings and geologic logs, geophysical logs, and selected rock cores to define mappable stratigraphic horizons. The resulting well construction summaries and structural contour maps along with static water level measurements from individual wells were used to assess, as closely as possible, the effective geologic unit or units that each well was screened or otherwise completed in. The bulk of the data for the over 200 wells can be used to provide an overall assessment related to water quality at the well locations in the assigned units. In some cases, because of variations in well development and screening techniques, wells could not clearly be assigned to a single geologic unit. These wells were classified as "composite" wells.

Following the assignment of the wells to particular geologic units, the water quality data were averaged for each monitoring well plotted on maps, with a separate map generated for each parameter and for each geologic unit. Analysis of these maps revealed the TDS, pH, and SO_4 were the most reliable indicators of contamination. Similar attempts to correlate dissolved metal, radionuclide and trace element concentrations with tailings solution migration were less successful, with the maps showing inconsistent distribution patterns. This discrepancy may result from the chemical interactions occurring between dissolved materials and solids along the flow path. Variations are less likely to be obscured when analyzing solvent components which occur in abundance (SO_4, TDS, pH). In contrast, the concentration of trace-level components (U, Se, Fe) will be highly sensitive to solid-liquid interactions.

The migration of SO_4 is included in the document to illustrate the results of preliminary data suggesting the extent of contamination near the tailings disposal area. It is emphasized that UNC's continuing work at the site is targetted at updating this preliminary evaluation. Figure C6-2 shows the averaged concentrations of SO_4 in wells completed in the alluvium and Dilco/Torrivio aquifers. Figure C6-3 shows average concentration in the Zone 3 and Zone 1 aquifers. Figure C6-4 provides the average concentration in the composite wells. Review of data in the August, 1981 GWDP progress report (SAI, 1981e) for averaged concentration zone maps, as well as time histories of water quality and water level trends and the operational history of the tailings disposal areas suggests the following:

- The area of greatest concern with respect to excursion of SO_4 liquid into groundwater exists in the area immediately to the northeast of the tailings disposal facility (exampled by well TWQ-124). The magnitude and history of water quality deterioration in this area indicates contamination of the Dilco, Zone 3 units, and possibly Zone 1 (SAI, 1981e). (Figures C6-2 through C6-4 show SO_4 concentrations as high as 12439 mg/l in this area).

- The water quality and water level information which was reviewed indicates that little contamination, as evidenced by SO_4 migration, is present in either Zone 3 or Zone 1 in areas north of and including the 400 series pumping wells. The limited number of wells and piezometers which are completed in the Dilco in this area also suggests no contamination of this unit; however, anomalous water quality trends in piezometer TWQ-115D suggest the need for additional investigation of the Dilco in areas adjacent to and south of TWQ-115D (SAI, 1981e). (Four additional wells are planned for completion in the Dilco/Torrivio to the north and east of the north pond to provide this information (Figure C6-1).)

- A trend of improving water quality as one moves on a line from east to west along the north dike and in the 400 series extraction wells indicates that the Pipeline Canyon channel alluvium is a recharge source of high quality water to the Dilco, Zone 3

and Zone 1 units to the northwest of the tailings area. Piezometric surfaces for this area further support this observation. This recharge source is providing diluton of natural and/or induced poorer quality water in these units and restricts contamination movement to a northeast trend (SAI, 1981e).

- The areas immediately north and east of borrow pits 1 and 2 show variable degrees of contamination. Many of the 300 series wells completed directly north of the borrow pits show trends of deteriorating water quality, which indicate a north/northeast component of contaminated groundwater movement. The variability of water quality trends in this area is likely due to time histories of extraction well pumping in this area (well 323A), and "sliming" or fine-grained tailings aggradation in the bottom of the borrow pits tending to reduce seepage rates and proximity to the borrow pit source area. Those wells and piezometers completed to the east or eastern perimeter of the borrow pit area display contamination, but to a lower and decreasing degree than those wells and piezometers to the north of the borrow pits. This lowered degree of contamination along the eastern perimeter of Borrow Pit 2 suggest that:

  (a) shallow alluvial recharge from the east may be providing both a hydraulic head barrier and/or dilution of contaminated water from the borrow pit area, or

  (b) natural attenuation or buffering of contamination from the borrow pit area (SAI, 1981e).

- The magnitude and trends of water quality deterioration to the west and southwest of the tailings area (exampled by GW-1) indicate the potential for some degree of contaminant migration from the central cell or south pond tailings areas or from the dam breach. The incisement of and ultimate filling with alluvium of Pipeline Canyon complicates the conceptualization of potential flow paths across this channel. Limited gèologic information in this area indicates that the Dilco and Zone 3 geohydrologic units have been eroded in this area. The trend of water quality deterioration coupled with the lack of more thorough understanding of the potential geologic and hydrologic

> flow systems in this area indicates a need for additional investigation in this area (SAI, 1981e). (Figure C6-1 shows the location of wells that are presently planned in this area to provide additional information.)

Tables C6.2 to C6.6 provide radionuclide concentrations for wells completed in the alluvial, Dilco, Zone 3, and Zone 1 wells and the composite wells. Inspection of these values shows variations in adjacent wells in each zone. The number and type of these variations make the formation of conclusions as to migrational activities difficult. In general, the highest levels of radionuclide concentrations exist on the borders of the central pond area, especially the northern border of the east borrow pit. There is no indication that migration of radionuclides is more extensive or follows pathways that differ from the migration of SO_4. There is no indication that radionuclides have migrated as far as SO_4 in the northeasterly direction from the north pond. As discussed in Section C6.2.3 above radionuclides are not expected to migrate to the same extent as SO_4 since they tend to be removed from the liquid by coprecipitation with metals, sorbing onto clay particles or metal complexes.

As described in Section B3.2.8, the five monitoring wells sampled as part of UNC's environmental monitoring program (Wells GW-1, GW-2, GW-3, GW-4, and GW-D1) have been consistently less than the MPC's for radiological constituents (Tables B3.11 through B3.21).

C6.2.6 Groundwater Use

None of the formations affected by the contaminant migration are presently being used to a distance of at least two miles from the site vicinity. The alluvial aquifer of Pipeline Canyon downstream of the mill is used for stock watering and domestic use but only at a distance of ten miles from the mill.

Section B3.2 and Tables B3.22 through B.26 presented data related to radiological parameters in five alluvial wells which were sampled both by UNC and the Public Health Service. These alluvial wells were located within 200 feet of the Puerco River. The results of the groundwater sampling as reported by the Public Health Service (1980) were as follows:

- Samples taken on July 18 had gross alpha concentrations between 1.7 and 5.0 pCi/l, gross beta concentrations between 2.8 and 8.9 pCi/l, and sulfate concentrations between 32 and 448 mg/l. These preliminary data indicate no early contamination of groundwater by the river system.
- Measurements taken in September, 1979 from one NMEID test well suggested seepage from the contaminated river into groundwater, as sulfate and uranium concentrations showed increases over previous background levels. These concentrations of uranium and sulfate returned to background levels by October, however.
- Subsequent public well samples have shown no indication of groundwater contamination as of May 2, 1980. Gross alpha, gross beta, and sulfate concentrations for the more recent samples have remained within the ranges reported for July 18, 1979.

Thus, even a spill such as occurred on July 16, 1979 has not had an impact on groundwater use of the alluvial aquifers.

C6.2.7 Projected Impact

At present, contaminant areas occur in the immediate area of the tailings disposal area, as might be expected. High concentrations of radionuclides were found in the wells immediately adjacent to the north pond and the borrow pits. Thorium-230 was especially high with concentrations reaching 5000 to 14000 pCi/l at wells near the north and south of the central cell. However, the radionuclides have not migrated as far as the sulfates due to precipitation,

coprecipitation, and adsorption. The contaminant migration to date has not affected any groundwater users nor is it expected to in future.

The proposed neutralization system is expected to effectively reduce the potential for migration of radionuclides and metals from the tailings disposal area. In addition, continuing efforts by UNC to more exactly define the hydrogeologic and hydrochemical regime in the area will provide further data to identify any other mitigating measures that may need to be taken at the site.

C.7.8

C7.0 ENVIRONMENTAL EFFECTS OF ACCIDENTS

This section addresses consequences of accidents potentially occurring during milling operations, for example:

- Accidents involving radioactivity at the mill;
- Nonradiological accidents at the mill; and
- Transportation accidents involving radioactive and nonradioactive materials, on-site and off-site.

C7.1 MILL AND TAILINGS ACCIDENTS INVOLVING RADIOACTIVITY

C7.1.1 Trivial Accidents

Small leaks or overflows of solutions containing potentially elevated levels of radionuclides are considered to be trivial occurrences that would not result in significant environmental effects because of the low level of radionuclides in the materials handled and because small volumes of solutions released would be totally confined to the mill site. Spills resulting from human error during the filling and emptying of tanks, and failure of valves and piping may occur in uranium mills as frequently as several times per year according to the U.S. Nuclear Regulatory Commission (U.S. NRC, 1977).

C7.1.1.1 Minor Spills

Vessels containing solutions in the grinding and yellowcake precipitation circuits are enclosed in the processing buildings. Spills from the semiautogenous grinder, cyclones, and associated piping system would be collected in floor sumps. The floors of the grinding circuit building are steeply inclined to facilitate collection and washdown. Spilled liquids would be pumped back into the grinding circuit if they are of significant volume. The floors of the building in which yellowcake is precipitated are also sloped and designed to facilitate the control and cleanup of spills.

All leach tanks, counter-current decantation (CCD) tanks, clarifloccu-lator tanks, clarified pregnant solution tanks, raffinate tanks, and solvent extraction tanks are located outdoors as shown in Figure C7-1. Small leaks from these tanks are confined to the immediate vicinity. The area around the tanks is paved and drains to the CCD basement pump-house (sump). This allows spills or washdown material to flow to the drains and then to either be discharged to the holding ponds or to be reprocessed in the mill circuit.

The leach tanks are located within a large recessed area with paved sloping floors which drain to a sump. Leach tank spills would be col-lected from the sump and returned to the process. Spilled material from a rupture of any of the CCD tanks would be retained in the CCD pumphouse basement or the emergency dump pond. Spills would then be returned to the CCD process.

The clarifloccul ator and raffinate tanks are located south of the pre-cipitation building. Drainage of any spills would be to the CCD pump-house basement and returned to the CCD process. The tank containing clarified pregnant solution is located immediately west of the precip-itation building. Accidental spills from this tank would drain to a floor sump at the sand filter area and would be reprocessed.

Solvent extraction tanks are located west of the precipitation building and adjacent to the pregnant solution tanks. The concrete floor around these tanks is curbed on all sides and sloped to drain sumps. This area, plus the lined emergency solvent dump pond, to the west is suf-ficiently large to accommodate the entire volume of three of the extraction tanks.

Another example of a minor spill is a solution spill in an ion exchange (IX) facility. UNC has operated the IX facility at the NECR facility since 1977 and at the OCR facility since 1979. Since the operations began, one spill has occurred at the NECR facility resulting

in the release of about 250 gallons of pregnant solution, 20 gallons of H_2SO_4 acid, and 250 gallons of water. Of these amounts, 150 gallons were contained in a downstream trench, 150 gallons collected in the Radon tank sump, 190 gallons were discharged into the mill circuit feed pump, and 10 gallons were released into the stream. The total amount of uranium (U_3O_8) released was about three pounds into the stream (UNC Internal Memorandum, 1979). A radiation survey in the IX building showed no residual levels above background.

Changes in the NECR drainage system have been made. Currently, if any spill occurs, it will be entirely directed to the sump area within the IX building.

C7.1.1.2 <u>Pipeline Rupture</u>

A pipeline transports slurried tailings from the mill to the tailings area, which is located approximately one-half mile east of the mill. The main pipeline is equipped with alarms, automatic shutoff controls and containment features designed to minimize the effects of any release.

The slurry is discharged from the tailings dike crest or from a cyclone on the far east side of the impoundment. Part of the slurry water is decanted and returned to the mill for neutralization and reuse. Released tailings would tend to accumulate in the immediate spill vicinity. The liquid effluent released would flow towards and be collected in the seepage collection ditch between the embankment and the outward dike and in the emergency pond downstream. Liquid effluent released by a rupture in the decant water pipeline would exhibit similar flow behavior. Released solid tailings and liquid effluent would be recovered and deposited in the tailings pond. The soil in the site vicinity is of an alkaline nature and would tend to neutralize the acidity of the liquid effluent. Any soil and vegetation contaminated by this type of release would be removed and deposited in the tailings pond.

Accidents involving leaks, overflows, or ruptures of vessels containing radioactive solutions and pipeline ruptures on site are considered to be "trivial" by the U.S. NRC (1980) and not worthy of a detailed analysis.

Accident probabilities for these occurrences are not discussed in the U.S. NRC's Final Generic Environmental Impact Statement on Uranium Mining and Milling (U.S. NRC, 1980).

C7.1.2 Accidents Resulting in Small Releases of Radioactivity

Small releases of radioactivity could result from failures of the air pollution control equipment at the yellowcake drying and packaging building, or from a fire or explosion in the solvent extraction circuit. These types of accidents are described in the following sections.

C7.1.2.1 Air Pollution Control Equipment Failure

The dust collection equipment is divided into two separate units:

1. Dust collection for the dryer, and
2. Dust collection for the packaging operations.

The dust collection pick-up point for the dryer dust collection system is at the top of the dryer. The hot dryer gas is passed through a wet dust collector equipped with a set of impingement plates and four sprayers under the impingement plates. The captured and entrained yellowcake dust is dropped at the plenum chamber and recirculated via a sump pump to the second wash thickener feed. Fresh water is added at the impingement plates at approximately ten gallons per minute, and a mixture of eight gallons per minute of fresh water and of two gallons per minute of recycle solution from the collector is added at the sprays for a total flow of 20 gallons per minute feed. Solids are removed from the recycle flow with a dual strainer. One strainer can be cleaned while the other is in service. The gas volume handled by the impingement plate collectors is 7,000 cubic feet per minute.

The dust collection pick-up points for the packaging system are from the yellowcake bin discharge point and the top of the yellowcake bin. The dust collector for this system is a venturi type collector. Feed to the

collector is 15 gallons per minute of collector recycle water augmented by five gallons per minute of fresh water. The flow is introduced tangentially to the collector for mixing with the incoming dust bearing air flow. Approximately 2,000 cubic feet per minute of gas passes through the venturi collector.

A series of interlocks is built in the circuit so that operations stop instantaneously if there is any component malfunction. Consequently, there is little danger of discharging excessive stack emissions. For example, if an exhaust fan stops, it would trigger dryer flame-out. This would also stop the centrifuge operations, screw conveyor, dryer tray rotation, and lump breaker rotation. The same is true with intermediate components. If one goes out of service, operations would cease. Visual and audio annunciators are located in the operator's control room and the dryer flame-out alarms are located in the vicinity of the dryer and at the packaging room. Consequently, the operator would be immediately aware of circuit shutdown.

The U.S. NRC considers the failure of the dust collection system described above to result in only a small release of radioactivity. The two types of failures envisioned by the U.S. NRC are:

- <u>Sudden Total Failure:</u>
  According to NUREG-0706 (U.S. NRC, 1980), quantitative information on this type of failure is unavailable. The probability of such a failure, however, is considered to be extremely remote.

- <u>Gradual Failure:</u>
  A gradual system failure is much more likely to occur than sudden total failures and would be readily identifiable during operational inspections. Probability estimates for this type of failure are not considered to be necessary and are not evaluated by the U.S. NRC (1980) in NUREG-0706.

C7.1.2.2 Fire or Explosion in the Solvent Extraction Circuit

The solvent extraction circuit is outdoors and may contain as much as 10,000 pounds of uranium in solution. The solvent and oil storage building, and the solvent extraction circuit mixer-settlers contain dry water spray fire suppression systems that would be activated in the event of a fire. A wet-type water spray system would handle fires inside the tankage in the solvent extraction area.

From chemical industry data, the probability of a major fire is estimated to be 4×10^{-4} fires per plant year (BNWL, 1973). Two major solvent extraction circuit fires are documented in the literature (U.S. Atomic Energy Commission, 1974). There have been approximately 540 plant-years of mill operation in the United States. Thus, on a per plant basis, the likelihood of a major solvent extraction fire is 3.7×10^{-3} fires per plant-year.

C7.1.3 Events Resulting in Releases of Radioactivity

In the following examples radioactive materials might be released to the environment. Because dispersion characteristics are variable, released radioactivity would not impact the environment uniformly.

C7.1.3.1 Tornado

A tornado passing through the project site could potentially pick up volumes of solutions, ore, and tailings containing elevated levels of the radionuclides and other potentially toxic material and transport them before release. The pick up and release of metal, plastic, glass, and concrete could also result in physical damage to persons and structures in the surrounding area.

The probability of a tornado passing through the mill site during the operational lifetime of the project is extremely low. Using data developed by Thom (1963)for a site in the same general area of New Mexico, the annual probability of a tornado striking a given point in the mill site area was determined as 1.5×10^{-4} tornados per year

(Sohio, 1980). The recurrence interval of such an incident was estimated to be about every 6,700 years and is expected to be of a similar frequency for the UNC site.

C7.1.3.2 Release of Tailings Slurry

Release from the tailings slurry line has occurred on two occassions since 1977 at the site. Data on each of these releases was submitted to NMEID and corrective maesures taken. On September 27, 1977, the tailings line became plugged with tailings. During unplugging operations, the CCD operator inadvertently ran flush water to sections of uncoupled pipe. This resulted in about one ton of tailings and 900 gallons of liquid flowing to the north side of the tailings line, across the land surface towards the arroyo. Part of the flush water and the tailings slimes entered the arroyo. The coarse sand fraction settled on the land surface. Tailings were scraped from the land surface and deposited in the tailings pond. A small but unknown quantity of tailings was released beyond the property boundary in the arroyo.

The second release from the tailings line occurred on September 30, 1978, when a coupling failed and the line separated. About 300 gallons of slurry spilled into the seepage collection ditch. Although the material sprayed over the berm separating the ditch from the arroyo, there was no evidence of tailings flowing into Pipeline Canyon arroyo. The spill material was scraped from the spill area and deposited in the tailings pond.

C7.1.3.3 Tailings Structure Failure

On July 16, 1979, the tailings structure breached. The results of the failure, as well as the clean-up procedures that followed, are discussed in Section C6.1. Compliance with engineering specifications for the original embankment and rebuilding of the structure, at the breach, as well as rigid inspection and surveillance programs, have been part of engineering requirements at the site.

Failures can result from an exceptionally large precipitation event or earthquake. The Church Rock structure has been designed to contain upgradient runoff and has adequate capacity to accommodate the probable maximum flood (PMF) event from internal drainage without overtopping. The tailings area has a system of diversion ditches designed to collect and divert runoff due to heavy local precipitation. The tailings structure has also been designed to withstand the earthquake magnitudes most likely to occur at the site (Section B4.0). The project site is situated in an area characterized by low to moderate seismic activity, and historical earthquakes have generally been of low magnitude and intensity.

A relatively large release of tailings liquids and solids could occur if there was a failure of the embankment. The July 16, 1979, event provides some experience as to the environmental consequences of such an event. In terms of surface water impact, a combination of dilution, sorption and clean-up resulted in surface water concentrations returning to pre-breach levels in a short period of time. The neutralization program should significantly lessen the consequences of surface water contamination. A perhaps inconsequential difference may result from neutralization - in 1979 the acidic nature of the liquid released seemed to have resulted in livestock not drinking the water until pH increased (at which time contamination levels also decreased). Because surface water contamination levels dropped rapidly in 1979, even if livestock used the arroyo for drinking purposes for a short time after the release, there should be no significant consequence, as most water standards are set at levels that presume use at such levels for years, even decades.

Impact on groundwater is also possible. The sampling conducted in wells near the Rio Puerco by UNC since 1979 has not disclosed such impact as a result of the 1979 breach. Dilution and sorption may have played a significant role. The neutralization program should significantly reduce any threat of adverse impact on groundwater. The recycling

program started after the 1979 breach further decreases conceivable impact on both surface and groundwater, because less tailings liquid is present at the site.

The release of solids was confined to the arroyo (particularly at gradient breaks) and its benches, with backup into feeder arroyos. The local population has no constructed residences in such locations, and irrigation farming is not conducted in such locations in the area. In 1979, physical sediment removal was employed. The restricted locations precluded use of large earth-moving equipment. Thus, detailed surveys and sampling, and manpower and small equipment were used. This program appears at this time to have been successful, and no long-term, adverse effects are expected.

It is possible to imagine a huge flood of a highly speculative occurance causing a tailings release. The Applicant considers a pmf event extremely speculative. Even if one were to occur, the tailings liquid would seem an insignificant factor. Further, the huge amount of natural sediment carried and moved by the flood would result in very significant sorption of some elements. The effects on surface water quality would be very small, and the surface water would probably contain much more than 10,000 mg/l TDS in any event. The effect on groundwater would seem even less, because of the additional sorption and dilution involved.

The tailings solids behavior in such an event is not subject to precise quantification, because behavior would depend upon peak flow volume, amount of tailings, contribution from feeder arroyos and other factors. The mixing with other sediments carried by such a flood would be very great, but at least some of the tailings solids would be carried many miles. The mixing that occurs may reduce the tailings to an

insignificant factor. The consequence of such an event may not result in Part 4 standards being exceeded because of the mode of deposition.

Another conceivable but unlikely and highly speculative situation would be one in which the extreme precipitation was so localized that the tailings basin filled with water, resulting in failure. This would require an event larger than the probable maximum precipitation event. In this case, the tailings materials would still follow the course described above, but the distance of transport would be much shorter. In this case, the deposited materials would be more concentrated favoring identification and recovery after the accident.

The transport routes followed by material released as a result of a seismic event would be similar. Tailings released by an earthquake would probably travel a shorter distance due to the smaller amount of water available to help carry the tailings solution. An estimate of accident probability can be obtained from historical mill data contained in NUREG-0706 (U.S. NRC, 1980). The embankment is specifically designed so that failure due to slurry release from the pipeline system and subsequent erosion is considered extremely remote.

Table C7.1, which summarizes the U.S. NRC (1980) data, shows that the average release from tailings failure or from flooding was approximately 1.4×10^7 gallons of liquids and 3.2×10^7 pounds of solids. Eleven of 15 releases for various mills reached a watercourse. Of the 15 recorded incidents, 9 involved dam failure or flooding. Thus, considering the 430 mill-years of operation in the sample period, the likelihood of release from a tailings pond to a watercourse is about 1 to 2×10^{-2} per plant-year. Appendix C.1 contains UNC's contingency plan for a total failure.

C7.2 NONRADIOLOGICAL MILL ACCIDENTS

C7.2.1 Leaks, Ruptures, and Overflows in Chemical Storage Tanks

Various process reagents, including acids, oxidants, flocculants, and solvents are handled and stored at locations throughout the mill. Solution leaks and ruptures from surface chemical storage tanks will have no significant environmental effect because spilled solutions will be confined to the mill vicinity and recovered.

Overflows from chemical storage tanks will be collected by the designed drainage systems surrounding the storage tanks. Recovered solutions will either be stored, disposed of in the tailings ponds, or used in normal mill processes. Chemical explosions, such as those resulting from pressure buildup in the ammonia tank and chemical fires could release toxic material to the airborne environment. The likelihood of major chemical explosives and fires is small due to proper tank design and safety procedures.

C7.2.2 Ruptures in Undergound Water and Fuel Oil Piping

Steel water supply pipelines from the wells and steel fuel oil supply pipelines are buried underground at the site. Water supply pipeline ruptures result in only minor environmental effects because no toxic or radioactive materials are released by a failure in the water piping.

As required by Federal Regulation 40 CFR, Part 112, UNC developed two Spill Control and Countermeasure (SPCC) plans related to the containment of fuel oil or kerosene spilled in the mill site itself (Kaiser, 1977) or into surface waters in the vicinity of the site (SER, 1976). Both plans list the source materials, potential magnitudes and causes, spill containment measures, countermeasures, provisions for inspection, evaluation and instruction of the plan, and maps and drawings with pertinent facilities. Both plans form the basis for handling all types of potential spill-related activities at the site and surrounding vicinity. While they were specifically prepared for oil and petroleum based liquid spills, UNC follows the general approach to handling any spillage in the same manner.

C7.2.3 Other Nonradiological Accidents

Other credible nonradiological mill accidents include electrical power failure, steam boiler failure, overflows from process chemical storage tanks, and minor fires. Electrical power failures and steam boiler failures do not involve toxic materials. The temporary loss of electric power at the mill site would cause no incident more serious than temporary overflow of a tank or vessel. Boiler failure could release low-pressure steam, which could possibly cause injuries to workmen.

Minor fires could result from welding, faulty electrical equipment, or combustion of small quantities of combustible material but these fires would be extinguished quickly. An adequate supply of properly serviced and appropriate fire extinguishers is maintained at the mill site at all times to promote quick containment and arrest of fires. Personnel trained in fire protection and fire fighting are present on-site at all times. All electrical equipment is properly wired and grounded in accordance with the National Electric Safety Code (ANSI-C2).

C7.3 TRANSPORTATION ACCIDENTS

C7.3.1 Process Chemical Shipments to the Mill

Although several process chemicals are shipped to the plant facility, an accident involving an anhydrous ammonia spill is considered the "worst-case" condition for assessing the magnitude of environmental impacts resulting from this type of accident. Based on the annual truck shipment of anhydrous ammonia and the annual number of accidents involving these truck shipments, the estimated frequency of these accidents is approximately 4.3×10^{-6} accidents per mile for an average shipping distance of 350 miles (U.S. NRC, 1980). The data indicate that about 80 percent of the reported accidents involved an average release of ammonia of about 1,700 pounds. Approximately 15 percent of the reported accidents involving an ammonia spill resulted in an injury to the general public, principally to the driver. Using these figures and average pop-

ulation densities, the probability of an injury to the general public as a result of an ammonia shipment by truck is about 4.8×10^{-7} injuries per mile (U.S. NRC, 1980). Assuming that the mill will require 65 ammonia shipments per year from a distance of approximately 400 miles, the probability of an injury to the general public from shipments of anhydrous ammonia to the mill site is estimated to be 0.025 injury accidents per year or one every 80 years.

C7.3.2 <u>Yellowcake Shipments from the Mill</u>

The mill is capable of producing 18,000 pounds per day at full capacity. The yellowcake produced is shipped to Metropolis, Illinois, and Gore, Oklahoma, located about 1,200 and 900 road miles from the mill, respectively. Since the mill began operations in 1977, Metropolis has received about 50 percent of the yellowcake produced and Gore has received the other 50 percent.

Yellowcake is packaged for shipment in 55-gallon steel drums. These drums are considered to be Type A packaging according to 10 CFR Part 71 and 49 CFR Parts 171-189 (CFR, 1977a and b). Historically, about 90 truck shipments of yellowcake are made per year, half to Gore and half to Metropolis. The occurrence probabilities and environmental effects of yellowcake transportation accidents and remedial action to be taken in the event of a yellowcake accident, are discussed below.

The probability of yellowcake release to the environment during transport depends upon the number of shipments made per year, mileage traveled per shipment, and probability of truck accidents of sufficient severity to release the contents. The annual overall probability of a truck accident is estimated to range from 1.6×10^{-6} to 2.6×10^{-6} accidents per mile (U.S. NRC, 1979a). Based on the maximum probability rate of 2.6×10^{-6} accidents per mile, an accident involving yellowcake shipments to Metropolis would be expected about every 7.2 years (0.14 per year) and about every 9.6 years (0.11 per year) for shipments to

Gore. The probability of such an accident occurring within the boundaries of New Mexico would be once every 20 years (0.05 per year). These figures were calculated by multiplying the number of shipments, miles traveled during shipment, and the accident rate per mile.

The probability of occurrence of accidents that release yellowcake to the environment is much lower. Table C7.2 lists the fractional occurrence probabilities of truck accidents and package release fractions for eight accident severity categories developed by the U.S. NRC (1980). These probabilities and release fractions have been used by the U.S. NRC in the assessment of the probabilities and environmental impacts of yellowcake transportation accidents. The eight severity categories are distinguished on the basis of the combined impact, puncture, crush, and fire that could result from various transportation accidents. Two accident models for package release fractions are applied to the eight severity categories. Total loss of the drum contents is assumed for Model I releases, whereas, partial drum content loss based upon empirical data is assumed for Model II releases. According to the U.S. NRC (1980), the probability of an accident of sufficient severity to release yellowcake is estimated to be 0.45. The probability of a yellowcake transportation accident of sufficient severity to release yellowcake is therefore estimated to be 0.063 per year to Metropolis, 0.05 per year to Gore, and 0.025 per year within New Mexico. During the 20 years of mill life, the probability estimate indicates that a transportation accident releasing yellowcake would occur once during shipments to Metropolis and would not occur for shipments to Gore or within New Mexico. The probability of a direct yellowcake spill into a lake or stream for yellowcake transport to either destination would be extremely low due to the proportion of intersections of flowing streams or standing water bodies with the transportation routes.

The expected fractional release for a given yellowcake transportation accident is 0.45 for Model I and 0.03 for Model II (U.S. NRC, 1980). These fractional losses are determined by integrating the fractional

occurrences and release fractions of Table C7.2. Yellowcake releases of eight tons for Model I releases and 0.5 tons for Model II releases are estimated for UNC yellowcake transportation accidents based on 18-ton shipment size and the U.S. NRC fractional package loss estimates.

Yellowcake released from the rupturing of drums would likely be deposited directly on the ground. Some yellowcake could possibly be released to the atmosphere in the initial puff. Some of this may be transported from the scene of the accident by wind. Yellowcake released into a stream or a standing water body would become part of the suspended particle fraction and would tend to settle because of its insolubility and high density. The major exposure pathway to biota from released yellowcake would be by inhalation of airborne particulates due to its insolubility and low specific activity.

Battelle Northwest Laboratories has developed expressions for the dispersal of material similar to dry yellowcake to the environment based on actual laboratory and field measurements over several years (U.S. NRC, 1980). Assuming a wind speed of 10 miles per hour, 24-hour release time, and a low population density of 7.5 persons per square mile, the consequences of a truck accident involving a shipment of yellowcake from a mill would be a 50-year dose commitment of approximately 9 and 0.7 person-rems to the lungs of the general population for Models I and II (U.S. NRC, 1980). A 50-year dose commitment of 200 (Model I) and 14 (Model II) person-rem would be received in an area with a population density of 160 persons per square mile. In September 1977, a truck from a mill overturned and released an estimated 7,000 pounds of uranium concentrate to the truck trailer and ground. This accident was calculated to result in a release of 24 kg (53 pounds) of U_3O_8 and a consequence of 1.2 person-rem in the area where the population density was 2.5 persons per square mile (U.S. NRC, 1980).

If yellowcake is spilled on land, it can be detected with sensing equipment, isolated, and removed. Small amounts of topsoil and vegetation

may also need to be removed to ensure that radiation levels are comparable to background radiation levels. Yellowcake released into water bodies would be recovered, if not significantly dispersed. Significantly contaminated sediments would also be removed from the water body. Appropriate state and federal agencies would be immediately notified.

C.7.4 CONTINGENCY RESPONSE PLANS

Appendices C.1 and C.2 contain UNC's contingency response plans in the event of a tailings failure and a yellowcake transportation accident occurring in New Mexico, respectfully. The yellowcake transportation accident response plan has been developed in conjunction with two other uranium operators in the Gallup/Grants region.

C.8.0

C8.0 MONITORING

C8.1 RADIOLOGICAL MONITORING

C8.1.1 Introduction

UNC has established and maintains radiological monitoring programs, many of which include preoperational phases. This section describes the current monitoring programs, including sampling locations and methods. Most of these programs have changed over time with the use of updated equipment and new sampling sites. Former sampling methods are described briefly in the footnotes of the data tabulations referenced in the subject headings of each of the following subsections. The current monitoring program is designed to meet NMEID requirements related to UNC's mill license. These programs are summarized in Tables C8.1 and C8.2, including perimeter environmental monitoring and occupational environmental monitoring.

The environmental monitoring program was expanded after the July 1979 breach to include surface water, alluvial wells, vegetation, sediment, and air particulate monitoring in areas downstream from the mill site (Table C8.3). Data obtained from the monitoring programs are tabulated in Appendix D (Environmental), Appendix E (Mill and Occupational), and Appendix F (Breach-Related Monitoring Program). Additional monitoring data were also presented in Section C3.0. UNC safety procedures, and the sampling procedures for all monitoring programs for which sampling is not contracted out, are given in Appendix G. This appendix also includes standardized data and calculation sheets for the respective monitoring programs. Current and past analytical methods and the lowest limit of detection (LLD) for each method used by the Radiological Laboratory on the Church Rock site are given in Appendix H. Specifications for the monitoring equipment used or administered by UNC personnel for radiological monitoring are given in Appendix I. These data are prepared by the equipment manufacturers.

C8.1.2 Environmental Monitoring

C8.1.2.1 Air Quality (Appendix D, Tables D-1, D-2, D-3, and D-4) Radiological emission of particulates or radon emissions by a uranium mill affect the dosage to any individual at the perimeter of the mill complex. For this reason, air quality monitoring at the periphery of the UNC Church Rock site includes several components:

- o Dryer and packaging stacks monitoring,
- o Suspended particulates - Low-volume continuous air samples,
- o Ambient radon monitoring (track-etch), and
- o Continuous gamma monitoring - Thermoluminescent dosimeter (TLD).

The stack monitoring program began at mill startup, but the current program has evolved since that time. Currently, each stack is monitored quarterly for Unat, Ra-226, Th-230, Pb-210, and Po-210. Three different samples are collected for each stack. Sampling methods are described in the USEPA's Method 5 for stationary sources (USEPA, 1977b). Dryer and packaging stacks are sampled on 32- and 4-point traverses, for 2 and 15 minutes per point, respectively, for a total of about one hour for each sample. Sampling, analyses, and calculations are performed for UNC by Kramer, Callahan and Associates of Albuquerque. Stack locations are shown in Figure C4-2. Other stack monitoring has not been instituted because the permit granted to UNC by NMEID via letter (Neal, 1975) accepted the air quality monitoring program proposed in the UNC permit application.

Suspended air particulates (low-volume continuous air samples) are monitored at six locations at the perimeter of the mill complex, as well as at two locations upwind from the mill site (based on prevailing wind directions). The six perimeter locations are shown in Figure C8-1 (Sites A through E). Site A is close to the nearest continuously occupied residence. Site B1 is a nearby workplace (Kerr-McGee property)

downwind from the site. Site C lies about 150 feet east of the eastern edge of the tailings impoundment facility. Site D lies to the southeast of the tailings impoundment. Site E is near the south end of the tailings dam, and Site F lies north of the tailings impoundment. Site OCR-IX is at the OCR Ion Exchange Plant, about three miles southwest of the mill. Springstead, a background site, is at the sewage treatment plant at the Springstead Trailer Park. Currently, air samples are collected continuously at 60 liters per minute using the RAS-2 pump (Appendix F). Filters (0.2- to 10-μm pore size) are changed weekly and composited quarterly. Analyses are performed at the mill by trained staff. Total suspended particulates, Unat, Ra-226, Th-230, Pb-210, and Po-210 are the parameters currently monitored.

Ambient radon is also monitored at the low-volume continuous air sampling sites mentioned above and shown in Figure C8-1. Terra-dex Type F Tracketch alpha particle detectors are employed (Appendix F), and Terra-dex Corporation (Walnut Creek, California) performs the analyses. UNC requires a sensitivity of 0.2 pCi/l per month for the analyses. The Type F detector is a cup-mounted detector with a filter so that only radon is measured. Currently, detectors are analyzed monthly. Environmental gamma radiation is continuously monitored by the use of TLD's located at the eight air quality monitoring sites. TLD's are supplied and analyzed by Eberline Instruments Corporation, Santa Fe. Type 100 Lithium Fluoride TLD's are used. TLD's are sensitive to 1 mrem gamma and are exchanged quarterly.

C8.1.2.2 Water Quality (Tables B3.7 through B3.13 and B3.17 through B3.21 and Appendix D, Table D-5)

Ground- and surface waters have been sampled and analyzed at UNC since 1977 and 1975, respectively. Groundwater is sampled quarterly at five locations shown in Figure C8-1. Analyses for Utot, Ra-226, and Th-230 are currently performed at UNC Church Rock by qualified personnel. Sampling and analytical methods are detailed in Appendices G and H.

Surface water samples are also collected quarterly at two sites. One of these sites (SW-3) is shown in Figure C8-1 near the mill complex at the Pipeline Canyon arroyo. SW-5 is about five miles downstream from the mill on North Fork Puerco River. Sample collection and analysis methods are included in Appendices G and H. Currently, Utot and Ra-226 are monitored.

In addition to the sampling sites detailed above, drinking water from a deep well tapping the Westwater Canyon Formation is monitored annually for gross alpha, Utot, and Ra-226. This is the drinking water source for the mill and for the mine.

C8.1.2.3 Vegetation (Appendix D, Table D-6)

Dried samples of vegetation are monitored for Unat, Ra-226, Th-230, Pb-210, and Po-210 on an annual basis. Samples are collected from 20- by 20-foot areas east and north of the tailings impoundment as shown in Figure C8-1. These areas are downwind (based on prevailing wind directions) of the mill and tailings facilities. These sites have been sampled since 1980. Before 1979, vegetation was sampled at five sites surrounding the mill (Table D-6, Appendix D). These samples were analyzed for gross alpha, gross beta, Utot, Ra-226, and Th-230. In response to the 1979 tailings spill, UNC performed vegetation sampling and analysis at 10 locations along the Pipeline Canyon arroyo and the Puerco River downstream from the spill (Section C8.1.4.4).

C8.1.2.4 Soils (Appendix D, Table D-7)

Currently, soil samples are collected annually from eight sites located near the air quality monitoring stations mentioned in Section C8.1.2.1. Soil is monitored for uranium, Ra-226, Th-230, Pb-210, and Po-210. Current sampling and analysis methods are given in Appendices G and H. The original 1976 to 1978 soil sampling locations were not continued after 1979. The locations of the earlier sampling sites are given in Table D-7 of Appendix D. During 1979, a cooperative program between UNC and

NMEID was established to provide background radiological parameters for soil in the Pipeline Canyon arroyo. During this program, 48 different soil samples were collected and analyzed, and mean background values were calculated by Battelle Pacific Northwest Laboratories (BPNL) for Utot, Ra-226, Th-230, and Pb-210 (Table D-7, Appendix D).

C8.1.3 <u>Occupational Monitoring</u>

Routine monitoring in the mill includes radon daughter working levels, continuous gamma exposure (TLD), instantaneous gamma exposure, mill alpha surface measurement, and airborne particulates (low-volume air sampling). Personnel TLD's are worn by selected mill employees. Bioassays (urinalyses) are performed on selected employees, particularly those working directly in yellowcake areas. Employee inhalation exposure to uranium is calculated on a quarterly basis for those employees exposed to yellowcake dust. Data summaries are included in Appendix E. Locations of the regular monitoring stations in the mill complex are shown in Figure C8-2. Methods used in mill sampling are included in Appendix G. Analytical methods used by the Radiological Laboratory on site are given in Appendix H. Manufacturers' specifications for instruments used or administered by UNC for radiological monitoring are included in Appendix I.

C8.1.3.1 <u>Suspended Particulates Monitoring - Low-Volume Air Sampling (Appendix E, Table E-1)</u>

UNC performs low-volume air sampling at 10 locations in the mill on a monthly basis. Samples are collected for a minimum 60 minutes at a pump rate of 30 liters per minute using the RAS-1 pump (Appendix I). Filters are counted in the radiological laboratory on site. Samples are monitored for Utot. Other locations have also been sampled, although not regularly. Earlier low-volume air samples were monitored for gross alpha and gross beta, as well as for uranium.

C8.1.3.2 <u>Radon Daughter Working Levels</u> (Appendix E, Table E-2)

Radon daughter working levels (WL's) are monitored at five locations in

the mill on a monthly basis. Several other locations are monitored on an irregular basis. Since September 1980, WL's have been determined by an MDA Instant WL Meter (Appendix I). Accuracy at 0.01 WL is expected to be ±10 percent (Brough, 1981). Annual exposure to workers due to mill WL's is not calculated because WL's do not approach the 0.33 WL standard (10 CFR 20, Appendix B), except as noted in Section C4.3.

C8.1.3.3 Mill Alpha Surface Measurements (Appendix E, Table E-3)
Mill alpha surveys are conducted monthly, or more frequently, at several locations throughout the mill. No locations have been regularly monitored since 1977. Sites are chosen based on suspected contamination. Alpha radiation is measured by means of a Ludlum alpha scintillometer (Model 43-5) and Geiger counter (Model 2) (Appendix I). The scintilometer is sensitive to 0.1 mrem per hour alpha radiation. Surface smears are collected in a 36-square-inch area if the counter value is 100 cpm or greater. Measurements are made in the UNC laboratory.

C8.1.3.4 Instantaneous Mill Gamma Monitoring (Appendix E, Table E-4)
Mill gamma is currently monitored at approximately 116 locations in 16 areas in the mill on a monthly basis. These locations are shown in Appendix G, Item EMP 6. Gamma radiation (mrem per hour) is measured by means of a Ludlum Model 19 mrem low-level gamma radiation meter (Appendix I). This instrument is sensitive to 20 mrem gamma per hour. The data summary in Appendix E includes only means and standard deviations for measurements made.

C8.1.3.5 Continuous Gamma Radiation Monitoring - TLD (Appendix E, Table E-5)
TLD's are located throughout the mill, in addition to control TLD's stored at the administration building. The TLD monitoring program includes 14 TLD's exchanged on a monthly basis and 10 TLD's at different locations exchanged on a quarterly basis. These locations are listed in Table E-5 of Appendix E. Lithium Fluoride TLD's (Type 100) are employed

and are supplied and analyzed by Eberline Instrument Corporation, Santa Fe. Dosages are provided in mrem per period of exposure. The TLD's are sensitive to 1 mrem gamma.

C8.1.3.6 Personnel TLD Monitoring of Mill Employees (Appendix E, Table E-6)

Skin and whole body doses of gamma radiation (mrem gamma per period of exposure) for employees of the UNC Church Rock Mill are determined by personnel TLD's, supplied and analyzed by Eberline Instrument Corporation. TLD's are worn on workers' lapels, shirts, or taped to the inside of plastic hard hats. The TLD's are exchanged quarterly.

C8.1.3.7 Inhalation Exposure (Appendix E, Table E-7)

Inhalation exposure to uranium, for personnel in contact with yellowcake dust, is a calculated value determined by multiplying air particulate data for uranium in several work areas by the time each employee worked in these areas of the mill. The worker time is determined by employee time cards. This exposure quantity is determined in mrems on a quarterly basis for each individual.

C8.1.3.8 Bioassay (Appendix E, Table E-8)

Currently, bioassays are performed biannually on selected employees of the mill with analyses performed fluorometrically by Core Laboratories, Albuquerque. Bioassay data indicate the total uranium concentration in the urine of workers.

The inhalation exposure and bioassay programs were initially focused on the entire mill population. Subsequently, they were modified to include reporting to NMEID only those exposures in excess of the limits specified in 10 CFR 20.103 or the more strict limits voluntarily established by UNC. Sampling is done of those individuals who work in areas that have the greatest exposure potential. This includes about 10 percent of the working force in the mill. The exposure limits established by UNC are 0.075 rem per quarter or 0.015 rem per day. Exposures below these cutoffs are not reported, but are kept on file.

C8.1.4 Spill-Related Monitoring

After the July 1979 breach, special monitoring programs were begun to assess the spill impact. These include:

- o Suspended particulates - High- and low-volume continuous air sampling downstream from breach,
- o Surface water monitoring - Upstream, along, and downstream from breach,
- o Alluvial well monitoring - Downstream from breach,
- o Vegetation monitoring - Downstream from breach,
- o Ambient radon activity monitoring (by NMEID-Milan), and
- o Sediment monitoring.

C8.1.4.1 Suspended Particulates - Air Sampling (Appendix F, Table F-1)

Currently, three sites along, or near, the Puerco River are sampled for air particulates. At two stations (Pinedale Road and 16K-336), three-hour samples are collected twice monthly with the Staplex high volume air sampler at 840 liters per minute pump rate. At Gallup, air samples are collected continuously at 60 liters per minute using the RAS-2 pump. Gallup samples are composited monthly from filters collected weekly or biweekly. Samples are monitored for Unat, Ra-226, Th-230, Pb-210, and Po-210. Site 16K-340 was monitored from Sepember 1979 to September 1980. As the Puerco River cleanup was occurring, suspended particulates were monitored near the cleanup activity. This monitoring also has been discontinued. Site descriptions are listed in Table F-1 of Appendix F.

C8.1.4.2 Surface Water (Section B.3, Tables B3.9 to B3.13)

Five surface water stations, including one upstream and four downstream from the mill complex, are sampled quarterly. Samples are currently analyzed for Utot and Ra-226. Sample collection and analysis methods are included in Appendices G and H. The five sites, "Above the Falls"

and RWS-25 to RWS-28, are described in Section B3.1, Tables B3.9 toB3.13.

C8.1.4.3 Alluvial Wells (Section B.3, Tables B3.22 to B3.26)
Since the breach, wells in close proximity to the Puerco River (within about 200 feet) have been sampled to assess the radiological impacts of the spill on local drinking water. A total of five wells (16T-339, 16K-340, 16K-336, Parker Springs, and Sunnyside) are monitored in this program. Water samples are collected quarterly and analyzed for gross alpha, Utot, Ra-226, Th-230, and Pb-210. Sampling methods and analytical techniques are summarized in Appendices G and H, respectively. Well locations are given in the footnotes of the above-referenced tables. These wells were also sampled from July 1979 to May 1980 by the Public Health Service (1980).

C8.1.4.4 Vegetation (Appendix F, Table F-2)
After the spill, 10 vegetation samples were collected within the banks of the arroyo from the point of the spill to the Puerco River at the Arizona state line, in five-mile intervals. These samples were considered sufficient by NMEID to meet the 1979 annual vegetation monitoring requirements by UNC. These samples were analyzed for Utot, Ra-226, Th-230, and Pb-210. Sample collection and analysis methods were much the same as those used in the regular environmental monitoring (Appendices G and H). This monitoring program has been discontinued.

C8.1.4.5 NMEID Ambient Radon Monitoring (Appendix F, Table F-3)
NMEID-Milan has performed a monthly survey of ambient radon at two sites downstream since the spill and at seven sites on the perimeter of the mill complex since July 1980. These sites do not correspond with UNC sampling sites. Air sampling is by means of tedlar bags whereby a sample is collected continuously for 48 hours. This sample is subsequently analyzed for radon by the Lucas chamber method.

C8.1.4.6 Sediment Monitoring
UNC has been collecting sediment samples downstream from the spill along the North Fork Puerco River and the Puerco River since the breach.

Currently, the sampling is done about annually in response to requests from NMEID. Most recently, in 1981, sampling was done at 124 specific staked locations to a distance of about 25 to 30 miles downstream from the mill. Analyses of the sediment are currently done by BPNL for U-238, Ra-226, Th-230, and Pb-210. Results of the recent sampling are currently being finalized for distribution (BPNL, 1981). Section C6.1 addresses preliminary results from the sampling data.

C8.1.5 Tabulated Values

The tables presented in Appendices E, F, and G are summaries of the radiological monitoring data collected and kept on file by UNC. The data were not statistically reduced for this document. The instantaneous mill gamma survey is an exception in that the 116 values collected monthly were reduced to mean values for each of the 16 mill areas where the data are collected. Multiple ambient radon values, using the Lucas chamber method, have also been statistically reduced for each site.

The use of "less than" values on these tables requires explanation. "Less than" values have historically been used when the concentration of a constituent was below the analytical sensitivity and the use of zero was unwarranted. These levels will fluctuate over the period of time in question as the result of modifications in procedures or as the result of variations in sensitivity due to other factors such as age of reagents or sampling standards.

C8.2 WATER QUALITY

Nonradiological water quality monitoring is performed by UNC at the Church Rock facility. This information is included in UNC's GWDP (SAI, 1980a) and is being updated by UNC on a periodic basis.

C8.3 METEOROLOGICAL MONITORING

Meteorological and climatic conditions at the site are based on data gathered by UNC at the mill and by the National Weather Service (NWS) in Gallup, New Mexico. Descriptions of these stations are contained in

this section as well as a discussion of sampling methods and calculation procedures.

C8.3.1 Meteorological Monitoring Stations

The locations of the meteorological monitoring stations are shown in Figure C8-3. UNC operated a meteorological station at the Church Rock site, collecting wind speed and wind direction data for approximately one year from May 1977 to April 1978.

The NWS operates a meteorological station at the Gallup, New Mexico Airport, collecting data on wind speed, wind direction, atmospheric stability, temperature, and precipitation. The Gallup station is approximately 16 miles southwest of the site. The elevation of the station is at approximately 6468 feet whereas the UNC mill is at approximately 7000 feet. The terrain is rough with steep walls lining the valley which runs northeast from the meteorological station at Gallup to the site.

C8.3.2 Meteorological Monitoring Methods

Wind speed and wind direction are monitored by an anemometer and a weather vane, respectively, at the Gallup station, as they were at the on-site station. The Gallup station takes hourly readings while the on-site station monitors wind continuously.

Atmospheric stability at Gallup is determined by the solar insolation method. For a certain percentage of cloud cover, an atmospheric stability classification is assigned according to the Pasquill Method (Pasquill, 1964). Cloud cover observations are estimated by a trained meteorologist simultaneously with the hourly wind speed and wind direction observations at Gallup.

Temperature is measured at Gallup by an aspirated thermometer shielded from direct solar radiation. Precipitation is monitored by the tipping bucket rain gage which is capable of measuring rain as well as snow and sleet.

C8.3.3 Calculation Methods

The joint frequency distribution table referenced in Section B2.1 was derived from eight daily observations of wind speed, wind direction, and atmospheric stability taken every three hours at Gallup from 1976 through 1980. The number of individual events associated with each of these three parameters was compared to the total number of observations and a frequency array was constructed. Table B2.1 contains this information.

C9.0 LONG-TERM IMPACTS

C9.1 INTRODUCTION

UNC is conducting some interim stabilization and reclamation which is detailed below. The NMEID has recently adopted amendments to the radiation protection regulations related to stabilization as soon as practicable after final inactivation of the facility. This long term stabilization is also discussed below.

C9.2 INTERIM STABILIZATION AND RECLAMATION

C9.2.1 Ongoing Programs

UNC is currently conducting reclamation activities on the areas that have been reseeded as shown on Figure C9-1. In September of 1980, 105 acres in the tailings vicinity were reseeded to a mixture of wheat and native grasses. The wheat was planted with a seed drill while the native grasses had to be planted with a broadcast seeder due to the fine size of the grass seed. In July of 1981, north area roadways were ripped using a bulldozer equipped with ripper shanks and seeded with 0.1 pounds per acre of Alkali Sacaton, 4.0 pounds per acre of Arriba Western Wheatgrass and 3.0 pounds per acre of Sodar Streambank Wheatgrass. This mixture was planted with a seed drill to a depth of about 1/2 inch.

During construction, areas around the mill were scraped, by necessity, to the bare soil. The existing cover is sandy soil. Therefore, a revegetation program was devised in order to help minimize soil loss due to wind and water erosion.

Following a field reconnaissance in the spring of 1977, the Soil Conservation Service identified five "Critical Treatment Units" (CTU). Specific recommendations were developed with respect to seeding mixtures, techniques, and rates for each unit (UNC, 1977). The CTU's and treatment, if any, were as follows:

Critical Treatment Unit No. 1 - This unit is a 19.5 acre area along Pipeline Canyon which was stripped for additional cover over the El Paso Natural Gas lines. It was seeded using a seed drill and a mixture of the following grass species: 6.7 pounds per acre of Barton western wheatgrass, 218 pounds per acre of Greenar intermediate wheatgrass, and 2.8 pounds per acre of Luna pubescent wheatgrass. This mixture should show fast initial growth from the intermediate and pubescent wheatgrass with the western wheatgrass forming the majority of growth in the second year.

Critical Treatment Unit No. 2 - This unit is 12.5 acres of riparian and streambed between the East Section fence and the waterfall. Broadcast seeding of Ioreed reed canarygrass at 14.6 pounds per acre was recommended to stabilize the streambanks and help prevent erosion at the toe dam. This unit has not been seeded to these species to date because natural revegetation has adequately protected this area.

Critical Treatment Unit No. 3 - This unit consists of 53 acres of slopes and flats which make up part of the tailings embankment and tailings area. Because of the steep slopes of the embankment, the following seeding mixture and rates were recommended: 17.8 pounds per acre of western wheatgrass, 2.8 pounds per acre of intermediate wheatgrass, and 2.4 pounds per acre of pubescent wheatgrass. The vegetative cover will assist in holding the soil in place and retaining soil moisture. This unit was seeded, mulched, and fertilized using a hydromulcher, giving the slopes an immediate cover and a protective, nutritive medium in which the seeds could quickly germinate.

Critical Treatment Unit No. 4 - This unit consists of two acres of slopes within the mill site which was seeded with 22.2 pounds per acre of western wheatgrass. A sprinkler system was used to aid in plant development and help sustain vegetative cover.

Critical Treatment Unit No. 5 - This unit is 22 acres of slopes on the exclusion dike and ditch around the tailings. It was hydrosprayed with the same seeding mixture and rate as CTU 3.

In addition to the seed described above, soil stabilizers have been used on test plot areas for the reduction of fugitive dust and blowing tailings. The results of the soil stabilizers are continually being evaluated in terms of long-term and cost effectiveness. Soil stabilizers currently being tested are Coherex, Dowell M-166, Soil Sement, Nalco 8820, and Curasol. Thus far, visual observations indicate that Soil Sement, Nalco 8820, and Coherex have been effective at controlling dust. However, these observations were made under dry conditions and need to be inspected further under wet conditions. The areas where the soil stabilizers have been used are shown on Figure C9-1.

C9.2.2 Planned Programs

Depending upon the characteristics of the areas which are disturbed or exposed during the milling operation, UNC will evaluate the need for continuing the procedures discussed above. A description of any additional interim stabilization activities will be provided to NMEID upon implementation.

C9.3 DECOMMISSIONING

The Applicant will give NMEID 30 days notice prior to vacating the premises. A general approach to decomissioning of the UNC's mill facility property is set forth below on a preliminary basis.

Material and equipment that can be economically decontaminated will be salvaged for resale. The determination of the material or equipment that will be considered for salvage will be made at the time of cessation. Buildings, concrete structures, and other ancillary facilities and equipment that cannot be economically salvaged will, where appropriate, be removed from the facilities area and deposited in the tailings disposal area. Concrete and other material suitable for use as rip rap will be

placed on the embankment for protection against 100-year or 200-year recurrence flood events.

Near the end of the useful life of the mill, UNC will submit a detailed decommissioning plan to NMEID. The detailed plan will include data from radiation surveys taken at the site and plans for any practicable mitigation measures identified by the survey.

C9.4 DECONTAMINATION

This section describes the general approach likely to be followed for decontamination.

After any removal of buildings, tanks, and ancillary facilities, a radiological survey will be conducted to determine the levels of radioactivity in soils from the vicinity of the milling operation. The objective of the radiological survey would be to delineate those areas where soil might be removed. Soil material removed would be disposed of in the tailings area.

C9.5 FINAL STABILIZATION AND RECLAMATION

UNC's long-term stabilization and reclamation plan for the tailings area provides for the placement of soil and soil/rock cover over the area on which tailings have been deposited and the grading of the embankment so that no slopes exceed 5H:1V. Most slopes will be 10H:1V or less steep. The areas to be considered in the restoration plan include the tailings disposal area, facilities area, and cover material stockpile. Estimated costs for restoration are also included for surety arrangements. Plans for an attempt at revegetation are also included.

UNC has developed the stabilization plan in accordance with NMEID's rules and regulations to show the procedures that will be used during final stabilization and reclamation. The following sections are included:

- Affected areas
- Contouring plan for affected areas

- o Cover material placement
- o Stabilization plan
- o Peak discharge for the 200-year flood event
- o Erosion control
- o Monitoring program
- o Estimated cost for restoration

C9.5.1 Affected Areas

The existing area to be stabilized (approximately 211 acres) is comprised of the three cell areas and two borrow pits in the general tailings disposal area, the facilities area, and the cover material stockpile area as shown on Figure C9-2. The area upon which tailings are presently deposited is about 100 acres. The general tailings disposal area comprises 86 percent (181 acres) of the affected area. The facilities area comprises 10 percent (21 acres), and the cover material stockpile area comprises 4 percent (9 acres). These areas contain relatively flat topography with the exception of the tailings disposal area containment dikes.

C9.5.2 Contouring Plan for Affected Areas

Prior to stabilizing the tailings, the tailings must be in a dry, stable condition. The drying process involves the removal of free ponded water and removal of the water trapped in the pore spaces between the tailings particles. The first step of drying will be achieved by solar evaporation. The second step is more complex and involves solar evaporation, capillary action, and downward percolation to aid in the removal of the trapped water. The critical aspect of this removal occurs near the surface when the fine-grained or slimes portion of the tailings gain sufficient strength by crust development to support the load of heavy equipment. The time involved in this development prior to cover material placement is anticipated to be on the order of several years.

Figure C9-2 shows the existing affected contours and plan view of cross section locations that were developed across the tailings disposal area. Figure C9-3 provides a cross sectional view of the south cell with the main dike cut to establish 5H:1V slopes and cover material placement. Figures C9-4 and C9-5 provide cross sectional views of the central pond,

north pond and borrow pits 1 and 2 with dike cuts and fills and cover material placement. Figure C9-6 shows the postmilling recontoured area of the tailings disposal area.

Contours within the facilities area during postmilling reclamation will remain essentially the same as the contours which now exist. The area will be graded to provide drainage and reduce possible depressions. The cover material storage stockpile area will be graded to tie into existing contours and provide drainage.

C9.5.3 Cover Material Placement

Upon completion of the grading (cut-and-fill) of the dike areas, cover material will be placed over the tailings ponds (143 acres) as shown on Figures C9-3, C9-4, and C9-5. Approximately 509,000 cubic yards (cy) of cover material will be obtained from the stockpile and materials removed from the main dikes during cut and fill operations associated with creating the maximum 5H:1V slopes (Figure C9-2). Approximately 367,000 cy will be obtained from the stockpile and the remaining 142,000 cy from the materials removed from the main dikes. Cover material will be replaced when in a dry enough state to avoid excess compaction. Material will be placed in two, ten inch horizontal lifts and one, six inch compacted 80 to 85 percent Standard Proctor density. Following placement and compaction of the third lift, the surface will be scarified on the contour to reduce erosion and increase precipitation infiltration during the time period between cover material placement and seeding-mulching operation.

Because the surface of the tailings as deposited will be relatively flat, the slope of the stabilized area directly over tailings will be 6 percent or less; mostly 3 percent or less. Because of the very gentle slopes directly over tailings, the soil cover directly over the tailings will be 26 inches. After stabilization, there will be slopes up to 5H:1V in steepness on the embankment forming the west margin of the tailings. The thickness of the soil of the embankment after stabilization between the surface of the embankment and the tailings measured by a line

perpendicular to the sloping surface of the embankment after stabilization is quite large; generally a minimum of 15 feet and increases downslope.

C9.5.4 Stabilization Plans

The grading plan provides for slopes no greater than 5H:1V with the majority of the area containing very gentle slopes. In general, vegetation is more readily established on gentle slopes than on steep slopes, other factors remaining constant. The following discusses procedures that will be used in attempting to encourage vegetation growth on stabilized areas.

It should be noted that some argue that stabilization of mill tailings is not aided by vegetative growth. The arguments against vegetation are that it encourages browsing animals to seek access to the covered tailings, and that such animals will be a disruptive factor. It is further argued that if plants become established, when they ultimately die their root system will decay and provide a potential pathway for increased radon emanation. The arguments for vegetation include increased resistance to erosion forces and aesthetic considerations. Those favoring vegetation argue that under the 1978 Uranium Mill Tailings Radiation Control Act, the ownership of the tailings after stabilization will pass to the State of New Mexico (or, conceivably, the Federal Government), that the property will be fenced at the time of stabilization, and that New Mexico will have a large continued care fund. Because of these factors, the argument goes, browsing animals will be easily prevented from visiting the site. It is further argued that browsing animals will not cause significant damage in any event. The argument is also made that radon releases through root passages is not significant in terms of health.

On balance, the Applicant believes it is better to make some attempt to encourage vegetative growth. However, the stabilization plan is not dependent upon the success or failure of efforts to encourage vegetation.

C9.5.4.1 Fertilization

A soil investigation will be conducted prior to attempts at encouraging revegetation. Results of the soil analyses will allow determination of the amount of nutrients contained in the replaced cover material. Random samples will be taken from the three affected areas to determine requirements for the following:

- available nitrogren (N) for seed germination and plant development;
- available phosphorus (P_2O_5) to stimulate root development and plant growth;
- available potash (K_2O); and
- organic matter.

It is anticipated that effective seeding of permanent vegetation will be conducted between mid-June and late July in order to allow sufficient time for germination and establishment before frost. These seeding dates coincide with the most favorable moisture and temperature situations during the year at the site. If conditions are not optimum, a preparatory crop such as barley or some other annual crop will be planted. If a preparatory crop is used, a split application of nitrogen will be used. The first application will be applied after seedbed preparation, in advance of spring or fall planting, and the second applied prior to drilling or broadcast seeding of permanent seed mixture in June or July. Phosphorus will be applied prior to seeding during the June-July time period.

C9.5.4.2 Seedbed Preparation

The affected areas to be revegetated will be prepared as follows:

- Facilities Area -- The facilities area will be the first area where revegetation efforts will be made. After removal, if appropriate, of administrative buildings, ancillary buildings, asphalt, concrete, and certain soil, the area will be ripped with a bulldozer or equivalent equipment equipped with ripper shanks which will make parallel cuts on the contour at a depth of two feet. The area will then be disked or harrowed to provide a surface for drill or broadcast seeding.

- Tailings Disposal Area -- After completion of cover material placement, the area will be disked or harrowed to provide a surface for drill or broadcast seeding.

- Cover Material Stockpile -- This area will be recontoured after final removal of the cover material to tie into existing contours (see Figure C9-6). The area will be disked or harrowed to provide a surface for drill or broadcast seeding.

- Diversion Ditches -- Diversion ditches will remain in place to collect runoff from adjacent watershed areas.

When broadcast seeding is used, the surface will be prepared in a manner that will result in a roughened or cloddy surface. This tillage operation will be conducted to create voids and furrows which will help minimize erosion, increase available soil moisture, and produce acceptable soil surface for broadcast seeding.

A smoother surface is required for drilling seeding than for broadcast seeding. When drill seeding is used, the drill will be modified to accommodate more than one seed box for different size seeds, if required.

C9.5.4.3 Postmilling Seeding Mixture

The postmilling seeding mixture is based on Soil Conservation Service (SCS, undated) recommendations for species adapted to the site and for erosion controlling capabilities. Both sod and bunchgrass species were selected to help provide soil stability and reduce erosion. Table C9.1 provides the permanent species mixture selected and the seeding/planting rates. Table C9.2 provides seeding rates and types for establishment of a rapid growing preparatory crop, if appropriate.

C9.5.4.4 Mulches

Mulch will be applied to all seeded areas to conserve soil moisture and reduce erosion. Application will immediately follow seeding unless

soil or climatic conditions (wet soils or inclement weather) prohibit the operation. Areas that have been seeded with a preparatory crop may not require mulching. The permanent seed mixture may be planted in the stubble. Mulching requirements for areas with preparatory crops will be determined on an area-by-area basis.

Mulch will be applied with 2 1/2 tons of hay or straw mulch per acre. The of mulch will be determined during the postmilling reclamation program. If straw or hay mulches are used, they will be anchored with a straw crimper.

C9.5.4.5 Fencing

Fencing will control access into the restricted area. The fencing will serve to control livestock grazing.

C9.5.5 Peak Discharge - 200-Year Flood Event

The peak discharge and floodplain extent of the 200-year flood event were determined with the methods used for determination of the 100-year event as described in Sections B3.1.5 and B3.1.6. The rainfall amounts of the 1, 6, and 24-hour, 200-year rainfall events were extrapolated from a graph of the 2, 5, 10, 25, 50, and 100-year events of these same durations using data extracted from the NOAA precipitation-frequency atlas for New Mexico (U.S. Department of Commerce, 1973). These rainfall amounts were 1.8, 2.4, and 3.0 inches for the 1, 6, and 24-hour 200-year storms, respectively, after adjustment for areal corrections. These rainfall amounts and durations were entered into the computerized version of the SCS synthetic triangular unit hydrograph method along with the Pipeline Canyon drainage basin characteristics used previously (Section B3.1.5). The resulting 200-year peak discharges were 3492, 3188, and 2178 cfs for the 1, 6, and 24-hour 200-year storms, respectively. As with the 100-year event, the shortest duration storm produced the highest peak discharge because of the much greater rainfall intensity used in the calculation.

The peak discharge of 3492 cfs was used in the HEC-2 water surface profile computer program with the same cross-sections that were used for the 100-year flood (Section B3.1.6 and Figure B3-4). Table C9.3 provides the calculated water surface elevation, top width, and channel velocity of the 200-year flood at each cross section. It can be seen that the 200-year flood will submerge the toe of the tailings dam only at cross sections 11 and 12. At cross section 11 the velocity of the flow at the intersection will be approximately 1.2 feet per second (fps) while at cross section 12 the flow velocity will be less than 1.0 fps. Protection of the tailings toe will be accomplished by rip rapping the section between cross sections 11 and 12 with the concrete and rubble obtained from dismantling the mill.

C9.6 EROSION CONTROL

C9.6.1 Soil Erosion Rates

C9.6.1.1 Water-Induced Erosion

Due to the nearly level to gently sloping topography of the stabilized areas, sheet and rill erosion caused by water is not anticipated to be a serious problem on these areas. In addition to the favorable topography, contour tillage and mulching practices will further reduce the rate of erosion. According to calculations performed using the Universal Soil Loss Equation (USLE), (USEPA, 1977), soil loss estimates for all the combined disturbed areas is estimated to be 0.18 tons/acre/year during early years when the mulch cover is intact. In later years, when the mulch cover loses its effectiveness and vegetation becomes established, soil loss is estimated to be 0.55 tons/acre/year.

Soil erosion rates for the tailings disposal area are estimated to be 0.20 tons/acre/year during early years when the mulch cover is intact and 0.60 tons/acre/year following vegetation establishment and deterioration of the mulch. At these rates, the 26 inches of cover material placed over the tailings are calculated to last a minimum 7,000 years. On the gentle slopes directly over the tailings, approximately 0.7 inches of

cover material are calculated to be lost due to water induced sheet and rill erosion over a 200 year period. This assumes a 15 percent vegetative cover is established.

These figures assume no active maintenance. The slope of the embankment forming the western margin of the tailings will contain the steepest slopes after stabilization. These slopes will not exceed a maximum of 5H:1V after stabilization. While the slope of the embankment will be steeper than the slope of the cover directly over tailings, the amount of soil material between the slope of the embankment and the tailings, as measured by a line perpendicular to the slope of the stabilized embankment, is relatively large over all the areas except within about three to five feet of top where it would be about 26 inches.

In addition, the lower 4.5 feet of the embankment near cross-sections 11 and 12 (Figure B3-4) after stabilization will be rip rapped to provide protection against a flood event of a 200-year reoccurrance.

The application of the USLE to the embankment slope after reclamation and with a 15 percent vegetative cover results in calculations demonstrating protection of the tailings against water induced sheet and rill erosion far, far longer than 200 years; on the order of 1000 years. These calculations assume no active maintenance. Table C9.4c summarizes the USLE erosion factors and calculations for the stabilized embankment.

Soil erosion rates for the facilities and stockpile areas are estimated to be 0.05 tons/acre/year and 0.19 tons/acre/year, respectively, on the freshly mulched land. Soil erosion rates on the revegetated facilities area are estimated at 0.14 tons/acre/year while rates on the revegetated stockpile area are estimated at 0.56 tons/acre/year. Table C9.4 summarizes the USLE erosion factors and calculations.

C9.6.1.2 <u>Wind-Induced Erosion</u>

Wind-induced erosion is not anticipated to be a serious problem at the site particularly because the tailings area covered is in a low area surrounded by mesas on several sides.

Soil loss due to wind erosion was estimated using the technique outlined by the U.S. Department of Agriculture (1980). The wind erosion equation is expressed as:

$$E = f(IKCLV)$$

where:

E = potential average annual soil loss (tons per acre per year)
f = a function of
I = soil erodibility factor
K = soil roughness factor
C = climatic factor
L = unsheltered distance (feet)
V = vegetative cover factor

The equation is a function of the five parameters involved. The reference provides methods for estimating the value for each of the parameters. For the UNC site, the values are:

I = 86 tons per acre per year - Table 1 (USDA, 1980)
K = 0.5 - Figure 2, Chart 1 (USDA, 1980)
C = 40 - Figure 1 (USDA, 1980)
L = 4900 feet (measured, Figure A1-2)
V = 40 to 60 pounds/acre flat, small grain residue - Figure 4 (USDA, 1980)

These factors are input to one of a series of wind erosion charts contained in the reference. The appropriate chart (Table 5, page 27) predicts an E value of about 15.5 tons per acre per year.

Assuming a weight of 110 pounds per cubic foot for the compacted soil, the loss of 15.5 tons per acre per year is calculated to result in an erosion of about 0.078 inches of cover per year or 12.88 years per inch of cover.

Therefore, the 26 inches of cover would, according to this technique, last over 330 years. This assumes no maintenance and does not consider the potential for deposition of wind-blown material in the tailings area. As noted above, the area is located in a topographic low, and there is a strong potential for deposition of the wind-blown material.

C9.6.2 <u>Arroyo Headcutting</u>

The geometry of the deposited tailings and the surrounding topography are

such that water induced erosional threats to deposited tailings, other than sheet and rill erosion, occur primarily along the Pipeline Arroyo. Flood protection against a flood event of a 200-year reoccurrence is provided in that direction. Stabilization contouring in the Pipeline Arroyo area further reduces "headcutting possibilities" in such direction. The eastern, northern, and southern margins of the deposited tailings are upgradient to the deposited tailings. In these areas, the stabilized cover would be in a depositional, rather than erosional environment. It is concluded that in terms of 200-year protection, the stabilization plan will provide protection against water induced erosion both as sheet and rill erosion and other types.

C9.6.3 Transport of Radionuclides

The above calculations related to erosion indicate that UNC's proposed stabilization program will provide protection of the tailings in excess of 200 years. Radionuclide transport will also be limited by the cover material sluice. No tailings will be transported from the area during that period.

A possible mechanism of radionuclide transport is emanation of released radon through the cover material from the tailings. Current NMEID Radiation Protection Standards limit concentrations of Ra-222 to 30 pCi/1, equivalent to a flux rate of 100 pCi/m^2-s (U.S. Department of Energy, 1981). Using data from the GEIS (U.S. NRC, 1980), UNC's proposed stabilization program, using a cover thickness of 26 inches, would result in a flux of less than 100 pCi/m^2-s.

The calculation technique is described in Appendix P of the GEIS (U.S. NRC, 1980). Values used as input to the calculation (Equation 7, Appendix P, Page P-2) are given in Table C9.5.

C9.7 MONITORING PROGRAM

In accordance with recently amended Section 12-300E of the Radiation Protection Regulations, UNC will inspect and maintain its stabilized inactive waste retention system prior to any transfer of ownership of

UNC's interest to the State or Federal Government or termination of its license. Prior to this, the stabilized inactive waste retention system will be inspected by UNC at least annually to assume continued integrity of the stabilization system and following any natural or man-made occurrences which would affect the integrity of the stabilization. During this period, maintenance needed to restore the system to its original effectiveness following stabilization will be performed as soon as possible.

During the described time period, such monitoring as described in Section C8 to determine environmental concentrations of radioactive materials will be performed. Much of the monitoring described in Section C8 is conducted due to the mill's operation; this monitoring will, of course, be discontinued upon its cessation and during the period following stabilization.

Upon transfer or termination of the license, New Mexico's continued care fund will assume costs for maintenance and monitoring and the governmental authority will be responsible for both.

C9.8 ESTIMATED COST FOR RESTORATION

The estimated cost to reclaim all disturbed areas is based on 1981 dollars and does not include estimates for contingencies. The estimated costs include:

- o handling of cover material,
- o final grading and ripping,
- o seedbed, preparation, fertilization, seeding, and mulching,
- o preliminary figures on decommissioning and decontamination of facilities, and
- o cutting and filling of the dikes.

The estimated total cost for reclamation is about $728,250 or about $3,451 per acre. An itemized list of reclamation costs is presented in Table C9.6.

UNC has title to the property on which the mill and tailings disposal area is presently located. The owned land consists of Lots 1, 2, 3, 4, S-1/2, N-1/2, S-1/2, of Section 2, Township 16, Range 16W , New Mexico Principal Meridian. The amount of land owned is 599.6 acres. The record of ownership is State of New Mexico, Book 18, Page 1980, No. 3096 dated December 27, 1968, and recorded January 3, 1969, in the McKinley County Clerk's office. The State of New Mexico owns the mineral interest. The Applicant holds a general mining lease on the property from the Commissioner of Public Lands. A copy of the patent for state land is attached to the Application for License Renewal.

C9.10 FINANCIAL SURETY ARRANGEMENTS

The Applicant will submit to the NMEID an application for surety arrangements prior to January 9, 1982, persuant to regulations recently adopted by the New Mexico Environmental Development Board. Until this license renewal application is acted upon, an interim amount of $25,000 per acre is used. The number of acres of tailings is 99.67 acres. The Applicant with submit documentation supporting self-incurrence as the surety method. The reason final stabilization per acre at Church Rock is significantly less than the interim $25,000 per acre results from the geometry of the tailings deposition. At Church Rock, the tailings are relatively flat, and gentle slopes require much less expense to stabilize than steeper slopes, other factors being constant. Upon final stabilization amounts being determined in this license renewal application, the Applicant will submit the appropriate surety arrangement to NMEID.

C10.0 ADMINISTRATION

C10.1 CORPORATE ORGANIZATION

The organization chart (Figure C10-1) shows the reporting responsibilities of the UNC Mining and Milling Division within the Corporate structure and key personnel in the Division. The General Manager of Milling and Ion Exchange in conjunction with the Vice President Environmental and Safety Services and the Director of Tailings Management are responsible for changes in the mill circuit and operating procedures prior to submittal to the President for final approval. Refer to Figure C10-1 for details.

Specific individuals responsible for ongoing activities and in key positions include:

Position/Responsibility	Person
Radiation Safety Officer (RSO)	G. D. Clark
General Manager of Milling and Ion Exchange (Mill Maintenance, adherence to mill operating procedures, changes in mill circuit and equipment)	G. A. Swanquist
Vice President-Environmental and Safety Services	H. J. Abbiss
Director of Tailings Management (Tailings maintenance, adherence to disposal procedures, changes in tailings disposal scheme and equipment)	T. M. Hill
Director-Environmental Operations	T. F. Miller
Director-Security	I. W. South

C10.2 QUALIFICATIONS OF KEY POSITIONS

Table C10.1 is a summary of UNC Mining and Milling's minimum qualification requirements for key positions described. The following resumes present the qualifications, training, and experience of the key personnel who have responsibility for conducting and administering the

radiation safety program, mill and tailings operations, and site security. As is evident from a review of the following resumes, the key personnel including the RSO have the experience and background qualifications that exceed the requirements for each position.

G. D. Clark - Radiation Safety Officer and Senior Environmental Chemist, UNC Mining and Milling. He graduated in 1973 with a Bachelor of Science degree in Chemistry from Brigham Young University, and he received additional training in the specialized field of radiochemistry while employed at the Indiana State Board of Health in Indianapolis from 1973 to 1978. During this time period, he attended a ten-week Health Physics Course at the Oak Ridge Associated University in Oak Ridge, Tennessee (1976); a two-week Radiochemistry Course at the Idaho National Engineering Lab in Idaho Falls, Idaho (1977); a one-week Radiochemistry "hands on" training at the Eastern Environmental Radiation Facility in Montgomery, Alabama (1977); and a one-week emergency reponse training program at the Defense Civil Preparedness Staff College in Battelle Creek, Michigan. From July 1978 through November 1980, as the Radiochemist/Assistant Lab Supervisor, he was in charge of Radiochemistry Section of Core Laboratories, Inc., in Albuquerque, New Mexico, where a new radiochemistry lab was designed and put into operation. From November 1980 to the present, he has been the Senior Environmental Chemist at the Church Rock Operations, and he is also RSO for UNC Operations.

G. A. Swanquist - General Manager Milling and Ion Exchange, UNC Mining and Milling. He graduated from New Mexico Tech in 1954 with a B.S. in Mining Engineering, and from 1954 to 1955, he was in the service. From 1956 to 1974, he was employed by the Anaconda Company; he was a surveyor at the Jackpile Mine from 1956 to 1957; from 1957 to 1958, he was a supervisor at the uranium concentrating plant at Bluewater, New Mexico, from 1959 to 1965, was Mill Foreman at the plant and supervised the grinding, leaching, resin in prep, precipitation circuits, and yellowcake section. From 1966 to 1970, he held the position of Assistant

Superintendent and from 1971 to 1974, he was the Superintendent. In the latter position, he was responsible for milling operations at 3,000 tons per day capacity and supervised 150 personnel, and from 1974 to 1975, he was the Project Engineer for Kaiser Engineers. His main activity centered around the United Nuclear Corporation NECR Mill project design and high-capacity thickeners test work. From 1975 to the present, he has been employed by the United Nuclear Corporation Mining and Milling Division. He was the UNC representative during the mill construction and was responsible for bringing the mill into production and for its continuing operation.

H. J. Abbiss - Vice President of Environmental and Safety Services. Mr. Abbiss graduated in 1949 as a Mining Engineer from Camborne School of Mines, England. He has the appropriate registrations and certificates to qualify as a Registered Professional Engineer or Safety Professional in the USA, Canada, Great Britain, and Newfoundland. Previous employment included Safety Director and Manager of Safety and Compensation Insurance for Homestake Sapin Partners and UN-HP and as Vice Presdent Environmental and Safety Services for UNC Mining and Milling.

To augment his experience in safety engineering, Mr. Abbiss has attended Radiation Training courses given by U.S. Publc Health Service, attended lectures at the Health Research Lab at Los Alamos, and participated in USBM radiation and dust seminars. He has developed and implemented mill licensing programs, assisted in the design of flocculation and ion exchange plants at Northeast Church Rock mines, and worked on dam stability and containment of tailings projects. These projects have involved working directly with various state and federal agencies. He is familiar with current state regulations and government procedures having to do with milling and environmental engineering safety.

T. M. Hill - Director, Tailings Management for UNC Mining and Milling. Mr. Hill has an extensive background in metallurgical programs dealing with uranium, beryllium, gold, silver, lead, zinc, and cooper. As Chief

Metallurgist for Federal-American Partners, he introduced several innovations to the uranium milling industry including the design of resin separation processes. As Project Manager for the same company, he established new procedures allowing for much more efficient operation of a fully integrated uranium operation. Productivity and product purity increased while costs decreased. Other projects have been license renewal and direction and implementation of a long-range tailings disposal program. His work has involved responsibilities at the industry, state, and federal levels. During the years of work in improving processes in the uranium industry, he has served on various state and federal committees on land use and economic planning and development.

T. F. Miller - Director, Environmental Operations for UNC Mining and Milling. Mr. Miller has a B.A. in Zoology (1975) from the University of Vermont. Since 1976, he has been employed by UNC Mining and Milling in various positions: draftsman, mine surveyor assistant, environmental technician, environmental coordinator, and manager of Environmental Operations. His responsibilities have included updating mine advance and planning maps, implementing a preoperational and environmental/radiological monitoring program as well as the final program, supervising a water treatment facility, assisting in the design of an ion-exchange system, developing the treatment system, and new mill monitoring. He has supervised the technical staff in monitoring programs designed to maintain compliance with regulation requirements and provided technical and supervisory expertise at mills and mines. Mr. Miller has been in management, supervisory, and liasion roles dealing with state, federal, and private industry groups which are involved in monitoring, safety permits, and regulations.

Ira (Bud) W. South - From March 1975 to the present, Director of Security for UNC Mining and Milling. Mr. South was responsible for setting up and organizing the security for UNC Mining and Milling at all of the property locations.

From 1949 to 1975, Mr. South was a New Mexico State Police (NMSP) Officer. While with the NMSP, he was assigned to several districts in the state and when promoted to Sergeant in July 1959, he supervised the Grants district. His duties included working with all law enforcement agencies regardless of their location, attending police in-service training schools to keep up with the changes in law enforcement, and investigating complaints of all types made against officers and civilian employees under his command. He attended the following classes held under the auspices of the New Mexico State Police and other agencies: homicide, robbery, and burglary investigations, motor vehicle laws (NM), criminal statutes (NM), laws of arrest, search and seizure, preparation of traffic and criminal cases for trial court procedures, interrogation of suspects, interviewing witnesses, public relations and supervision, roadblock techniques, the use of firearms, defensive tactics, first aid, crime scene searches, and preservation and presentation of evidence.

C10.3 <u>TRAINING</u>

UNC Mining and Milling employees working in the mill or tailings disposal areas each receive an eight-hour program of indoctrination related to radiation and equipment safety and hazards, accident criteria and reporting, site emergency facilities, first aid, general rules of conduct, and administration. This program meets MSHA specifications, and it is administered within a week of the hiring of a new employee and annually on the anniversary of their employment.

A verbal question and answer period covering the critical aspects of radiation safety as well as knowledge of the work facilities and environment is required of every employee. A written examination of first aid is given to every employee. All training and examination, while generally conducted in English, is also provided in Navajo and Spanish upon request.

Employees assigned to the yellowcake packaging area are given additional training in respirator usage and specific direction as to the more

stringent requirements related to food consumption, clothes, showering, and material handling. The respirator program for all mill employees assigned to packaging is structured to meet the requirements of the U.S. NRC Regulatory Guide 8.15.

Personnel involved in environmental and mill sampling throughout the facility also receive specific training related to the procedures for sampling and handling, transport, and analysis of the samples. This safety training program is included as part of Appendix G which contains a description of the on-site sampling techniques.

Included in Appendix J is UNC's Radiation Safety orientation outline, Rules for Radiological Work Procedures, and Radiation Safety Training Program Guide used for employee indoctrination.

C10.4 SECURITY

C10.4.1 Security Policy

It is the policy of UNC Mining and Milling to provide maximum security at all of the operational locations and at its Division headquarters. The Security personnel will at all times be efficient in their work and courteous of all persons they encounter.

C10.4.2 Standard Operating Procedures

The operating procedures for UNC Mining and Milling's Security Section were approved by the Vice President of Environmental and Safety Services and became effective April 1, 1979. Pertinent sections from the operating procedures have been taken from the security manual and are included herein. The complete manual contains the rules, regulations, policies, and procedures by which the security staff shall operate.

Each member of the UNC Mining and Milling Security Section shall become familiar with the contents of this manual. Strict compliance with its rules and regulations is required. The value and effectiveness of the Security Section is in direct proportion to the degree of sincerity,

honesty, and intelligence with which each member of the section observes the rules contained herein.

C10.4.2.1 Responsibilities of Security Guards - Church Rock Operations

1. MINE AND MILL SPECIFIC PROCEDURES

   a. Direct new hires to their supervisors.

   b. Log all vehicles entering and leaving the mine and mill area.

   c. Log ore trucks entering and leaving the mine and mill area.

   d. Record all activities including unusual occurrences in the mine and mill in the Daily Activity Log.

   e. Be responsible for directing the deliveries made to the warehouse in the mine and mill area.

   f. Maintain a log on all telephone calls.

2. MILL SPECIFIC PROCEDURES

   a. The switchboard is attended 24 hours a day. All long distance calls and all incoming and outgoing calls between 4 pm and 8 am are recorded.

   b. All calls made on the internal communications system are recorded.

   c. Responsible for having all visitors sign in the Visitors' Register and issuing hard hats and safety glasses.

   d. Responsible for notifying appropriate supervisors of personnel reporting off-duty.

   e. Operate the fire alarm when necessary according to the fire control plan.

   f. Check and secure the Administration Building at 6 pm Monday through Friday and all day on Saturdays, Sundays, and holidays.

   g. Responsible for logging employees entering the Administration Building after it has been

locked and escorting them to the South Door of the building for entry and then relocking the door. Check the Administration Building after the employee signs out.

3. MOTOR PATROL PROCEDURES

a. Vent fans are checked for malfunctions and reported to the mine electrician on duty.

b. Powder bunkers are checked periodically and close security is provided in the mine area.

c. The six-foot chain link fence topped with three strands of barbed wire surrounding the entire mill complex and the perimeter four-strand barbed wire fence surrounding the tailings disposal are patroled hourly.

d. The Administration Building is checked periodically to be sure all doors are secured. The Administration Building is unlocked at 6:30 am Monday through Friday.

e. A security check is made at CR 1 Shaft at shift change.

f. The locks at the yellowcake storage lot are checked on each patrol and a count is made of the barrels of yellowcake.

C10.4.2.2 Supplemental Mill Tailings Surveillance

The entire tailings area is under surveillance on three shifts, 24 hours per day. The mill tailings operators responsible for this monitoring are independent of the security guards and report directly to the mill foreman at the beginning and end of each shift.

Any operational incident related to the tailings area, the pipeline, or the pumpback interceptor well system is reported immediately to the mill foreman who in turn notifies the RSO. Any incident of trespass is reported immediately to security.

C10.4.3 MILL SECURITY PROCEDURES

UNC Mining and Milling is aware of the need to enforce strict entry and egress requirements to the mill area and, in particular, to areas of yellowcake manufacturing, handling, and storage. Appendix K contains the physical security plan related to yellowcake and includes a description of how access to the general mill area is conducted and enforced.

C10.5 RADIATION SAFETY

Details regarding radiation monitoring are described in Section C8.0. UNC's Radiation Safety Program uses a variety of sampling techniques to determine the occupational exposures and effluent releases in the mill area. (Procedures, frequency, and sampling sites are in Appendix G.)

Area and personnel TLD's are provided throughout the mill with spot check readings used as a backup. Airborne particulates are determined by grab, low volume and working level samples. Gross alpha levels are determined by spot checks and "area swipe" analysis.

If high radiation is detected, the RSO and Mill Operations Superintendent are notified. Cleanup operations are instituted immediately and the area is checked again upon cleanup completion. Necessary personnel are provided during cleanup.

Yellowcake packaging personnel wear approved respirators during the packaging process but employee exposure, determined from low volume grab samples, is calculated as though no respirator was worn.

C11.0 REFERENCES

Achhorner, F., 1981, Personal Communication, Engineered Construction, Inc.

Baca, T., 1981, NMEID Correspondence.

Barres, R., 1981, Personal Communication, Navajo Research and Statistics Office, Gallup, New Mexico.

Battelle Pacific Northwest Laboratories (BPHL), 1981, Analysis of UNC Sediment Sampling Data, Preliminary Evaluation, August 27, 1981.

BDM, 1981, Dose Assessment at the UNC Mill Site.

Billings, G. K., 1981, Personal Communication, Billings and Associates, Albuquerque, New Mexico.

Brough, T. G., 1981, Personal Communication, NMEID, Milan, New Mexico.

Civil Systems, Inc., 1980, "Final Design Report - Southeast Evaporation Ponds," prepared for United Nuclear Corporation Church Rock Facility, Gallup, New Mexico.

Code of Federal Regulations, 1977a, Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions, Title 10, Chapter 1, Part 71, U.S. Government Printing Office, Washington, DC.

Code of Federal Regulations, 1977b, Transportation, Title 49, Chapter Parts 100-189, U.S. Government Printing Office, Washington, DC.

Code of Federal Regulations, 1981, Energy, Title 10, Chapter 1, Part 20, U.S. Government Printing Office, Washington, DC.

Controls for Environmental Pollution, Inc. (CEP), 1980, Statistical Analysis of Sampling Program and Analytical Data from the Rio Puerco, 37 pp., Appendices.

Coppedge, R. O., 1981, U.S. Department of Agriculture, Cooperative Extension Service, Economic Change and Development, Coping with Economic Change: Information and Assistance, Fact Sheet.

Davis, C. M., 1980, "Poor House Ruin LA 21152, A Late Eleventh Century Anasazi Dwelling in McKinley County, New Mexico," for United Nuclear Corporation and the Gallup Museum of Indian Art.

Earth Environmental Consultants, Inc., 1978, Design Hydrology and Sediment Yield Study, Pipeline Canyon, Church Rock Mill, prepared for United Nuclear Corporation, Albuquerque, New Mexico.

Ellis, B., 1981, Personal Communication, New Mexico State University.

Faich, R., 1981, Personal Communication, Navajo Research and Statistics Center, Gallup, New Mexico.

Gulf Mineral Resources Company, 1979, Mt. Taylor Uranium Mill Project, New Mexico, Environmental Report, Vol. 2, Part 1.

Hann, D. J., 1979, "Statement for Oversight Hearing," Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs, U.S. House of Representatives, Washington, DC.

Hemphill and Shelby Drilling Company, 1968, Preliminary Soils and Foundation Investigation, Church Rock Uranium Mill, United Nuclear Corporation, Gallup, New Mexico.

Henderson, J., 1981, Personal Communication, Navajo Research and Statistics Office.

Holzworth, G. C., 1972, Mixing Heights, Wind Speeds and Potential for Urban Pollution Throughout the Contiguous United States, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

Hydrologic Engineering Center, 1976, HEC-2 Water Surface Profiles - Users Manual with Supplement, U.S. Army Corps of Engineers, Sacramento, California.

Jacobs Engineering Co. and Wahler Associates, 1979, United Nuclear Corporation Church Rock Tailings Impoundment Dam Evaluation of Probable Cause of July 16, 1979 Failure.

Kaiser Engineers, Inc., 1976, "Stability Analysis - Tailings Dam, Church Rock Uranium Project," Personal Communication including slip circle analysis diagram, Albuquerque, New Mexico.

Kaiser Engineers, Inc., 1977, Spill Control and Counter Measure Plan, 5 pp., 8 figures.

King, P. B., 1959, The Evolution of North America, Princeton University Press, Princeton, New Jersey.

Longmire, Hicks and Brookins, 1981, Aqueous Geochemical Interactions Between Ground Water and Uranium Minestope Backfilling - Grants Mineral Belt, New Mexico: Applications of Eh-pH Diagrams, Symposium on Uranium Mill Tailings Management, October 26-27, 1981, Fort Collins, Colorado.

Neal, R. C., 1975, Personal Communication, letter, New Mexico Environmental Improvement Agency.

New Mexico Air Quality Bureau, 1980, Annual Report, 1979-1980, Santa Fe, New Mexico.

New Mexico Environmental Improvement Division (NMEID), 1980, Radiation Protection Regulations.

New Mexico Environmental Improvement Division (NMEID), 1981, Amended Radiation Protection Regulations.

New Mexico Interstate Stream Commission and the New Mexico State Engineer, 1975, County Profile: McKinley County, Santa Fe, New Mexico.

NMSA, 1978, New Mexico Air Quality Control Act, Sections 74-2-1 to 74-2-17, in Environmental Reporter, 9/14/79, The Bureau of National Affairs, Inc., Washington, DC.

Pace Company, 1979, Economics of Uranium Mill Tailings Disposal Using a Dragline, for United Nuclear Corporation Mining and Milling Division.

Pace Company, 1980, Initial Site Evaluation Study for Disposal of Uranium Mill Tailings, for United Nuclear Corporation Mining and Milling Division.

Pasquill, F., 1964, Article by Bruce Turner explaining Pasquill stability classification, Journal of Applied Meteorology.

Public Health Service, 1980, Biological Assessment After Uranium Mill Tailings Spill, Church Rock, New Mexico, EPI-79-94-2, Atlanta, Georgia.

Raney, 1981, Geotechnical Consulting North Cell Tailings Storage for United Nuclear Corporation, Church Rock, New Mexico.

Science and Engineering Resources, Inc. (SER), 1976, Spill Prevention Containment and Countermeasure Plan for United Nuclear Corporation's Church Rock Mine near Gallup, New Mexico.

Science Applications, Inc. (SAI), and Bearpaw Geosciences, 1980, Geology of the Church Rock Area, New Mexico, prepared for United Nuclear Corporation Mining and Milling Division.

Science Applications, Inc. (SAI), 1980a, Groundwater Discharge Plan for United Nuclear Corporation, N.E. Church Rock Mill, Vol. 1, Albuquerque, New Mexico.

Science Applications, Inc. (SAI), Natural Resources Division, 1980b, Seepage Study, UNC-Church Rock Operations, prepared for United Nuclear Corporation Mining and Milling Division, Church Rock, New Mexico.

Science Applications, Inc. (SAI), 1980c, Groundwater Discharge Plan for United Nuclear Corporation, N.E. Church Rock Mill, Volume II Addendum, prepared for United Nuclear Corporation Mining and Milling.

Science Applications, Inc. (SAI), 1980d, Discharge Plan for the Southeast Evaporation Ponds at the Church Rock Uranium Mill, prepared for United Nuclear Corporation Mining and Milling Division, Albuquerque, New Mexico.

Science Applications, Inc. (SAI), 1981a, PMF Determination for the Southeast Diversion Channel and Section I Watersheds Using SCS Hydrograph Techniques," prepared for United Nuclear Corporation Mining and Milling Division, Albuquerque, New Mexico, 6 pp.

Science Applications, Inc. (SAI), 1981b, UNC-Church Rock Facility - Discharge Capacity South Diversion Channel, prepared for United Nuclear Corporation Mining and Milling Division, Church Rock, New Mexico, 7 pp.

Science Applications, Inc. (SAI), 1981c, Qualitative Analysis of Water Level Changes in Wells Near the Central Tailings Area at the UNC Church Rock Mill, prepared for United Nuclear Corporation Mining and Milling Division, Church Rock, New Mexico.

Science Applications, Inc. (SAI), 1981d, Updated Seepage Analysis - April 28 - May 10, 1981, prepared for United Nuclear Corporation Mining and Milling Division, Albuquerque, New Mexico.

Science Applications, Inc. (SAI), 1981e, Groundwater Discharge Plan, Volume III Addendum, prepared for United Nuclear Corporation Mining and Milling Division, Albuquerque, New Mexico.

Sergent, Hauskins & Beckwith Engineers, Inc., 1974, Preliminary Geotechnical Investigation Report, Tailings Dam - Church Rock Uranium Mill, United Nuclear Corporation, Church Rock, New Mexico, SHB Job No. E74-1072.

Sergent, Hauskins & Beckwith Engineers, Inc., 1976a, Report of Additional Geotechnical Studies, Church Rock Uranium Tailings Dam, Church Rock, New Mexico, SHB Job No. E75-1115.

Sergent, Hauskins & Beckwith Engineers, Inc., 1976b, Geotechnical Investigation Report, United Nuclear Corporation, Tailings Pond and Dam, Church Rock Uranium Mill, Church Rock, New Mexico, SHB Job No. E76-1013.

Sergent, Hauskins & Beckwith Engineers, Inc., 1978, Geotechnical and Design Development Investigation Report, Tailings Disposal Systems Analysis, United Nuclear Church Rock Mill, Church Rock, New Mexico, SHB Job No. E78-1041, Vol. 1.

Sergent, Hauskins & Beckwith Engineers, Inc., 1979, Stability & Integrity Assessment, Church Rock Tailings Dam, Church Rock, New Mexico, SHB Job No. E79-1096, Vol. 1, 2, and 3.

Sergent, Hauskins & Beckwith Engineers, Inc., 1980, As-Built Construction Drawings, Breach Repair and Raising of Mai Dam, Church Rock, New Mexico.

Shomaker, J. W., 1974, Hydrologic Conditions Near the United Nuclear Corporation Millsite, prepared for United Nuclear Industries, Inc., Richland, Washington, 23 pp.

Simons, Li and Associates, Inc., 1979, User's Manual - Multiple Watershed Model for Water and Sediment Routing from Mined Areas, Fort Collins, Colorado.

Simons, Li and Associates, Inc., 1980, Probable Maximum Flood from the Pipeline Canyon Watershed for Determining Stability of Uranium Tailings Disposal Dam, Church Rock, New Mexico, United Nuclear Corporation, Fort Collins, Colorado.

Sohio, 1980, Environmental Report, L-Bar Uranium Project, Valencia County, New Mexico.

Strange, D. L. and T. J. Bander, 1981, MILDOS - A Computer Program for Calculating Environmental Radiation Gases from Uranium Recovery Operations, NUREG/CR - 2011/PNL-3767.

Teknekron, 1978, Summary of Tailings Slurry Releases, 1972-1977, as reported in U.S. Nuclear Regulatory Commission, 1981.

Thom, H. C. S., 1963, "Tornado Probabilities," Monthly Weather Review, Vol. 91.

Udall, M. K., 1979, "Opening Statement to Oversight Hearing," Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs, U.S. House of Representatives, Washington, DC.

United Nuclear Corporation (UNC), Mining and Milling Division, 1974, Church Rock Uranium Mill Environmental Report, Albuquerque, New Mexico.

United Nuclear Corporation (UNC), Mining and Milling Division, 1976, Applicant's Environmental Report on the Church Rock, New Mexico Uranium Mill and Mine, Vol. 1, UNC-ER-1.

United Nuclear Corporation (UNC), 1977, Interoffice Communication from Todd Miller, May 25, 1977.

United Nuclear Corporation (UNC), Mining and Milling Division, 1979, Impact Evaluation, NECR Tailings Spill.

United Nuclear Corporation (UNC), Mining and Milling Division, 1980, Uranium Mill Tailings Backfill - Environmental Report, Northeast Church Rock Mine.

United Nuclear Corporation (UNC), Mining and Milling Division, 1981a, Water Budget Analysis from September, 1981 to Present.

United Nuclear Corporation (UNC), 1981b, Internal Memorandum, Church Rock Operations, Gallup, New Mexico, May 26, 1981.

United Nuclear Corporation (UNC), 1981c, On-Site Wind Speed Direction Data for May, 1977 to April, 1978, Church Rock Mill, New Mexico.

United Nuclear Corporation (UNC), 1981e, Yellow Cake Drying and Dust Collection at United Nuclear Corporation Church Rock Operations, paper presented by G. A. Swanquist at the Symposium on Health and Safety in Uranium Mining and Milling, Fort Collins, Colorado.

U.S. Atomic Energy Commission (USAEC), 1972, Environmental Survey of Nuclear Reports for Uranium Mills, AEC Guidelines.

U.S. Atomic Energy Commission (USAEC), 1974, Environmental Survey of the Uranium Fuel Cycle, 1248, Washington, DC.

U.S. Bureau of Reclamation (USBR), 1977, Design of Small Dams, U.S. Department of the Interior, Denver, Colorado, 816 pp.

U.S. Department of Agriculture (USDA), Soil Conservation Service, undated, "Seeding Recommendations - Church Rock Area, UNC Mining and Milling," Written Communication.

U.S. Department of Agriculture (USDA), 1979, New Mexico Agricultural Statistics, New Mexico Crop and Livestock Reporting Service, New Mexico State University, Las Cruces, New Mexico.

U.S. Department of Agriculture, (USDA), 1980, Soil Conservation Service, Technical Note No. 27, Re: Wind Erosion - Wind Erosion Equation, Revised October 30, 1980.

U.S. Department of Commerce (USDC), undated, Climatological Summary, Gallup, New Mexico, U.S. Weather Bureau.

U.S. Department of Commerce (USDC), 1961, Rainfall Frequency Atlas of the United States for Durations of 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years: Technical Publication 40, U.S. Weather Bureau National Weather Service.

U.S. Department of Commerce (USDC), 1968, Climatic Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA), National Climatic Center, Asheville, North Carolina.

U.S. Department of Commerce (USDC), 1968, Tabulation III; Daily Mixing Depth and Average Wind Speed; Station: #23050 - Albuquerque, New Mexico. Period of Record: January, 1960 - December, 1964, Environmental Sciences Administration Environmental Data Service, National Weather Records Center, Asheville, North Carolina.

U.S. Department of Commerce (USDC), 1972, Climatological Summary for Gallup, New Mexico, National Oceanic and Atmospheric Administration (NOAA), National Climatic Center, Asheville, North Carolina.

U.S. Department of Commerce (USDC), 1973, Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA), Silver Springs, Maryland.

U.S. Department of Commerce (USDC), 1981, Monthly and Annual Wind Distribution by Pasquill Stability Classes, Star Program, Station: #23081 - Gallup, New Mexico, Period of Record: January, 1976 - December, 1980, National Oceanic and Atmospheric Administration (NOAA), National Climatic Center, Asheville, North Carolina.

U.S. Department of Energy (USDOE), 1981. Interagency Memorandum from S. H. Greenleigh, USDOE to K. Selander USEPA , July 15, 1981, 8p., 5 Enclosures.

U.S. Environmental Protection Agency (USEPA), 1977a, Compilation of Air Pollution Emission Factors, Third Ed. Section 1.3: Fuel Oil Combustion, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, pp. 1.3-1 to 1.3-5 (NTIS PB275 525).

U.S. Environmental Protection Agency (USEPA), 1977b, "Sampling of Stationary Sources," Federal Register, Vol. 42, No. 160, August 18, 1977, pp. 41754-41789.

U.S. Environmental Protection Agency (USEPA), 1977c, Preliminary Guidance for Estimating Erosion on Areas Disturbed by Surface Mining Activities in the Interior Western United States, EPA-908/4-77-005.

U.S. Environmental Protection Agency (USEPA), 1979, National Pollutant Discharge Elimination System Permits, issued to United Nuclear Corporation for the Northeast Church Rock Mine and the Old Church Rock Mine.

U.S. Environmental Protection Agency (USEPA), 1980, Personal Communication.

U.S. Geologic Survey (USGS), 1981, Water Resources Data for New Mexico, WY80, pp. 540-544, Albuquerque, New Mexico.

U.S. Nuclear Regulatory Commission (USNRC), 1977, Draft Environmental Statement Related to the Operation of the Bear Creek Project, Rocky Mountain Energy Company, Wyoming, NUREG-0129.

U.S. Nuclear Regulatory Commission (USNRC), 1979a, Final Environmental Statement Related to the Operation of the Plateau Resources, Ltd., Shootering Canyon Uranium Project, NUREG-0583, Docket No. 40-8698.

U.S. Nuclear Regulatory Commission (USNRC), 1979b, Calculational Models for Estimated Radiation Doses to Man From Airborne Radioactive Materials Resulting From Uranium Milling Operations, Office of Standards Development.

U.S. Nuclear Regulatory Commission (USNRC), 1980, Office of Nuclear Material Safety and Safeguards, Final Generic Environmental Impact Statement of Uranium Milling, NUREG-0706.

U.S. Soil Conservaton Service, 1972, National Engineering Handbook, Section 4 - Hydrology, U.S. Department of Agriculture, Washington, DC.

University of New Mexico, 1981, Bureau of Business and Economic Research, Automated Data Aquisition Service.

TABLES

TABLE A3.1 LICENSE BACKGROUND DATA

	LICENSE CONDITION	EFFECTIVE DATE	CURRENT STATUS
1.	**Name:** United Nuclear Corporation Mining & Milling Division	01/13/77	In Effect
2.	**Address:** P.O. Drawer QQ Gallup, New Mexico 87503	01/13/77	In Effect
3.	**License Number:** UNC-ML-GA-00	01/13/77	Superceded
	NM-UNC-ML-GA-01	02/24/77	Superceded
	NM-UNC-ML-GA-02	05/03/77	Superceded
	NM-UNC-ML-GA-03	06/23/77	Superceded
	NM-UNC-ML-GA-04	01/11/78	Superceded
	NM-UNC-ML-GA-05	05/25/78	Superceded
	NM-UNC-ML-06	12/05/78	Superceded
	NM-UNC-ML-07	01/25/79	Superceded
	NM-UNC-ML-08	01/29/79	Superceded
	NM-UNC-ML-09	03/15/79	Superceded
	NM-UNC-ML-10	11/20/79	Superceded
	NM-UNC-ML-11	04/01/80	Superceded
	NM-UNC-ML-12	06/24/80	Superceded
	NM-UNC-ML-13	08/06/80	Superceded
	NM-UNC-ML-14	08/08/80	Superceded
	NM-UNC-ML-15	01/20/81	Superceded
	NM-UNC-ML-16	01/30/81	Superceded
	NM-UNC-ML-17	06/15/81	In Effect
4.	EXPIRATION DATE: January 31, 1982	01/13/77	In Effect
5.	Reference Number: None	None	None
6.	Radioactive Materials: (See Associated Conditions 7, 8, 9)		
	A. Cesium 137	01/13/77	Deleted 01/20/81
	B. Promethium 147	02/24/77	Deleted 01/20/81
	C. Promethium 147	02/24/77	Deleted 01/20/81
	D. All natural isotopes encountered in the milling of natural uranium	05/03/77	In Effect
	E. Cadmium 109	12/05/78	Deleted 1/20/81
	F. All natural radioisotopes encountered in uranium mill tailings sands.	01/29/79	In Effect
	G. Cobalt - 57	11/20/79	Deleted 01/20/81
7.	Chemical and/or physical form: (See associated Conditions 6,8,9)		
	A. Sealed Sources (Texas Nuclear Mod. 570-57157C)	01/13/77	Deleted 01/20/81
	B. Sealed Source (Amersham/Searle Mod. PHX-3004)	02/24/77	Deleted 01/20/81
	C. Sealed Sources (Isotope Products Labs. Type XF8 Custom Sources)	02/24/77	Deleted 01/20/81
	D. Any required in the milling production U_3O_8	05/03/77	In Effect
	E. Sealed Source (Texas Nuclear Mod. TN696-696-T82)	12/05/78	Deleted 01/20/81
	F. Chemical and physical forms encountered in uranium mill tailings sands	01/29/79	In Effect
	G. Sealed Sources (NER 9021 Co 57 Custom Sources)	11/20/70	Deleted 01/20/81
8.	*Maximum Quantity Licensee may possess at any one time (See associated Conditions 6, 7, 9)*		
	A. Nine sources not to exceed 200 millicuries per source	01/13/77	Revised 03/15/79
	B. Ten sources not to exceed 200 millicuries per source	03/15/79	Revised 01/20/81
	C. One source not to exceed 15 millicuries per source	02/24/77	Revised 01/20/81
	D. Six sources not to exceed 8 millicuries each.	02/24/77	Revised 01/20/81
	E. As necessary for the throughput authorized in item 9D.	05/03/77	In Effect
	F. One source not to exceed 3 millicuries.	12/05/78	Deleted 01/20/81
	G. As necessary for the transfer authorized in item 9F.	01/29/79	In Effect
	H. Two sources not to exceed 11 millicuries each.	11/20/79	Revised 04/01/80
	I. Seven sources not to exceed 11 millicuries each.	04/01/80	Deleted 01/20/81

TABLE A3.1 LICENSE BACKGROUND DATA

	LICENSE CONDITION	EFFECTIVE DATE	CURRENT STATUS
9.	Authorized Use (See associate conditions 6, 7, 8)		
	A. To be used in Texas Nuclear Model 5190 or 5191 source holder for density control in the licensee's mill.	01/13/77	Deleted 01/20/80
	B. To be used in a Nuclear Equipment Corporation Model CXSS-20-X-ray Fluorescence Spectrometer for analysis of metals and mill process control at the licensee's Churchrock mill.	02/24/77	Deleted 01/20/80
	C. To be used in a Nuclear Equipment Corporation Model CXSS-20-ray Fluorescence Spectrometer for analyss of metals and mill process control at the licensee's Churchrock mill.	02/24/77	Deleted 01/20/80
	D. This license authorizes uranium ore processing at the licensee's Church Rock Uranium Mill at a nominal throughput of 4000 tons per day in accordance with statements, representations and conditions of the licensee's application and letters enumerated in the head of this amendment (License Number NM-UNC-ML-GA-02).	05/03/77	In Effect
	E. For ore analyses in Texas Nuclear Division Portable Ore Analyser in Source holder model TN 9256.	12/02/78	Deleted 01/20/80
	F. This license authorizes the use of coarse tailings sands from United Nuclear Churchrock Mill located at Section 2 T16N R16W for backfilling excavated mine stopes in the UNC Northeast Churchrock Mine and in the UNC Old Churchrock mine located at Section 35 T17N R16W - Section 17 T16N R16W, respectively, using approximately 700,000 tons on an operational test basis in accordance with the statements, representations, and conditions in the licensee's letter dated January 12, 1979, signed by H. J. Abbiss, and meeting agreements January 19, 1979 concerning license conditions between the Division and UNC.	01/29/79	In Effect
	G. For determination of ore grade with an experimental gauge.	11/20/79	Deleted 01/20/80
10.	Radioactive materials shall be used in the licensee's Churchrock mill north-east of Gallup, NM.	01/13/77	In Effect
11.	The licensee shall comply with Part 4, Radiation Protection Regulations.	01/13/77	Deleted 08/08/80
12.	Radioactive materials shall be used by, or under supervision of, H. J. Abbiss, J. D. Murdock or G. A. Swanquest.	01/13/77	In Effect
13.	Sealed sources containing radioactive materials shall not be opened or removed from their respective source holders by the licensee.	01/13/77	Deleted 01/20/81
14.	Installation, relocation, maintenance, repair and initial radiation survey of devices containing radioactive material and installation, replacement, and disposal of sealed sources containing radioactive materials used in devices shall be performed only by the supplier or by other persons specifically authorized by the Agency, the U.S. Nuclear Regulatory Commission or another Agreement State to perform such services.	01/13/77	Deleted 01/20/81
15.	Each sealed source containing cesium - 137 shall be tested for leakage or contamination upon installation and at the time the source holder is removed from service.	01/13/77	Deleted 01/20/81
16.	Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive materials described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated February 3, 1976, signed by D. D. Turberville, Vice President and letter dated July 26, 1976 signed by H. J. Abbiss, Director, Technical Services.	01/13/77	Deleted 01/20/81
17A	Except as authorized in Condition 15, each sealed source containing radioactive material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage for contamination at intervals not to exceed six months. In the absence of a certificate from a transferor, indicating that a test has been made within six months prior to the transfer, the sealed sourre shall not be put into use until tested.	02/24/77	Deleted 01/20/81
17B	The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Agency.	02/24/77	Deleted 01/20/81

TABLE A3.1 LICENSE BACKGROUND DATA

LICENSE CONDITION	EFFECTIVE DATE	CURRENT STATUS
17C If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw he source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Agency regulations. A report shall be filed within five days of the test with the Radiation Protection Section, Environmental Improvement Agency, P. O. Box 2348, Santa Fe, New Mexico 87503, describing the equipment involved, the test results, and the corrective action taken.	02/24/77	Deleted 01/20/81
17D Tests for leakage or contamination shall be performed by the licensee, or persons specifically authorized by the Agency, the U. S. Nuclear Regulatory Commission or another Agreement State to perform such services.	02/24/77	Deleted 01/20/81
18. The licensee is hereby exempt from the requirement of 4-220.E.2. of the Radiation Protection Regulations for areas within the mill provided all entrances to the mill are conspicuously posted in accordance with 4-220.E.2. and with the words, "Any area within this mill may contain radioactive material".	05/03/77	In Effect
19. The licensee shall immediately notify the Program Manager, Radiation Protection Section, Environmental Improvement Agency, P.O. Box 2348, Santa Fe, NM 87503, by telephone and in writing of any failure in an earth dam retention system which results in a release of radioactive material into unrestricted areas. This requirement is in addition to the requirements of Part 4, New Mexico Radiation Protection Regulations.	05/03/77	In Effect
20. The licensee shall determine that employees leaving work are not contaminated with radioactive materials. When an employee working in the precipitation area of the mill has showered and changed clothes prior to leaving work, the employee may be assumed to be free of external contamination.	05/03/77	Deleted 08/08/80
21. The licensee shall submit a report to the Agency within 60 days after January 1, and July 1 of each year, specifying the quantity of each of the principal radionuclides release to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation, and an estimate of the maximum annual radiation doses to the public resulting from effluent releases. If quantities of radioactive materials released during the reporting period are significantly above the licensee's design objectives previously reviewed as part of the licensing action, the report shall cover this specifically.	05/03/77	In Effect
22. Mill tailings shall not be transferred from the site without specific prior approval of the Agency obtained through application for amendment of this license.	05/03/77	In Effect
23. Approved waste generating processes and mill tailings management practices may be subject to revision in accordance with the conclusions of the final generic environmental impact statement presently being prepared by the U.S. Nuclear Regulatory Commission (refer to the Federal Register, 41 FR 22430, June 13, 1976) and any related rule making.	05/03/77	Deleted 06/24/80
24. To comply with the December 1, 1980 prospective annual dose limit of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as a result of planned discharges of radioactive materials, radon and its daughters excepted, the Agency may cause the license to operate at decreased values from those contained in Part 4, New Mexico Radiation Protection Regulations.	05/03/77	Deleted 08/08/80
25. For purposes of complying with Section 4-130-B of the New Mexico Radiation Protection Regulations, the limits given in Column 1, Appendix A of Part 4 may be deemed to apply to exposures to the concentrations for 40 hours per week for a period of 13 weeks.	05/03/77	In Effect
26. Notwithstanding Item 4. this license shall expire and become null and void on May 31, 1979 and all operations under this license shall cease on May 31, 1979 unless emergency containment measures designed to minimize the effect of a tailings dam break as described in letter dated April 25, 1977, are completed to the satisfaction of the Agency prior to May 31, 1979.	05/03/77	Deleted 02/05/78
27. Operation of an Ion Exchange Plant located at the North East Church Rock Mine Site is authorized in accordance with statement, representations, and conditions in above references.	06/23/77	In Effect
28. Operation of the modified tailings lines containment system is authorized in accordance with statements, conditions, and representations in references of License NM-UNC-ML-GA-04.	01/11/78	Deleted 12/05/78

TABLE A3.1 LICENSE BACKGROUND DATA

LICENSE CONDITION	EFFECTIVE DATE	CURRENT STATUS
29. The May 3, 1978 completion date indicated for activities in item 2 of the letter signed by N. Savignac to R. Rhoades dated April 25, 1977 is hereby changed to July 31, 1978.	05/25/78	Deleted 12/05/78
30. Construction and operation of the tailings management system is authorized in accordance with statements, conditions and representation in references associated with License NM-UNC-ML-06.	12/05/78	Deleted 12/05/78
31. The director of the Division or his authorized representatives shall be allowed to enter the premises to inspect the radiation-related activities at all times. Failure of the licensee to admit the director or his authorized representatives shall constitute grounds for an immediate cease and desist order.	12/05/78	Deleted 08/08/80
32. Operation of an Ion Exchange Plant (IX) located adjacent to the Old Church Rock Mine is approved. Except as specifically provided otherwise by the license, the licensee shall comply with all statements, representations and procedures set forth in the November 23, 1977 and May 5, 1978 letters from UNC.	01/25/79	In Effect
33. The licensee is hereby exempt from the requirements of NMEID Radiation Protection Regulations Part 4-220 E.2 for areas within the mine and tailings storage area at the mine provided all entrances to the mine and tailings storage area at the mine are conspicuously posted in accordance with Part 4-220 E.2 and with the words, "ANY AREA WITHIN THIS BOUNDARY MAY CONTAIN RADIOACTIVE MATERIAL."	01/29/79	In Effect
34. The licensee's air monitoring program shall consist of the following:		
A. Radon measurements taken at tailings loading and unloading areas and storage area at mine. The first set of radon measurements shall be taken prior to transfer of coarse tailings sands and a second set one week after start of transfer. A third set of radon measurements shall be taken two weeks after the second set. Subsequent radon measurements shall be taken at monthly intervals or more frequently if indicated for personnel safety.	01/29/79	In Effect
B. Particulate air samples shall be taken at the same location as in 34A above and at the same frequency sequence. Samples shall be analyzed for natural uranium, thorium 230 and radium 226.		
C. Working level measurements of radon daughters shall be made in the area of the mine being backfilled at least weekly. Data from mine safety working level measurements can be substituted for this condition if it meets the sampling frequency.	01/29/79	In Effect
35. The results of the above air monitoring program shall be provided to the Division for review by the Division and the licensee after three months of operation. The above air monitoring program may be modified as a result of this review. Sampling should be keyed as near as possible to actural backfilling operation. The above air monitoring program shall be executed by the licensee instead of the program described in paragraph 4 of the licensees January 12, 1979 letter.	01/29/79	In Effect
36. Personnel at the loading, unloading and storage areas where the coarse tailings sands are handled shall wear personnel dosimeter badges.	01/29/79	Modified 06/24/80, 01/30/81 (See #43, 44)
37. Notwithstanding the original license expiration date, license authority for items 6F, 7F, 8F, and 9F shall expire June 30, 1980.	01/29/79	Modified 06/24/80 01/30/81 (See #43, 44)
38. Backfilling operations under license NM-UNC-ML-08 may not proceed unless the operations are conducted in full compliance with New Mexico Water Quality Control Commission Regulations.	01/29/79	In Effect
39. Ground water sampling shall be as specified by NMEID letter dated January 23, 1979 signed by Mr. Tom E. Baca, or as specified by an approved ground water discharge plan.	01/29/79	Discharge Plan Submitted 12/01/80
40. Drainage and run-off from course tailings sands prior to backfilling shall be collected and returned to tailings pond or coarse tailings sands shall be stored where seepage drains directly to the tailings pond.	01/29/79	In Effect

TABLE A3.1 LICENSE BACKGROUND DATA

LICENSE CONDITION	EFFECTIVE DATE	CURRENT STATUS
41. The licensee shall comply with the EPA 40 CFR 190 standards effective December 1, 1980: Prospective annual dose limit of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as a result of planned discharges of radioactive material, radon and its daughters excepted. To meet this condition the Division may require the licensee to operate at decreased values from those contained in Part 4, New Mexico Radiation Protection Regulations.	06/24/80	Deleted 08/08/81
42. Approved waste generating processes and mill tailings management practices may be subject to revision in accordance with (1) the conclusions of the final Generic Environmental Impact Statement on Uranium Milling presently being prepared by the U.S. Nuclear Regulatory Commission (2) the Uranium Mill Tailings Radiation Control Act of 1978, (3) and any revision to New Mexico Radiation Protection Regulations and the Division's findings based on a review by the Division staff and the reports of the Division's technical consultants.	06/24/80	Deleted 08/08/80
43. The expiration date for mine backfilling identified in license condition 37 is hereby extended from June 30, 1980 to January 31, 1981.	06/24/80	Superceded 01/30/80 (See #44)
44. The expiration date for mine backfilling identified in license condition 37 is hereby extended from January 31, 1981 to June 15, 1981.	01/30/81	In Effect
45. The exiration date for mine backfilling identified in license conditions 37, 43, and 44 is hereby extended from June 15, 1981 to January 31, 1982.	06/15/81	In Effect

Current Ammendment Status 12/31/81

TABLE B1.1

1980 Population Data for the United States, New Mexico, McKinley County and Gallup, New Mexico[1]

Location	Population (Thousands)				Percent Increase		
	1950	1960	1970	1980	'50-60'	'60-70'	'70-80'
United States	151,326	179,323	203,212	226,505	18.5	13.3	11.5
New Mexico	681	951	1,016	1,300	39.6	6.8	30.0
McKinley County	28	37	43	55	34.8	16.1	27.1
Gallup	9	14	15	18	54.9	3.5	24.7

(1) University of New Mexico, 1981.

TABLE B1.2

1979 Population Projections[1]
(Thousands)

Location	1980	1985	1990	1995	2000
New Mexico	1,270.7	1,408.7	1,546.0	1,673.2	1,790.6
McKinley County	61.5	72.7	83.9	94.3	104.0
Valencia County[2]	55.2	64.1	73.1	81.7	90.3
San Juan County	79.2	94.8	110.8	126.6	141.8
Gallup[3]	26.7	NA[4]	36.4	NA	45.1

(1) University of New Mexico, 1981.

(2) Recently divided into Valencia and Cibola counties.

(3) Projections for Gallup include the city and a three-mile urban fringe.

(4) Not available.

TABLE B1.3

1980 Employment Data
For New Mexico and McKinley County[1]

Category	New Mexico	McKinley Co.	Percent of County Civilian Labor Force	County Percent of State
Civilian Labor Force	542,000	18,796	100	3.5
Employment	502,000	17,250	91.8	3.4
Unemployment	40,000	1,546	8.2	3.9
Nonagricultural Wage and Salary	462,300	19,621	104.4[2]	4.2
Manufacturing	34,300	899	4.8	2.6
Mining	29,500	4,685	24.9	15.9
Construction	30,200	778	4.1	2.6
Transportation and Utilities	28,400	957	5.1	3.4
Wholesale and Retail Trade	103,100	4,024	21.4	3.9
Finance, Insurance, Real Estate	21,000	387	2.1	1.8
Services and Miscellaneous	91,300	3,106	16.5	3.4
Government	124,500	4,785	25.5	3.8

(1) University of New Mexico, 1981.

(2) The nonagricultural wage and salary statistic is compiled on a place-of-employment basis and the total civilian labor force statistic is compiled on a place-of-residence basis. Thus the total number of nonagricultural wage and salary employees may be greater than the total civilian labor force reflecting employees holding more than one job and employees working within the county but residing elsewhere.

TABLE B1.4

New Mexico and McKinley County
Per Capita Personal Income for Selected Years(1)
(Dollars)

Year	McKinley Co.	New Mexico	U. S.
1950	840	1,117	1,496
1959	1,604	1,914	2,161
1969	1,988	2,848	3,708
1979	5,393	7,482	8,773

(1) University of New Mexico, 1981.

TABLE B1.5

Land Use In McKinley County, New Mexico, 1974(1)

Classification	Acres	Square Miles	Percent of Total
Inland water(2)	3,521	5.5	.1
Urban and Buildup(3)	18,703	29.2	.5
Roads(4)	14,545	22.7	.4
Irrigated Cropland	5,440	8.5	.2
Dry Cropland	12,200	19.1	.3
Defense(5)	22,119	34.6	.6
Parks, fish, and wildlife(6)	15,186	23.7	.4
Commerical timber(7)	260,454	407.0	7.5
Non-commercial timber and woodland(8)	1,649,717	2,577.7	47.2
Rangelands(9)	1,493,155	2,333.1	42.7
TOTAL	3,495,040	5,461	100

(1) New Mexico State Engineer, 1975.

(2) Inland water areas in New Mexico include only lakes and reservoirs with 40 surface acres or more. There are no streams in the state that meet census criteria of 660 feet or more in width.

(3) Urban and built-up areas include land subdivided for residential and industrial use as well as cities, villages, and other built-up areas of more than 10 acres.

(4) The area for roads does not include roads in parks, military reservations, fish and wildlife refuges, or urban and built-up areas.

(5) Some of the defense lands are also used for grazing.

(6) The areas for parks, fish and wildlife include state and national parks and lands administered by the U.S. Bureau of Fisheries and Wildlife, and the New Mexico State Game and Fish Department.

(7) Commercial timber areas include land that is capable of producing saw timber and is not withdrawn from timber utilization (e.g. wilderness areas) and is economically available. Practically all the commercial timber areas are also used for grazing and recreational purposes.

(8) Non-commercial forest and woodlands include: productive-reserved (as excluded from commercial timber, footnote 7); unproductive non-reserved (incapable of yielding crops of industrial wood because of adverse site conditions, also, pinon-juniper areas); and unproductive-reserved (such as unproductive forest and woodlands in wilderness areas, etc.).

(9) Rangeland areas include land that supports grass, shrubs, and brush. Rangeland does not include cropland that may be used for grazing.

TABLE B1.6

Populations of Communities Within
The 80 km (50 Mile) Radius Area, 1980[1, 2]

Community	1980 Population
San Juan County	
Naschitti (division[3])	1,925
McKinley County	
Crownpoint (division)	10,541
Gallup	18,161
Zuni (division)	6,857
Cibola County	
Milan (village [4])	3,747

(1) University of New Mexico, 1981.

(2) 1980 population totals are not currently available for very small communities.

(3) Includes the community population and the population in the surrounding area.

(4) Includes the population within the village limits only.

Table B2.1

Annual Relative Frequency Distribution[1]
Gallup, New Mexico
January, 1976 - December, 1980

Class A Stability - Extremely Unstable Conditions

DIRECTION	SPEED (KTS) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.000678	.000411	.000000	.000000	.000000	.000000	.001089
NNE	.000565	.000342	.000000	.000000	.000000	.000000	.000908
NE	.000678	.000411	.000000	.000000	.000000	.000000	.001089
ENE	.000226	.000137	.000000	.000000	.000000	.000000	.000363
E	.000678	.000411	.000000	.000000	.000000	.000000	.001089
ESE	.000973	.000479	.000000	.000000	.000000	.000000	.001453
SE	.000452	.000274	.000000	.000000	.000000	.000000	.000726
SSE	.000226	.000137	.000000	.000000	.000000	.000000	.000363
S	.000747	.000342	.000000	.000000	.000000	.000000	.001089
SSW	.000452	.000274	.000000	.000000	.000000	.000000	.000726
SW	.000792	.000479	.000000	.000000	.000000	.000000	.001271
WSW	.002262	.001370	.000000	.000000	.000000	.000000	.003631
W	.001357	.000822	.000000	.000000	.000000	.000000	.002179
WNW	.001018	.000616	.000000	.000000	.000000	.000000	.001634
NW	.000452	.000274	.000000	.000000	.000000	.000000	.000726
TOTAL	.011556	.006779	.000000	.000000	.000000	.000000	.018336

(1) U.S. Department of Commerce, 1981

Table B2.1
(Continued)

Annual Relative Frequency Distribution[1]
Gallup, New Mexico
January, 1976 - December, 1980

Class B Stability - Unstable Conditions

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.004677	.002123	.000822	.000000	.000000	.000000	.007623
NNE	.001720	.000753	.000548	.000000	.000000	.000000	.003021
NE	.003783	.001575	.000753	.000000	.000000	.000000	.006112
ENE	.002408	.001096	.000753	.000000	.000000	.000000	.004257
E	.002408	.001096	.000753	.000000	.000000	.000000	.004257
ESE	.000826	.000411	.000274	.000000	.000000	.000000	.001510
SE	.001582	.000685	.000411	.000000	.000000	.000000	.002678
SSE	.001720	.000753	.000342	.000000	.000000	.000000	.002815
S	.002477	.001233	.000959	.000000	.000000	.000000	.004668
SSW	.002407	.000890	.001027	.000000	.000000	.000000	.004325
SW	.003027	.001507	.001986	.000000	.000000	.000000	.006520
WSW	.005984	.002671	.002466	.000000	.000000	.000000	.011121
W	.006466	.003014	.002260	.000000	.000000	.000000	.011740
WNW	.002958	.001370	.001233	.000000	.000000	.000000	.005561
NW	.003990	.001781	.000822	.000000	.000000	.000000	.006592
NNW	.001926	.000753	.000822	.000000	.000000	.000000	.003501
TOTAL	.048356	.021712	.016233	.000000	.000000	.000000	.086301

(1) U.S. Department of Commerce, 1981

Table B2.1
(Continued)

Annual Relative Frequency Distribution[1]
Gallup, New Mexico
January, 1976 - December, 1980

Class C Stability - Slightly Unstable Conditions

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.000989	.002397	.002466	.000205	.000000	.000000	.006058
NNE	.000973	.002123	.001507	.000205	.000000	.000000	.004809
NE	.001300	.003151	.001644	.000274	.000068	.000000	.006437
ENE	.001329	.003219	.003767	.000205	.000068	.000000	.008589
E	.000594	.001438	.002055	.000205	.000000	.000000	.004292
ESE	.000226	.000548	.000548	.000068	.000000	.000000	.001391
SE	.000170	.000411	.000753	.000137	.000068	.000000	.001539
SSE	.000226	.000548	.000890	.000068	.000000	.000000	.001733
S	.000707	.001712	.002740	.000753	.000274	.000000	.006186
SSW	.000848	.002055	.003836	.001712	.000342	.000274	.009067
SW	.001482	.003356	.006575	.004110	.001849	.000753	.018126
WSW	.002233	.005411	.009726	.004521	.002466	.000411	.024768
W	.002132	.004932	.006027	.003151	.000548	.000068	.016858
WNW	.001103	.002671	.003288	.001096	.000205	.000000	.008363
NW	.000537	.001301	.001301	.000479	.000068	.000000	.003688
NNW	.000424	.001027	.000959	.000068	.000068	.000000	.002547
TOTAL	.015274	.036301	.048082	.017260	.006027	.001507	.124452

(1) U.S. Department of Commerce, 1981

Table B2.1
(Continued)

Annual Relative Frequency Distribution[1]
Gallup, New Mexico
January, 1976 - December, 1980

Class D Stability - Neutral Conditions

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.001143	.002055	.004178	.003425	.000205	.000137	.011143
NNE	.000831	.001301	.003493	.002603	.000205	.000068	.008502
NE	.001143	.002055	.003356	.002397	.000068	.000000	.009020
ENE	.001181	.002123	.005890	.003356	.000479	.000068	.013099
E	.000914	.001644	.004658	.002945	.000685	.000068	.010914
ESE	.000533	.000959	.001438	.000822	.000068	.000068	.003890
SE	.000381	.000685	.001507	.001370	.000274	.000068	.004285
SSE	.000838	.001507	.003288	.003082	.000753	.000205	.009674
S	.001715	.003082	.010137	.007055	.001027	.000342	.023358
SSW	.001631	.002740	.012877	.010959	.002808	.000685	.031699
SW	.002240	.003836	.020137	.029384	.008630	.003288	.067514
WSW	.002286	.004110	.018151	.032466	.012945	.004452	.074409
W	.001410	.002534	.009658	.015479	.004452	.001164	.034697
WNW	.000762	.001370	.003425	.006233	.001644	.000205	.013639
NW	.000381	.000685	.002466	.003630	.000548	.000137	.007847
NNW	.000419	.000753	.001507	.001233	.000342	.000000	.004255
TOTAL	.017808	.031438	.106164	.126438	.035137	.010959	.327945

(1) U.S. Department of Commerce, 1981

Table B2.1
(Continued)

Annual Relative Frequency Distribution[1]
Gallup, New Mexico
January, 1976 - December, 1980

Class E Stability - Slightly Stable Conditions

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.000000	.001027	.003082	.000000	.000000	.000000	.004110
NNE	.000000	.001918	.002397	.000000	.000000	.000000	.004315
NE	.000000	.001849	.002055	.000000	.000000	.000000	.003904
ENE	.000000	.001575	.002055	.000000	.000000	.000000	.003630
E	.000000	.002123	.001781	.000000	.000000	.000000	.003904
ESE	.000000	.001575	.000890	.000000	.000000	.000000	.002466
SE	.000000	.002329	.000753	.000000	.000000	.000000	.003082
SSE	.000000	.001918	.001712	.000000	.000000	.000000	.003630
S	.000000	.004247	.007808	.000000	.000000	.000000	.012055
SSW	.000000	.003014	.007740	.000000	.000000	.000000	.010753
SW	.000000	.003425	.009932	.000000	.000000	.000000	.013356
WSW	.000000	.004041	.007671	.000000	.000000	.000000	.011712
W	.000000	.001918	.003562	.000000	.000000	.000000	.005479
WNW	.000000	.000822	.002055	.000000	.000000	.000000	.002877
NW	.000000	.000685	.001096	.000000	.000000	.000000	.001781
NNW	.000000	.000137	.000959	.000000	.000000	.000000	.001096
TOTAL	.000000	.032603	.055548	.000000	.000000	.000000	.088151

(1) U.S. Department of Commerce, 1981

Table B2.1
(Continued)

Annual Relative Frequency Distribution(1)
Gallup, New Mexico
January, 1976 - December, 1980

Class F Stability - Stable and Extremely Stable Conditions

	SPEED (KTS)						
DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.013542	.003562	.000000	.000000	.000000	.000000	.017103
NNE	.013870	.003562	.000000	.000000	.000000	.000000	.017432
NE	.027412	.007123	.000000	.000000	.000000	.000000	.034535
ENE	.020902	.005411	.000000	.000000	.000000	.000000	.026313
E	.029577	.007260	.000000	.000000	.000000	.000000	.036838
ESE	.017393	.004315	.000000	.000000	.000000	.000000	.021708
SE	.014268	.003493	.000000	.000000	.000000	.000000	.017761
SSE	.017777	.004589	.000000	.000000	.000000	.000000	.022366
S	.032127	.007671	.000000	.000000	.000000	.000000	.039798
SSW	.017064	.004315	.000000	.000000	.000000	.000000	.021379
SW	.022272	.005685	.000000	.000000	.000000	.000000	.027957
WSW	.028385	.007466	.000000	.000000	.000000	.000000	.035851
W	.015830	.003904	.000000	.000000	.000000	.000000	.019734
WNW	.004687	.001233	.000000	.000000	.000000	.000000	.005920
NW	.003385	.000890	.000000	.000000	.000000	.000000	.004276
NNW	.003906	.001027	.000000	.000000	.000000	.000000	.004934
TOTAL	.282397	.071507	.000000	.000000	.000000	.000000	.353904

(1) U.S. Department of Commerce, 1981

Table B2.1
(Continued)

Annual Relative Frequency Distribution[1]
Gallup, New Mexico
January, 1976 - December, 1980

All Stability Classes Combined

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	>21	TOTAL
N	.021370	.011575	.010548	.003630	.000205	.000137	.047466
NNE	.018900	.010000	.007945	.002808	.000205	.000068	.039927
NE	.030075	.016164	.007808	.002671	.000137	.000000	.056856
ENE	.024971	.013562	.012466	.003562	.000548	.000068	.055177
E	.026680	.013973	.009247	.003151	.000685	.000068	.053803
ESE	.015795	.008288	.003151	.000890	.000068	.000068	.028261
SE	.015050	.007877	.003425	.001507	.000342	.000068	.028270
SSE	.017521	.009452	.006233	.003151	.000753	.000205	.037315
S	.035080	.018288	.021644	.007808	.001301	.000342	.084464
SSW	.025245	.013288	.025479	.012671	.003151	.000959	.080793
SW	.033924	.018288	.038630	.033493	.010479	.004041	.138856
WSW	.046025	.025068	.038014	.036986	.015411	.004863	.166367
W	.032199	.017123	.021507	.018630	.005000	.001233	.095692
WNW	.014845	.008082	.010000	.007329	.001849	.000205	.042311
NW	.010567	.005616	.005685	.004110	.000616	.000137	.026732
NNW	.007711	.004041	.004247	.001301	.000411	.000000	.017711
TOTAL	.375959	.200685	.226027	.143699	.041164	.012466	1.000000

(1) U.S. Department of Commerce, 1981

Table B2.2

Wind Speed Distribution By Month
United Nuclear Corporation
Church Rock
May, 1977 - April, 1978[1]

Wind Speed (mph)	1977								1978			
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
0-3	31.7	35.2	41.9	45.5	44.9	54.3	62.1	66.5	68.1	44.1	28.7	29.3
4-7	25.2	23.1	37.7	27.2	33.9	25.9	22.8	22.6	21.0	26.4	26.0	23.7
8-12	32.7	32.1	20.0	25.2	20.7	15.9	10.8	9.8	9.3	24.5	33.8	34.5
13-18	5.1	8.6	0.4	2.2	0.3	3.5	3.3	0.8	1.0	4.8	9.9	11.0
19-24	3.8	1.1	0.0	0.0	0.1	0.7	0.0	0.4	0.3	0.0	1.0	1.7
Over 24	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(1) UNC Mining and Milling, 1981d

Table B2.3

Percent Wind Direction Distribution By Month
United Nuclear Corporation
Church Rock
May, 1977 - April, 1978(1)

Wind Direction	1977								1978			
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
N	10.6	11.8	15.8	9.6	5.5	19.3	27.5	7.4	21.8	2.3	1.8	1.9
NNE	3.7	5.7	6.2	10.3	17.7	21.9	25.0	13.0	29.8	12.7	17.6	8.5
NE	17.5	14.9	10.4	16.3	15.5	7.7	11.0	36.6	17.0	18.6	16.4	13.8
ENE	1.0	1.2	3.1	2.7	0.1	2.2	0.6	2.5	0.7	2.6	1.4	0.9
E	1.0	0.8	4.0	3.6	4.7	1.9	0.9	0.8	2.7	0.1	0.8	0.3
ESE	0.4	0.1	2.5	1.1	1.0	3.3	0.9	1.0	0.6	0.9	0.6	1.7
SE	2.3	2.6	10.1	2.3	13.9	1.1	1.1	0.8	1.2	3.1	1.6	2.4
SSE	1.0	1.2	7.2	3.2	0.0	6.6	1.3	2.1	2.2	1.6	0.5	3.3
S	4.9	5.8	11.4	9.2	8.1	2.9	4.3	2.9	2.3	1.4	1.4	3.9
SSW	18.9	20.5	11.1	12.9	8.6	18.2	13.0	17.6	8.4	20.5	20.0	26.9
SW	26.7	22.4	6.2	11.9	17.0	6.2	8.7	9.6	5.0	27.3	28.9	23.9
WSW	5.7	4.0	2.9	4.6	0.6	3.5	1.7	3.4	3.6	3.2	2.7	3.4
W	3.0	4.0	2.4	3.2	5.1	2.6	3.3	0.8	2.0	2.9	1.5	3.0
WNW	1.3	1.7	1.7	2.3	0.3	0.9	0.6	0.4	1.2	1.3	0.6	1.5
NW	1.9	2.5	2.8	3.2	1.8	0.2	0.0	0.2	1.0	0.9	2.2	2.8
NNW	0.6	0.7	2.2	3.6	0.0	1.3	0.2	1.0	0.3	0.4	1.4	2.0

(1) United Nuclear Corporation, 1981d

Table B2.4

Percent Wind Direction and Speed Distribution
United Nuclear Corporation
Church Rock
May, 1977 - April, 1978(1)

Wind Direction	Wind Speed (mph)						Percent of Total
	0-3	4-7	8-12	13-18	19-24	Over 24	
N	4.4	3.6	2.6	0.2			10.8
NNE	10.6	1.8	1.5				13.9
NE	14.1	1.4	0.6				16.1
ENE	1.3	0.2	0.1				1.6
E	1.0	0.5	0.3				1.8
ESE	0.6	0.4	0.1				1.1
SE	1.8	1.4	0.6				3.8
SSE	1.1	0.8	0.3	0.2			2.4
S	2.1	2.0	0.8	0.1			5.0
SSW	3.3	5.9	5.2	1.7	0.3	0.1	16.5
SW	2.0	4.6	8.0	1.9	0.4		16.9
WSW	0.8	1.2	1.1	0.1			3.3
W	0.7	1.1	1.0	0.1			2.9
WNW	0.2	0.5	0.4				1.1
NW	0.6	0.8	0.4				1.7
NNW	0.4	0.4	0.3				1.1

(1) United Nuclear Corporation, 1981d

Table B2.5

Monthly Means and Extremes of Temperature (°F)
Gallup, New Mexico(1)
1938 - 1960

Month	Mean Daily Maximum	Mean Daily Minimum	Mean	Record Daily Highest	Year	Record Daily Lowest	Year
January	42.7	13.9	28.6	65	1954(2)	-18	1955(2)
February	46.2	17.5	32.1	69	1957	-23	1951
March	52.6	22.9	37.9	75	1946	- 6	1948
April	63.3	31.0	46.9	83	1943	8	1945
May	72.9	37.6	55.2	95	1946	15	1953
June	83.3	45.6	64.5	99	1956	24	1950
July	87.2	52.9	70.0	99	1958	36	1949
August	84.4	52.6	68.2	97	1954	26	1948
September	79.2	44.9	62.0	99	1950	14	1950
October	67.2	33.5	50.4	87	1953	12	1949
November	53.3	19.9	36.4	73	1953(2)	-15	1945
December	45.6	14.5	29.9	65	1949(2)	-17	
Annual Mean And Extreme Values	64.8	32.2	48.5	99	July 1958(1)	-23	February 1951

(1) U.S. Department of Commerce, 1972

(2) Also on earlier dates, months, years.

Table B2.6

Monthly and Annual Average
Relative Humidity[1]
Gallup, New Mexico

MONTH	AVERAGE MONTHLY PERCENT RELATIVE HUMIDITY
January	75
February	65
March	52
April	50
May	33
June	42
July	50
August	55
September	55
October	50
November	55
December	70
ANNUAL	54

---

(1) U.S. Department of Commerce, 1968

Table B2.7

Annual Monthly Precipitation
Gallup, New Mexico(1)
1938-1960

Month	Precipitation Totals (Inches) Mean	Greatest Daily	Year	Snow, Sleet Mean	Maximum Monthly	Year	Greatest Daily	Year	Mean No. of Days Precipitation Equals or Exceeds 0.1 Inch
January	0.64	0.62	1952	5.7	12.0	1960	6.0	1945	3
February	0.69	0.93	1948	5.7	15.0	1939	8.0	1942	2
March	0.78	1.09	1954	5.9	17.8	1945	5.0	1945(2)	3
April	0.65	0.83	1952	2.1	9.5	1945	5.0	1945	2
May	0.55	0.60	1954	0.3	3.0	1944	3.0	1944	2
June	0.46	0.94	1952	0	0	--	0	--	1
July	1.74	1.90	1954	0	0	--	0	--	4
August	1.81	1.27	1947	0	0	--	0	--	5
September	1.05	1.64	1941	(3)	(3)	1945	(3)	1945	3
October	1.00	1.50	1941	(3)	(3)	1959(2)	(3)	1959(2)	3
November	0.51	0.60	1940	2.2	16.5	1952	5.0	1952	2
December	0.77	0.75	1955	6.8	15.5	1941	8.0	1955	3
Annual Average And Extreme Values	10.65	1.90	July 1954	28.7	17.8	March 1945	8.0	Dec. 1955(2)	33

(1) U.S. Department of Commerce, 1972

(2) Also in earlier years

(3) Less than 0.01 inches

TABLE B3.1

USGS Gaging Station Data[1]

Gage Number	09395350	09395500
Title	Puerco River near Church Rock, NM	Puerco River at Gallup, NM
Location[2]	Sec 17, T16N, R16W	Sec 16, T15N, R18W
Period of Record	10/77 to Present	6/40 to 7/46, 9/77 to Present
Drainage Area (mi^2)	193	558
Average Discharge (cfs)	8.25	9.67
Maximum Discharge (cfs)	450	12,000
Minimum Discharge (cfs)	1.3	No flow

(1) U.S. Geological Survey, 1981.

(2) Gage locations shown in Figure B3-2.

TABLE B3.2

Pipeline Canyon 100-Year Precipitation Amounts and Peak Discharges(1)

STORM DURATION (HOURS)	PRECIPITATION (INCHES)	PEAK DISCHARGE (CFS)
1	1.6	2,655
6	2.1	2,351
24	2.7	1,711

(1) U.S. Department of Commerce, 1973.

TABLE B3.3

100-YEAR Floodplain Characteristics

CROSS SECTION(1)	CHANNEL BOTTOM ELEVATION (FEET)	WATER SURFACE ELEVATION (FEET)	TOP WIDTH (FEET)	CHANNEL VELOCITY (FPS)	ELEVATION OF TOE OF DAM(2) (FEET)
1	6878.0	6881.5	62.7	14.1	N/A
2	6886.0	6890.5	43.3	20.3	6936
3	6915.0	6922.1	184.1	9.6	6940
4	6922.0	6926.3	238.7	14.0	6941
5	6924.0	6929.9	46.2	12.3	6939
6	6929.0	6933.5	36.7	20.3	6942
7	6939.5	6945.4	116.1	10.6	6950
8	6948.0	6950.7	405.4	7.3	6955
9	6945.0	6946.1	141.8	17.8	6960
10	6948.0	6949.9	184.2	7.8	6960
11	6946.7	6949.1	264.1	7.1	6948
12	6947.2	6949.5	[illegible].2	8.2	6949
13	6949.6	6951.5	433.4	8.1	6956
14	6952.0	6953.8	315.3	7.1	6956
15	6954.5	6957.1	413.4	6.7	N/A
16	6964.3	6965.4	458.1	5.8	N/A

(1) Cross section locations shown on Figure B3-4.

(2) SAI,1980a.

TABLE B3.4

Results of Water Quality Analysis - Location M-1[1,2]

PARAMETER	UNITS	4/80	5/80	6/80	7/80	8/80	9/80	10/80	11/80	12/80	1/81	2/81	3/81
FLOW	GPM	1082.6	1050.0	1104.8	1097.2	1076.6	1029.4	1013.0	1039.0	1038.0	1054.9	1067.4	1038.5
TEMPERATURE	°C	11.8	12.8	16.0	20.2	23.1	20.8	16.	10.8	10.	8.75	7.25	6.9
TOTAL SUSPENDED SOLIDS	mg/l	9.06	2.95	3.33	2.45	3.29	3.89	4.12	4.15	4.98	8.46	7.09	7.15
TOTAL URANIUM	mgU/l	0.43	0.81	0.81	1.07	1.04	1.15	1.02	1.28	1.77	2.08	1.57	1.47
TOTAL RADIUM-226	pCi/l	15.04	2.86	3.88	2.39	1.59	2.35	2.66	2.70	2.76	5.41	5.12	5.96
DISSOLVED RADIUM-226	pCi/l	0.93	0.71	0.90	0.59	0.14	0.27	0.33	0.30	0.26	0.19	0.25	0.31
ZINC	mg/l	0.1753	0.0140	0.0252	0.0245	0.0350	0.0262	0.0471	0.0478	0.0493	0.0289	0.0389	0.0249
MOLYBDENUM	mg/l	0.0131	0.0056	0.0138	0.0095	0.0248	0.0134	0.0100	0.0096	0.0070	0.0052	0.0063	0.0096
VANADIUM	mg/l	0.0177	0.0158	0.0072	0.0224	0.0176	0.0219	0.0170	0.0140	0.0150	0.0124	0.0158	0.0223
SELENIUM	mg/l	0.0404	0.0671	0.0519	0.0505	0.0730	0.0581	0.0540	0.0620	0.0699	0.0551	0.0591	0.067
pH	S.U.	8.08	8.16	8.37	8.17	7.84	8.04	7.93	8.05	8.09	7.71	7.73	7.77
CHEMICAL OXYGEN DEMAND	mg/l	6.69	2.23	6.98	4.95	1.97	9.40	3.50	1.81	4.42	9.87	7.18	5.40

(1) NPDES Quarterly Discharge Monitoring Report, values shown are means for the month

(2) Location shown on Figure B3-7.

TABLE B3.5

Results of Water Quality Analysis - Location M-2[1,2]

PARAMETER	UNITS	4/80	5/80	6/80	7/80	8/80	9/80	10/80	11/80	12/80	1/81	2/81	3/81
FLOW	GPM	150[3]	150[3]	150[3]	171	187	180[3]	335	373	227	141	307	388
TEMPERATURE	°C	10.0	13.8	16.6	19.8	21.7	23.5	20.0	14.0	12.0	9.5	7.7	8.3
TOTAL SUSPENDED SOLIDS	mg/l	4.63	5.87	3.42	3.16	3.83	2.84	7.32	6.38	13.11	13.09	11.02	11.24
TOTAL URANIUM	mgU/l	0.42	0.77	0.90	0.87	0.45	0.64	1.09	1.33	1.09	0.80	0.99	0.95
TOTAL RADIUM-226	pCi/l	3.40	2.40	2.90	3.78[4]	3.57	3.03	9.61	13.82	12.39	10.7	6.59	8.19
DISSOLVED RADIUM-226	pCi/l	2.10	1.60	3.00	4.88	4.51	3.20	5.14	6.02	1.70	3.79	1.73	0.98
ZINC	mg/l	0.0094	0.0149	0.0113	0.0128	0.0158	0.0219	0.0212	0.0199	0.0223	0.0141	0.0162	0.0119
MOLYBDENUM	mg/l	0.010	0.005	0.005	NR[5]	NR	0.001[3]	0.003[3]	NR	0.001[3]	0.002[3]	NR	0.006[3]
VANADIUM	mg/l	0.0415	0.0463	0.083[3]	NR	NR	0.002[3]	0.079[3]	NR	0.096E(3)	0.121[3]	NR	0.120[3]
SELENIUM	mg/l	0.006	0.015	0.002[3]	NR	NR	0.155[3]	<0.001[3]	NR	<0.001[3]	0.017[3]	NR	0.001[3]
pH	S.U.	8.25	8.46	8.50	8.41	8.33	8.64	8.48	8.51	8.67	9.32	8.27	8.37
CHEMICAL OXYGEN DEMAND	mg/l	12.50	14.63	16.83	10.95	7.36	9.90	6.70	2.55	1.88	2.70	1.55	2.30

(1) NPDES Quarterly Dishcarge Monitoring Report. Values shown are means for the month except as noted.

(2) Location is at OCR plant prior to discharge into North Fork Puerco River

(3) Maximum Value Reported.

(4) Minimum Value Reported.

(5) NR Not Reported as sample is required once per quarter

TABLE B3.6

NPDES Monitoring Requirements And Discharge Limitations[1]

SAMPLING LOCATION M-2

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	Continuous	Record
Temperature	N/A	N/A	1/week	In Situ.
Total Suspended Solids	20 mg/l	30 mg/l	1/week	24-Hr. Composite
Chemical Oxygen Demand	100 mg/l	200 mg/l	1/week	24-Hr. Composite
Radium 226 (dissolved)	3 pCi/l	10 PCi/l	1/week	24-Hr. Composite
Total Radium 226	10 pCi/l	30 pCi/l	1/week	24-Hr. Composite
Total Uranium	2.0 mg/l	4.0 mg/l	1/week	24-Hr. Composite
Total Zinc	0.5 mg/l	1.0 mg/l	1/week	24-Hr. Composite
Total Molybdenum	N/A	N/A	1/3 month	24-Hr. Composite
Total Selenium	N/A	N/A	1/3 month	24-Hr. Composite
Total Vanadium	N/A	N/A	1/3 month	24-Hr. Composite
pH	(>6.0, <9.0)		1/week	Grab Sample

SAMPLING LOCATION M-1[2]

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day	(3) MGD	(3) MGD	Continuous	Record
Temperature	(3) °F	(3) °F	1/week	Grab Sample
Total Suspended Solids	20 mg/l	30 mg/l	1/week	24-Hr. Composite
Chemical Oxygen Demand	100 mg/l	200 mg/l	1/week	24-Hr. Composite
Total Zinc	0.5 mg/l	1.0 mg/l	1/week	24-Hr. Composite
Dissolved Radium 226	(3) pCi/l	3.3 pCi/l	2/week	24-Hr. Composite
Total Radium 226	10.0 pCi/l	30.0 pCi/l	1/week	24-Hr. Composite
Total Uranium	(3) mg/l	2.0 mg/l	2/week	24-Hr. Composite
Total Molybdenum	(3) mg/l	(3) mg/l	1/week	24-Hr. Composite
Total Selenium	(3) mg/l	(3) mg/l	1/week	24-Hr. Composite
Total Vanadium	(3) mg/l	(3) mg/l	1/week	24-Hr. Composite
pH	(>6.0, <9.0)		1/week	Grab Sample

---

(1) NPDES Quarterly Discharge Monitoring Report.

(2) Location shown on Figure B3.7.

(3) Reported as recorded/analyzed.

Table B3.7

Surface Water Monitoring Results(1,2)
Site SW-3

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l	Po-210 pCi/l
12/12/75	857	1.943	1315	17.0	72.7	ND(3)	ND
6/11/76	937	2.55	1726	48.6	26.7	ND	ND
12/22/76	968	2.34	1584	74.3	38.2	ND	ND
8/18/77	945	0.850	575	17.2	8.0	ND	ND
10/11/77	295	0.99	670	17.71	ND	ND	ND
1/25/78	235	0.96	650	4.7	11.7	ND	ND
4/4/78	380	1.43	968	3.31	1.67	ND	ND
7/28/78	133	0.54	366	3.7	4.9	ND	ND
10/23/78	211	0.58	393	3.1	<0.6	ND	ND
1/31/79	38	0.75	508	2.3	2.9	ND	ND
6/15/79	350	0.66	447	6.7	ND	ND	ND
7/16/79	383	0.71	481	2.5	37.8	ND	ND
7/27/79	342	0.90	609	2.5	21.5	ND	ND
8/17/79	245	0.66	447	1.2	13.4	ND	ND
8/24/79	177	0.22	149	0.8	3.6	ND	ND
8/30/79	317	0.76	515	1.3	3.8	13.7	ND
9/7/79	290	0.70	474	4.4	8.4	11.0	ND
9/14/79	309	0.14	95	2.8	8.5	30.1	ND
9/21/79	130	0.26	176	4.4	6.5	34.3	ND
9/27/79	394	0.81	548	5.6	4.0	ND	ND
10/5/79	620	0.30	203	2.8	16.3	22.2	ND
10/11/79	327	0.77	521	3.3	14.0	17.7	ND
10/18/79	367	0.84	569	5.4	11.4	4.1	ND
11/9/79	425	1.09	738	8.6	16.7	ND	ND
12/3/79	358	1.01	684	2.2	10.3	2	ND
1/3/80	260	0.86	582	0.8	5.8	2.0	ND
4/14/80	55	1.01	684	2.7	5.4	<1.5	ND
7/18/80	564	1.32	894	1.9	17.5	ND	ND
10/29/80	348	1.16	785	0	3.1	9.3	ND
1/15/81	566	1.30	880	1.33±0.66	0.45±0.36	0.51±0.92	0±6.2
5/13/81	ND	1.33	900	1.06±0.40	2.0±0.7	0.92±0.98	6.8±7.5

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 1.5 miles upstream from mill at ford in road.
Sampling method: See Section C8.

(3) ND No Data.

Table B3.8

Surface Water Monitoring Results(1,2)
Site SW-5

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
12/12/75	381	1.372	929	6.2	255	ND(3)
6/11/76	1440	2.44	1650	11.1	81.9	ND
12/22/76	1160	2.36	1600	62.6	40.6	ND
8/18/77	131	ND	ND	2.5	<0.6	ND
10/11/77	223	ND	ND	3.6	ND	ND
1/25/78	326	1.04	704	1.3	10.8	ND
4/4/78	415	1.24	839	3.2	0.72	ND
7/28/78	239	0.72	487	2.2	6.7	ND
10/23/78	474	1.30	880	2.3	5.4	ND
1/31/79	273	0.87	589	1.5	3.7	ND
6/15/79	345	0.72	487	2.4	15.3	ND
7/16/79	1678	7.49	5070	546.0	10.1	ND
7/27/79	201	0.56	379	3.0	7.0	ND
8/17/79	172	0.54	366	<0.6	11.9	ND
8/24/79	211	0.20	135	<0.6	0.9	ND
8/30/79	201	0.62	420	2.3	3.8	5.3
9/7/79	264	0.65	440	<0.6	5.6	3.4
9/14/79	162	0.20	135	<0.6	16.3	15.4
9/21/79	100	0.31	210	0.6	6.5	11.1
9/27/79	191	0.34	230	<0.6	4.0	ND
10/5/79	288	0.15	102	0.7	3.1	4.7
10/11/79	330	0.89	603	5.0	14.0	27.3
10/18/79	239	0.77	521	<0.6	9.3	3.8
11/9/79	411	1.14	772	1.4	5.8	ND
12/3/79	384	0.97	657	0.7	15.9	20
1/3/80	280	0.80	542	1.1	3.2	18.4
4/14/80	11	1.12	758	<0.6	6.4	<1.5
7/18/80	507	1.25	846	0.5	6.2	ND
10/29/80	395	1.35	914	0.36	4.7	45.0
1/15/81	485	1.32	894	0.43±0.17	0.82±0.52	1.8±1.1
5/13/81	ND	1.53	1040	0.56±0.33	0.63±0.46	2.1±1.1

---

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 5 miles downstream from mill at NM566 bridge.
Sampling method: See Section C8.

(3) ND No Data.

Table B3.9

Surface Water Monitoring Results[1,2]
Above the Falls

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pC/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
7/16/79	209	0.79	535	5.5	19.3	ND[3]
7/27/79	337	0.86	582	3.0	21.5	ND
8/17/79	263	0.70	474	2.3	14.1	ND
8/24/79	337	0.26	176	1.0	7.2	ND
8/30/79	307	0.72	487	1.8	0.9	17.2
9/7/79	114	0.74	501	3.5	8.4	38.4
9/14/79	497	0.15	102	0.9	15.5	57.5
9/21/79	140	0.23	156	4.1	<0.6	42.4
9/27/79	266	0.82	555	3.8	12.1	ND
10/5/79	342	0.18	122	1.5	5.4	54.9
10/11/79	341	1.04	704	4.7	10.1	9.8
10/18/79	336	0.85	575	1.8	7.8	5.9
11/9/79	397	1.16	785	9.0	8.3	ND
12/3/79	421	1.02	691	2.6	7.5	3.0
1/3/80	212	0.86	582	1.2	4.0	7.2
4/14/80	64	1.04	704	2.7	5.4	<1.5
7/18/80	491	1.36	921	2.1	1.5	ND
10/29/80	372	1.16	785	0.77	5.4	0
1/15/81	461	1.38	934	1.12±0.24	ND	ND
5/13/81	ND	1.34	907	1.04±0.39	ND	ND

(1) See Figure B3-7 for location.

(2) <u>UNC Monitoring Program</u>: Sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 0.5 miles upstream from mill at waterfall.
Sampling method: See Section C8.

(3) ND No Data.

Table B3.10

Surface Water Monitoring Results(1,2)
RWS-25

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	pC/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
7/16/79	122	6.49	4390	100.2	8095.5	ND(3)
7/27/79	128	0.58	393	2.8	11.0	ND
8/17/79	185	0.55	372	<0.6	8.4	ND
8/24/79	194	0.21	142	4.6	<0.6	ND
8/30/79	281	0.63	427	1.8	4.7	4.7
9/7/79	224	0.67	454	1.2	10.3	24.5
9/14/79	288	0.18	122	<0.6	4.7	6.6
9/20/79	170	0.15	102	<0.6	8.7	4.9
9/27/79	276	0.67	454	<0.6	13.7	ND
10/5/79	327	0.17	115	0.9	6.2	3.1
10/11/79	280	0.85	575	0.9	11.7	5.8
10/18/79	265	0.85	575	<0.6	5.4	7.3
11/9/79	405	1.13	765	1.3	77.9	ND
12/3/79	298	0.86	582	1.0	1.9	2.0
1/3/80	221	0.81	548	<0.6	6.4	4.3
4/14/80	8	1.11	751	0.8	4.3	3.7
7/18/80	549	1.36	921	0.5	19.5	ND
10/29/80	341	1.14	772	0.30	1.2	0
1/15/81	913	1.36	921	0.41±0.20	ND	ND
5/13/81	ND	1.55	1050	0.14±0.27	ND	ND

---

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 4.5 miles downstream from mill at Pinedale Road Crossing
Sampling method: See Section C8.

(3) ND No Data.

Table B3.11

Surface Water Monitoring Results(1,2)
RWS-26

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
7/16/79	2596	6.81	4610	53.0	47,862.9	ND(3)
7/27/79	7	<0.01	7	2.6	<0.6	ND
8/17/79	33	0.21	142	<0.6	0.7	ND
8/24/79	147	0.19	129	1.0	1.8	ND
8/30/79	125	0.48	325	1.6	4.7	6.2
9/7/79	197	0.58	393	1.4	0.9	9.8
9/14/79	225	0.18	122	0.6	3.1	7.0
9/23/79	90	0.19	129	<0.6	6.5	9.2
9/27/79	55	0.75	508	<0.6	8.0	ND
10/5/79	301	0.25	169	<0.6	7.8	8.4
10/11/79	262	0.83	562	2.2	11.7	10.9
10/18/79	267	0.75	508	<0.6	10.1	1.3
11/9/79	273	0.80	542	4.3	40.9	ND
12/3/79	574	1.22	826	1.3	10.3	1
1/3/80	209	0.73	494	0.8	9.5	10.1
4/14/80	24	1.12	758	<0.6	3.6	<1.5
7/18/80	470	1.34	907	0.2	11.3	ND
10/29/80	299	1.07	724	0.12	0.9	0
1/15/81	427	0.90	609	0.30±0.18	ND	ND
5/13/81	ND	1.87	1270	(4)	ND	ND

---

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: Sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 13 miles downstream from mill northeast of El Paso Refinery.
Sampling method: See Section C8.

(3) ND No Data.

(4) Samples being rerun.

Table B3.12

Surface Water Monitoring Results(1,2)
RWS-27

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
7/16/79	3354	6.37	4310	23.0	47,862.9	ND(3)
7/27/79	5	<0.01	7	2.6	<0.6	ND
8/17/79	39	0.16	108	<0.6	2.8	ND
8/24/79	3	0.05	34	<0.6	1.8	ND
8/30/79	105	0.40	271	5.7	<0.6	8.7
9/7/79	135	0.28	190	1.6	3.8	8.3
9/14/79	149	0.12	81.2	0.8	1.6	6.7
9/23/79	80	0.22	149	<0.6	4.4	9.1
9/27/79	192	0.81	548	<0.6	3.2	ND
10/5/79	293	0.20	135	1.2	4.7	10.1
10/11/79	224	0.75	508	1.8	10.1	5.6
10/18/79	222	0.59	399	<0.6	0.8	15.0
11/9/79	71	0.24	162	1.8	25.0	ND
12/3/79	453	1.33	900	<0.6	12.2	2.0
1/3/80	146	0.59	399	0.6	6.9	8.9
4/14/80	25	0.17	115	<0.6	<0.6	<1.5
7/18/80	557	1.39	941	0.3	11.8	ND
10/29/80	380	1.04	704	0	3.1	5.0
1/15/81	384	1.09	738	0.54±0.25	ND	ND
5/13/81	ND	1.83	1240	(4)	ND	ND

---

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 16 miles downstream from mill at hogback east of Gallup.
Sampling method: See Section C8.

(3) ND No Data.

(4) Samples being rerun.

Table B3.13

Surface Water Monitoring Results[1,2]
RWS-28

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
7/16/79	105	0.51	345	3.4	29.7	ND[3]
7/27/79	44	0.19	129	6.6	4.0	ND
8/17/79	15	0.16	108	1.6	3.5	ND
8/24/79	49	0.19	129	1.0	<0.6	ND
8/30/79	69	0.33	223	3.1	4.7	<2.7
9/7/79	103	0.48	325	2.3	5.6	4.2
9/14/79	73	0.13	88	0.9	4.7	4.8
9/23/79	70	0.18	122	<0.6	2.9	ND
9/27/79	25	0.10	68	0.8	<0.6	ND
10/5/79	127	0.28	190	<0.6	<0.6	4.0
10/11/79	146	0.43	291	1.7	3.9	9.3
10/18/79	111	0.42	284	<0.6	3.1	19.0
11/9/79	25	0.12	81	0.4	<0.6	ND
12/3/79	69	0.16	108	<0.6	<0.6	1.0
1/3/80	48	0.31	210	<0.6	2.6	11.1
4/14/80	<2	0.13	88	<0.6	<0.6	<1.5
7/18/80	279	0.99	670	0.2	7.7	ND
10/29/80	375	0.61	413	0.06	0.3	0
1/15/81	276	0.87	589	0.32 ± 0.17	ND	ND
5/13/81	ND	1.16	785	(4)	ND	ND

---

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 12/75 at two sites (SW-3, SW-5); following breach, five additional sites have been sampled.
Sampling frequency: semiannually (1975-1976); quarterly (8/77 to 6/15/79); weekly or biweekly (7/79 to 10/79); quarterly after 12/79.
Sampling location: 35 miles downstream from mill at weigh station east of Arizona border.
Sampling method: See Section C8.

(3) ND No Data.

(4) Samples being rerun.

TABLE B3.14

Radionuclide Standards in New Mexico Waters[1]

Radionuclide	Maximum Permissible Concentration In Water In Unrestricted Areas Above Natural Background (Dissolved)
Uranium-Natural	30,000 pci/l
Uranium-235	30,000 pci/l
Thorium-230	2,000 pCi/l
Radium-226	30 pCi/l
Lead-210	100 pCi/l
Polonium-210	700 pCi/l

---

[1] Appendix A, Table II, Column 2 Part 4, Standards for Protection Against Radiation, Radiation Protection Regulations, Environmental Improvement Division, New Mexico State, April 21, 1980.

TABLE B3.15

Records of Wells and Springs in the Vicinity of Church Rock Mill Site(1)

Reference Number	Location(2)	BIA Number	Elev. (Feet)	Depth (Feet)	Aquifer(3)	Water Level (Feet)	Water Level (Date)	Yield During Test, (gpm)	Use of Water(4)
1	16.15.17	16T-348	6900	410	Kd	flow 87	1957 1974	8	D,S
2	16.16. 1	16-K319	7128	963	Kd	320	1948	7	D,S
3	16.16. 6	14N-70	7010	---	Kcd	---	----	0.5	D,S
4	16.16. 6		7030						
5	16.16.11		68755		Qal				
6	16.16.14		6838		Qal				
7	16.16.14		6905	525	Jmw	54	1974		D,S
8	16.16.15	16T-513	6875	318	Jmw	181 275P(5)	1959 1974	33	D,S
9	16.16.16		6799		Qal	 144	 1968		
10	16.16.17		6808		Jmw	319	1974		
11	16.16.17	16T-532	6810	450	Kd				
12	17.15.30	15T-303	7038	614	Kg	305 318P	1952 1974	23	D,S
13	17.16.32	14K-313	7010	622	Kg	235	1953	20	D,S
14	17.16.35		7180	1650	Jmw-Kd	900	1969	20	D

---

(1) Shomaker, (1974).

(2) See Figure B3-8 for locations.

(3) Aquifers: Qal, alluvium, Kcc - Crevasse Canyon Formation, Kcd - Dalton Sandstone Member of Crevasse Canyon Formation, Kmf - Menefee Formation, Kpl - Point Lookout Sandstone, Kg - Gallup Sandstone, Km - Mancos Shale, Kd - Dakota Sandstone, Jmw - Westwater Canyon Sandstone Member of Morrison Formation, Jcs - Cow Springs Sandstone

(4) D = Domestic.
S = Stock Watering.

(5) P = Pump level data

TABLE B3.16

Well Completion Summary[1]

WELL NO.[2]	GROUND ELEVATION (feet, MSL)	TOTAL DEPTH (feet)	SCREENED INTERVAL (feet)	DRILL DIA (inch)	PVC CASING I.D. (inch)	FORMATION[3]
303	7010.3	182	52-172	8 1/4	(4.5)	UG/MANCOS
335	6979.1	180	70-130 130-170	7 7/8	(4.5)	QAL/UG/MANCOS
323A	6977.9	175	65-165	7 7/8	(4.5)T	UG
GW-1	6914.8	60	40- 60	6	4.0	QAL[4]
GW-2	6910.5	95	65- 95	6	4.0	QAL[4]
GW-3	6909.1	80	60- 80	6	4.0	QAL[4]
GW-4	6958.2	60	40- 60	6	4.0	QAL
GW-D1	6955.2	135	105-135	6	2.5	KCD/UG[5]
402	6965.8	154	117-147	8 3/4	4.5	Zone 3 KCD/UG
438	6998.0	175	109-159	12 3/4	6	Zone 3 KCD/UG

(1) SAI (1980b), SAI (1981e), Abbiss (1977).

(2) See Figure B3-7 for well locations.

(3) QAL = Alluvium; UG = Upper Gallup; KCD = Dilco/Torrivio.

(4) These wells are principally at the base of the alluvium but are also screened, in part, up to five feet into an underlying unit (Dilco/Torrivio Sandstone).

(5) Completed in the Dilco/Torrivio Sandstone.

Table B3.17

Groundwater Monitoring Results[1,2]

Well GW-1

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Radium-228 pCi/l	Thorium-230 pCi/l
1/4/77	ND[3]	0.0519	35.1	2.0±1.3	2.5±1.9	ND
3/8/77	95±17	0.0546	37.1	<0.6	<1.0	<0.6
4/15/77	17±9	0.0191	12.9	1.3±0.4	2±1	<0.6
7/30/77	ND	0.020	13.5	<0.6	<1.0	<0.6
10/77	ND	0.07	47.4	0.36	7.6	5.0±1.2
1/25/78	ND	0.044	29.8	0.3	10.9	8.3
4/26/78	ND	0.09	60.9	16.7	4.2	0.4
7/26/78	ND	0.06	40.6	1.7	<1.0	0.6
10/23/78	ND	0.11	74.5	0.6	5.9	3.9
1/23/79	ND	0.06	40.6	0.8	<1.0	<0.6
5/31/79	ND	0.20	135	<0.6	<1.0	<0.6
9/28/79	ND	0.04	27.1	<0.6	<1.0	<0.6
11/14/79	ND	0.11	74.5	2.4	<1.0	<0.6
3/18/80	ND	0.07	47.4	2.7	2.7	2.6
5/28/80	29	0.10	67.7	1.3	ND	<0.6
8/31/80	ND	0.05	33.9	0.92	ND	<0.6
12/19/80	27	0.12	81.2	0.98±0.34	ND	0.14±2.60
2/18/81	ND	0.07	47.4	0.45±0.23	ND	1.5±0.7
5/14/81	ND	0.06	40.6	0.47±0.46	ND	5.4±1.7

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 1/77; results are reported to NMEID.
Sampling frequency: quarterly.
Sampling location: approximately 1000' southwest of southwestern margin of tailings impoundment; 59.5', contact Dilco Sandstone at 57', 4" casing with deepest 20' perforated; gravel packed.
Sampling Method: See Section C8.

(3) ND No Data.

Table B3.18

Groundwater Monitoring Results[1,2]

Well GW-2

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Radium-228 pCi/l	Thorium-230 pCi/l
1/4/77	ND[3]	0.0865	58.6	1.7±1.4	<1.0	ND
3/8/77	86±19	0.0532	36.0	1.4±0.4	<1.0	<0.6
4/15/77	61±19	0.0309	20.9	1.2±0.4	<1.0	36.3±7.8
7/30/77	ND	0.022	14.9	<0.6	<1.0	<0.6
10/77	ND	0.15	102	0.65	8.4	12.7±1.2
1/25/78	ND	0.059	39.9	0.6	3.9	5.1
4/26/78	ND	0.10	67.7	8.0	7.5	1.7
7/26/78	ND	0.07	47.4	4.1	<1.0	0.7
10/23/78	ND	0.09	60.9	1.2	10.3	0.8
1/23/79	ND	0.08	54.2	1.8	1.0	0.9
5/31/79	ND	0.09	60.9	0.8	<1.0	2.2
9/28/79	ND	0.10	67.7	<0.6	<1.0	<0.6
11/14/79	ND	0.10	67.7	<0.6	<1.0	3.3
3/18/80	ND	0.05	33.9	<0.6	<0.6	4.0
5/28/80	51	0.10	67.7	<0.6	ND	<0.6
8/31/80	ND	0.09	60.9	0.54	ND	<0.6
12/19/80	20	0.11	74.5	0.57±0.29	ND	0.0±2.39
2/18/81	ND	0.10	67.7	0.11±0.17	ND	0.38±0.45
5/14/81	ND	0.11	74.5	0.07±0.14	ND	1.3±0.6

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 1/77; results are reported to NMEID.
Sampling frequency: quarterly.
Sampling location: 200' north of GW#1 near south bank of arroyo; 95' TD, contact with Dilco Sandstone at 90', 4" casing with deepest 30' perforated; gravel packed.
Sampling Method: See Section C8.

(3) ND No Data.

Table B3.19

Groundwater Monitoring Results[1,2]

Well GW-3

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Radium-228 pCi/l	Thorium-230 pCi/l
1/4/77	ND[3]	0.0044	3.0	1.8±1.0	<1.0	ND
3/8/77	20±12	0.0262	17.7	2.5±0.5	<1.0	<0.6
4/15/77	29±19	0.0083	5.6	0.8±0.4	4.0±1.0	19.4±8.2
7/30/77	ND	0.021	14.2	<0.6	<1	<0.6
10/77	ND	0.14	94.8	0.29	0.5	19.7±2.3
1/25/78	ND	0.051	34.5	2.80	0.7	32.6
4/26/78	ND	0.14	94.8	9.8	6.7	0.8
7/26/78	ND	0.07	47.4	2.7	23.3	1.0
10/23/78	ND	0.11	74.5	2.7	8.4	<0.6
1/23/79	ND	0.09	60.9	0.9	2.0	<0.6
5/31/79	ND	0.11	74.5	1.0	<1.0	<0.6
9/28/79	ND	0.10	67.7	0.8	<1.0	2.4
11/14/79	ND	0.06	40.6	<0.6	<1.0	<0.6
3/18/80	ND	0.01	6.8	0.7	<0.6	2.6
5/28/80	<2	0.09	60.9	0.8	ND	1.0
8/29/80	ND	0.08	54.2	0.65	ND	<0.6
12/19/80	11	0.13	88.0	0.42±0.27	ND	0.0±2.39
2/18/81	ND	0.11	74.5	0.17±0.18	ND	1.5±0.7
5/14/81	ND	0.14	94.8	0.17±0.41	ND	1.6±0.7

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 1/77; results are reported to NMEID.
Sampling frequency: quarterly.
Sampling location: 150' north of GW-2 near north bank of arroyo; 80 TD, contact with Dilco Sandstone at 75-80', 4" casing with deepest 20' perforated, gravel packed.
Sampling Method: See Section C8.

(3) ND No Data.

Table B3.20

Groundwater Monitoring Results[1,2]

Well GW-4

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Radium-228 pCi/l	Thorium-230 pCi/l
1/4/77	ND[3]	0.0325	22.0	1.8±1.2	<1.0	ND
3/8/77	78±19	0.153	104	1.7±0.5	6.0±2.0	<0.6
4/15/77	78±26	0.147	100	<0.6	2.0±1.0	<0.6
7/30/77	ND	0.124	83.9	<0.6	<1.0	<0.6
10/77	ND	0.20	135	1.25	1.3	4.2±0.5
1/25/78	ND	0.12	81.2	0.4	11.2	6.5
4/26/78	ND	0.17	115	32.8	28.1	0.8
7/26/78	ND	0.15	102	2.1	15.5	1.4
10/23/78	ND	0.28	190	2.3	18.2	<0.6
1/23/79	ND	0.16	108	1.9	<1.0	1.5
6/1/79	ND	0.13	88.0	1.0	<1.0	2.2
9/28/79	ND	0.14	94.8	2.2	<1.0	<0.6
11/14/79	ND	0.14	94.8	1.2	<1.0	2.5
3/18/80	ND	0.10	67.7	0.7	2.9	5.3
5/28/80	<2	0.13	88.0	<0.6	ND	<0.6
8/31/80	ND	0.12	81.2	1.10	ND	<0.6
12/19/80	28	0.17	115	1.55±0.39	ND	0.0±2.46
2/18/81	ND	0.14	94.8	0.46±0.22	ND	0.04±0.30
5/13/81	ND	0.15	102	0.63±0.46	ND	0.50±0.37

---

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 1/77; results are reported to NMEID.
Sampling frequency: quarterly.
Sampling location: 200' north of tailings impoundment on east bank of arroyo at ford in access road; 60' TD, in fine grained channel sands, 4" casing with deepest 20' perforated; gravel packed.
Sampling Method: See Section C8.

(3) ND No Data.

Table B3.21

Groundwater Monitoring Results[1,2]

Well GW-D1

Sample Date	Gross Alpha pCi/l	Total Uranium mg/l	Total Uranium pCi/l	Radium-226 pCi/l	Radium-228 pCi/l	Thorium-230 pCi/l
1/4/77	ND[3]	0.0640	43.3	2.7±1.1	<1.0	ND
3/8/77	25±13	0.0658	44.5	<0.6	1.0	<0.6
4/15/77	61±24	0.0733	49.6	2.2±0.6	5.0±2.0	<0.6
10/77	ND	0.20	135	0.33	0.9	13.3±0.9
1/25/78	ND	0.240	163	0.3	3.4	21.9
5/12/78	ND	0.19	129	1.6	2.7	1.8
7/26/78	ND	0.13	88.0	2.3	1.7	1.4
10/23/78	ND	0.18	122	3.0	11.7	<0.6
3/30/79	ND	0.17	115	2.7	<1.0	2.2
6/1/79	ND	0.10	67.7	1.1	2.0	4.1
9/28/79	ND	0.13	88.0	2.0	<1.0	<0.6
11/14/79	ND	0.16	108	3.9	<1.0	2.5
3/18/80	ND	0.14	94.8	<0.6	0.6	<0.6
5/28/80	20	0.15	102	1.9	ND	<0.6
8/31/80	ND	0.12	81.2	1.45	ND	1.2
12/19/80	81	0.16	108	2.17±0.44	ND	0.0±2.18
2/18/81	ND	0.11	74.5	0.90±0.21	ND	ND
5/14/81	ND	0.15	102	3.37±0.67	ND	1.8±2.6

(1) See Figure B3-7 for location.

(2) UNC Monitoring Program: sampling began 1/77; results are reported to NMEID.
Sampling frequency: quarterly.
Sampling location: 300' east of NM566 between mill and tailings impoundment; 135' TD, contact with Dilco Sandstone at 80' and coal and shale at 105-135'; casing from surface to 135'; deepest 30' perforated.
Sampling Method: See Section C8.

(3) ND No Data.

Table B3.22

Alluvial Well 16K-336 Monitoring Results[1,2,3]

Sample Date	Gross Alpha pCi/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210
10/05/79	6	0.09	<0.6	<0.6	5.7
10/18/79	5	0.08	2.3	1.3	1.5
01/28/80	18	0.05	<0.6	1.3	12.4
04/14/80	11	0.05	1.2	<0.6	<1.5
07/18/80	17	0.07	0.8	<0.6	-

(1) Data provided by UNC, 1981.

(2) Location: Two miles north of gasoline plant off pipeline road.

(3) Well dry after July 1980 sampling.

Table B3.23

Alluvial Well 16K-340 Monitoring Results[1,2]

Sample Date	Gross Alpha pCi/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
01/28/75	ND[3]	0.12	ND	ND	ND
10/15/75	35	0.33	2.9	ND	ND
08/30/79	<2	0.12	3.2	<0.6	ND
10/05/79	13	0.05	1.4	0.7	2.3
10/18/79	21	0.07	2.1	2.7	<7.0
01/28/80	Dry	Dry	Dry	Dry	Dry
04/14/80	<2	<0.01	0.9	<0.6	<1.5
07/18/80	<2	0.06	1.1	<0.6	ND
10/29/80	10	0.07	0.69	0	ND
01/15/81	7	0.06	0.81	1.1	ND
05/13/81	ND	0.02	0.65	0	ND

(1) Data provided by UNC, 1981.

(2) Location: North of Whiterock Mesa.

(3) ND - No data.

Table B3.24

Alluvial Well 16T-339 Monitoring Results[1,2]

Sample Date	Gross Alpha pCi/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
08/31/79	3	0.09	1.3	<0.6	ND[3]
10/05/79	8	0.01	1.0	<0.6	4
10/18/79	12	<0.01	2.2	3.2	<4.7
01/03/80	<2	0.01	0.9	<0.6	4.6
04/14/80	12	<0.01	1.4	<0.6	<1.5
07/18/80	<2	<0.01	0.6	<0.6	ND
10/29/80	<2	0.02	0.57	0	ND
01/22/81	15	0.07	0	0.56	ND
05/13/81	ND	0.01	0	0.87	ND

---

(1) Data provided by UNC, 1981.

(2) Location: North of Defiance.

(3) ND - No data.

Table B3.25

Parker Spring Alluvial Well Monitoring Results[1,2]

Sample Date	Gross Alpha pCi/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
08/31/79	<2	0.17	<0.6	<0.6	ND[3]
10/05/79	19	0.07	0.9	<0.6	8.3
10/18/79	7	0.08	2.1	3.2	<6.8
01/03/80	<2	0.07	1.2	<0.6	5.5
04/14/80	<2	0.07	<0.6	<0.6	<1.5
07/18/80	4	0.06	0.2	<0.6	ND
10/29/80	3	0.07	0.13	0	ND
01/22/81	18	0.07	0.11	0	ND
05/13/81	ND	2.58	0.27	0	ND

(1) Data provided by UNC, 1981.

(2) Location: Foot of Leo Canyon, 12 miles west of Gallup, New Mexico.

(3) ND - No data.

Table B3.26

Sunnyside Trailer Park Alluvial Well Monitoring Results[1,2]

Sample Date	Gross Alpha pCi/l	Total Uranium pCi/l	Radium-226 pCi/l	Thorium-230 pCi/l	Lead-210 pCi/l
07/18/79	5.8	ND[3]	ND	ND	ND
08/31/79	<2	0.13	3.1	1.5	ND
10/05/79	<2	0.06	2.2	0.7	9.0
10/18/79	2	0.05	1.8	0.6	<8.5
01/03/80	6	0.05	0.9	<0.6	14.2
04/14/80	<2	0.04	5.7	<0.6	<1.5
07/18/80	<2	0.06	2.0	<0.6	ND
10/29/80	13	0.04	0.54	0	ND
01/27/81	4	0.05	2.52	0.25	ND
05/13/81	ND	0.02	1.14	0.95	ND

(1) Data provided by UNC, 1981.

(2) Location: Northeast of Gallup.

(3) ND - No data.

TABLE B4.1

Recent Historical Seismicity[1]

Earthquakes Within 200 Kilometers (125 miles) of Site, by Distance From Site

DATE	LATITUDE	LONGITUDE	DISTANCE (KM)	MAGNITUDE
1976 05 20	35.474	109.039	30.83	ND[2]
1976 01 05	35.844	108.341	50.15	5.0
1977 03 05	35.915	108.286	59.39	4.6
1969 08 23	34.846	108.698	72.73	3.9
1950 01 17	35.700	109.600	84.36	5.0
1940 05 17	35.200	107.800	88.18	ND
1973 12 24	35.258	107.739	91.19	4.4
1918 05 01	35.000	110.000	130.49	ND
1966 09 09	35.700	108.300	138.20	ND
1966 03 24	36.800	108.300	148.96	ND
1921 04 06	34.900	110.200	151.75	4.3
1921 07 31	36.000	107.000	163.18	3.0
1931 02 05	35.100	106.800	178.08	5.0
1975 09 29	35.955	106.787	179.95	ND
1966 08 12	36.600	107.200	182.07	ND
1975 06 28	34.763	106.895	183.47	ND
1973 02 09	36.430	110.425	186.54	3.2
1936 09 09	35.100	106.700	186.88	ND
1954 11 02	35.100	106.700	186.88	3.7
1954 11 03	35.100	106.700	186.88	4.3
1956 04 26	35.100	106.700	186.88	4.3
1967 12 10	16.678	107.208	187.44	5.1
1938 03 23	34.800	106.800	189.48	ND
1948 12 03	35.000	110.700	189.94	ND
1970 11 28	35.000	106.700	189.94	4.5
1971 01 04	35.022	106.691	190.00	4.7
1918 05 28	35.500	106.600	190.11	5.7
1971 03 14	36.478	110.437	190.40	2.2
1931 04 07	34.300	110.200	191.10	4.3
1966 01 25	36.800	107.300	191.57	ND
1899 02 09	34.700	106.800	194.40	ND
1935 12 12	34.700	106.800	194.40	ND
1935 12 18	34.700	106.800	194.40	4.3
1935 12 19	34.700	106.800	194.40	ND
1935 12 19	34.700	106.800	194.40	ND
1935 12 22	34.700	106.800	194.40	3.7
1935 12 31	34.700	106.800	194.40	ND

TABLE B4.1

Recent Historical Seismicity[1]
(cont'd)

Earthquakes Within 200 Kilometers (125 miles) of Site, by Distance From Site

DATE	LATITUDE	LONGITUDE	DISTANCE (KM)	MAGNITUDE
1966 01 23	36.900	107.400	194.53	ND
1938 04 15	35.100	106.600	195.71	ND
1938 04 16	35.100	106.600	195.71	ND
1973 09 22	34.465	106.952	196.49	3.1
1971 05 01	36.601	110.481	201.56	2.0

Total Earthquakes Within 200 Kilometers (125 miles) of the Site Since 1899 is 41

(1) CSI, 1980
(2) ND - Magnitude not determined

TABLE C1.1
Mill Material Input (1)

Point Where Added	Solids lb/min	Water gal/min	H_2SO_4 lb/min	$NaClO_3$ lb/min	Polyacrylamide lb/min	Kerosene gal/min	Amine lb/min	Isodecanol lb/min	NH_3 lb/min
Ore	5555	74.0							
Grinder		600.0 (2)							22.24 (2)
Leaching		1.62		5.56					
Leaching		1.50	250						
Leaching		36.0 (3)							
Thickener		24.88			0.56				
Solvent Extraction						1.40	0.30	0.55	
Stripping									2.43
Precipitator									4.83
ADU Thickener		6.0							
Centrifuge		12.0							
Dust Collector		4.5							
TOTAL	5555	760.0 (6336 lb/min)	250	5.56	0.56	1.40	0.30	0.55	29.50

(1) Data from UNC Mining and Milling, 1981
(2) Neutralized
(3) As steam

TABLE C1.2
Mill Material Output(1)

	To Atmosphere	To Tailings									Product
Point of Release	Gaseous CO_2 lb/min	Solids lb/min	Water gal/min	H_2SO_4 lb/min	NaCl lb/min	Polyacrylamide lb/min	Kerosene gal/min	Amine lb/min	Isodecanol lb/min	NH_3 lb.min	Yellowcake lb/min
Leaching	62										
Thickener		5607.37	672	85	3.05	0.56					
Extraction			100				1.40	0.30	0.55	22.24	
Sand Filter										7.26	
Dryer											8.5
TOTAL	62	5607.37	772 (6436 lb/min)	85	3.05	0.56	1.40	0.30	0.55	29.50	8.5

(1) Data from UNC Mining and Milling, 1981

TABLE C1.3
Mill Related Airborne Effluents(1)

Gaseous Effluent Discharge Point	Prior Treatment	Effluent	Volume of Gas	Effluent Concentration	Quantity of Effluent Discharged
Stack from precipitator and dryer	Impingent-type scrubber	NH_3	7,000 ft^3/min	11.1 mg/m^3	9 lb/day
Stack from yellowcake packaging	Venturi-type wet scrubber	Processed Ore Dust(2,3)	2,000 ft^3/min	0.23 mg/m^3	1 lb/day
Stack from grinding area and leach tanks	Wet scrubber	Ore dust(3)	11,500 ft^3/min	Near zero	Trace
		Acid mist		UNK(4)	Trace
		CO_2		18%	62 lb/min
Stack from laboratories	None	Miscellaneous chemicals	2,000 ft^3/min	UNK	UNK
Solvent extraction outdoor facility	None	Kerosene	NA(5) open air process	UNK	Trace
Ore piles and conveyor	Kept wet	Dust	NA	Near zero	Trace
Tailings area	Kept wet	Kerosene	NA	UNK	Trace(6)

(1) Data provided by UNC Mining and Milling, 1981
(2) Primarily U_3O_8
(3) "Dust" only after flow through scrubber
(4) UNK - Unknown
(5) NA - not applicable
(6) Most of kerosene used stays in tailings

Table C2.1

Approval Dates for Construction
Activities Requiring Stability Analyses

Construction Activity/Design	By	Approval Date(s)
Original Starter Dam Design	Kaiser	SEO - 4/7/76 [1]
Dam Raising to 7,004 Feet	SH&B	SEO - 4/26/79
Breach Repair and Cross Dike Construction	SH&B	SEO - 1/29/80 EID - 2/7/80 [2]
North Cell Dry Tailings Disposal	Raney	SEO - 6/8/81 EID - 6/12/81

(1) SEO (State Engineers Office).

(2) EID (Environmental Improvement Division).

Table C3.1

Church Rock Sand Backfill Data[1]

MONTH/YEAR	TOTAL BACKFILL EMPLACED (tons)
November/1979	11,049.79
December/1979	14,422.65
January/1980	18,766.67
February/1980	7,438.20
March/1980	2,687.25
April/1980	8,035.40
May/1980	10,040.70
June/1980	40.50
July/1980	18,479.70
August/1980	16,148.05
September/1980	13,018.72
October/1980	16,941.50
November/1980	13,601.25
December/1980	8,824.35
January/1981	11,289.50
February/1981	No Backfilling
March/1981	11,786.50
April/1981	3,369.51
May/1981	7,009.86
June/1981	3,836.00
July/1981	786.00
August/1981	3,306.82
September/1981	No Backfilling
Total Backfill Emplaced to Date	200,878.92

Monthly Average = 8732.1

(1) Data from UNC Mining and Milling, 1981

Table C3.2

Backfill Sands - Chemical and Radiological Data[1]

	Mean	Standard Deviation
Ra-226 (pCi/g)	143.1	97.6
Ra-228 (pCi/g)	19.17	51.46
Pb-210 (pCi/g)	122.3	93.63
Th-230 (pCi/g)	834.88	2,467.2

Analytical Data

%	Mean	Standard Deviation
SO4	1.494	1.243
Fe	.8993	.4877
Cl	1.394	1.926
Mg	.0648	.0436
Mo	.0011	.0016
As	.00036	.00018
Zn	.0025	.0016
NH3	.001	0
Na	.2615	.654
Si	91.292	11.44
K	.0819	.1219
Pb	.0012	.0010
Mn	.0073	.00238
Ca	.2667	.2699
Ba	.01133	.0140
Al	.1797	.0950
Se	.00047	.00022

Screens

+ 28 mesh	8.48%
- 28 + 48 mesh	32.26%
- 48 + 65 mesh	22.11%
- 65 + 100 mesh	16.53%
- 100 + 200 mesh	10.61%
- 200 mesh	10.01%

(1) Data from UNC Mining and Milling, 1981

Table C3.3

Backfill Slurry - Chemical Data[1]

Parameter[2]	Mean	Standard Deviation
Alk.	1	0
Al	200	281.8
Ba	0.01	0
Ca	410	28.3
Cl	89.5	48.8
Fe	148	186
Mg	215	77.8
Mn	48	1.4
pH	2.6	0.85
K	0.31	0.27
Se	0.01	0
Si	175	35.4
Na	300	28.3
TDS	8,845	3,726
Cond. (mho/cm)	3,748	3,660
SO4	7,198	733
Zn	5.1	2.27
U (pCi/ l)	19.0	16.25
Ra-226 (pCi/ l)	77	0
Ra-228 (pCi/ l)	2	0
Th-230 (pCi/ l)	2.7	0

(1) Data from UNC Mining and Milling, 1981

(2) All parameters reported in mg/l unless otherwise specified.

TABLE C4.1

SOURCE LOCATION TABLE

SOURCE DESCRIPTION	LOCATION			
	x (km)	y (km)	z (m)	Area (km)
South Tailings*	0.12	-0.88	-16.00	0.100
South-Central Tailings*	0.33	-0.64	-16.00	0.074
Central Tailings*	0.58	-0.39	-16.00	0.100
North Tailings*	0.79	-0.18	-16.00	0.074
East Tailings*	0.81	-0.46	-16.00	0.093
Northeast Tailings*	1.00	-0.36	-16.00	0.054
Ore Piles and Dust	0.16	0.02	2.28	0.003
Yellowcake Dryer Stack	0.00	0.00	18.59	0.000
Yellowcake Packaging Stack	0.01	0.00	17.37	0.000
Sandfill Area 1*	-0.73	0.20	187.50	0.007
Sandfill Area 2*	-0.28	0.74	30.00	0.007

NOTES

(1) A positive x value indicates east and a negative x value indicates west of the yellowcake dryer stack origin.

(2) A positive y value indicates north and a negative y value indicates south of the yellowcake dryer stack origin.

(3) A positive z value indicates meters above and a negative z value indicates meters below the base of the yellowcake dryer stack.

*Used only for the run which includes tailings sources.

TABLE C4.2

AVERAGE ANNUAL RELEASE RATES FOR STACKS

	U NATURAL	Ra-226	Th-230	Pb-210
Dryer, Mean (Ci/yr)	0.293	2.44×10^{-4}	7.33×10^{-4}	2.02×10^{-5}
Dryer, MILDOS Input* (Ci/yr)	0.073	6.1×10^{-5}	1.83×10^{-4}	5.04×10^{-6}
Packaging, Mean (Ci/yr)	1.53×10^{-2}	2.81×10^{-5}	9.02×10^{-5}	2.75×10^{-6}
Packaging, MILDOS Input* (Ci/yr)	3.83×10^{-3}	7.03×10^{-6}	2.26×10^{-5}	6.88×10^{-7}

*Assumed 25 percent of the measured stack value.

TABLE C4.3

STACK PARAMETERS

	DRYER	PACKAGING
Average Stack Dry Flow Rate		
in m^3/hr	7750	1667
in m^3/sec	2.10	0.463
Stack Diameter (m)	0.851	0.286
Average Exit Velocity (m/sec)	3.69	7.22
Product of Inside Stack Diameter and Average Exit Velocity* (m^2/sec)	3.14	2.06

*Input format required by MILDOS.

TABLE C4.4

TAILINGS SOLIDS: BULK SPECIFIC ACTIVITY[1]

S-4 - Tailings Sump or Cyclone Feed

DATE	U TOTAL (m Ci/gm) x 10^{-6}	Th-230 (m Ci/gm) x 10^{-6}	Ra-226 (m Ci/gm) x 10^{-6}	Pb-210 (m Ci/gm) x 10^{-6}
4/23/80	53.5	1.1±0.1	0.45±0.07	680±10
5/14/80	ND[2]	1.6±0.1	38±4	172±4
5/21/80	ND	27±2	220±33	37±1
5/28/80	24.2	0.6±0.1	226±10	71.4±2.8
6/04/80	ND	0.6	300±45	190±4
6/11/80	8.05	1.5±0.8	654±98	<0.1
6/18/80	20.1	256±0.14	328±49.2	88±2
7/09/80	129.95	1.2±0.1	270±41	69.2±1.0
7/16/80	ND	214±20.4	255.6±7.7	296±4
7/23/80	68.4	184±45.2	261.7±8.1	178.7±3.4
7/30/80	ND	566±62	191.7±6.6	140.8±4.2
8/06/80	ND	218±28	82.8±3.9	241.6±5.1
8/20/80	ND	4406.0±184.0	10.4±0.8	367.4±6.2
8/28/80	ND	321.1±16.0	139.1±4.0	252.6±4.8
9/18/80	ND	351.9±40.7	112.9±4.5	340.4±12.3
9/25/80	ND	ND	332.4±11.9	265.6±14.4
1/07/81 (1/81)	56.4	299±34	13±1	131±17
1/14/81	ND	1454±204	76±4	532±65
2/04/81	ND	328±80	241±4	363±41
2/11/81	ND	381±81	230±10	440±100
3/81	68.4	ND	ND	ND
4/81	58.1	ND	ND	ND
5/81	58.7	ND	ND	ND
6/81	48.9	ND	ND	ND
7/81	44.3	ND	ND	ND
		CYCLONE		
1/14/81	ND	950±146	90±7	116±93
2/04/81	ND	209±61	154±4	243±82
2/11/81	ND	132±50	103±4	600±80
Average of Means	53.3±30.9	468.4±945	188.3±145.1	252.9±180.6

(1) Data provided by UNC, 1981

(2) ND - No Data.

TABLE C4.4 (Continued)

TAILINGS SOLIDS: BULK SPECIFIC ACTIVITY[1]

Sandfill Data

SAMPLE DATE	TOTAL U (pCi/g)	Ra-226 (pCi/g)	Th-230 (pCi/g)	Pb-210 (pCi/g)
1979	81.2	93.4	40.0	ND[2]
1979	36.6	77.4	26.9	ND
4/23/80	28.2	0.20±0.03	1.9±0.1	440±13
5/14/80	26.5	168±7	0.9±0.6	<1.5
5/28/80	33.4	139±7	0.68±0.07	107±39
6/04/80	15.0	155±23	2.6±0.4	72±2.2
6/11/80	20.1	174±260	2.7±0.3	50±1.4
6/18/80	13.2	124±18	0.25±0.04	63±2
7/09/80	76.5	81±12	1.2±0.1	26.4±0.6
7/16/80	ND	267.9±7.9	10000±462	269±5
7/23/80	69.0	151.3±4.1	86.8±26.8	122.1±4.9
7/30/80	ND	93.1±3.2	241±38	74.12±4.77
8/06/80	ND	152.7±3.8	218±41	127.9±3.9
8/20/80	ND	21.4±1.1	428.5±14.5	143.1±5.5
8/28/80	ND	7.5±0.7	157.5±210	161.0±6.4
8/28/80	ND	251.5±7.3	3972±258	142.9±5.2
9/18/80	ND	148.3±4.4	56.22±39.43	117.7±7.2
9/24/80	ND	16.9±1.3	ND	109.2±9.1
1/81	ND	93±2	102±14	182±26
Means	40.0±25.8	116.6±75.1	852.2±2462.0	130.0±101.6

(1) Data provided by UNC, 1981

(2) ND - No Data

TABLE C4.5

AVERAGE SOURCE RELEASE RATES

SOURCE NAME	RELEASE RATE (CURIES/YEAR)				
	U-238	Th-230	Ra-226	Pb-210	Rn-222
South Tailings	0.0054	0.047	0.019	0.026	7.0
South Central Tailings	0.0040	0.035	0.014	0.019	5.2
Central Tailings	0.0054	0.047	0.019	0.026	7.0
North Tailings	0.0040	0.035	0.014	0.019	5.2
East Tailings	0.0050	0.044	0.018	0.024	6.5
Northeast Tailings	0.0029	0.026	0.010	0.014	3.8
Ore Piles and Dust	0.0021	0.0014	0.00057	0.00077	136.0
Yellowcake Dryer Stack	0.017	6.2×10^{-6}	0.0013	5.0×10^{-6}	0.0
Yellowcake Packaging Stack	0.0092	9.7×10^{-7}	0.0016	6.9×10^{-7}	0.0
Sandfill Area 1	0.00028	0.0022	0.00083	0.00092	0.0049
Sandfill Area 2	0.00028	0.0022	0.00083	0.00092	0.0049

TABLE C4.6

NEW MEXICO VEGETABLE PRODUCTION

YIELDS FOR THE STATE[1]
(kg/acre)

	1978	1979	TWO-YEAR AVERAGE
Spring Lettuce	12273	6818	9546
Fall Lettuce	8637	9901	8864
Onions	14545	13636	14091
Chile Peppers	1397	1089	1243
			33744

Average production for 4 vegetables = 8436 kg/acre/yr

= 2084507 kg/km^2/year

(1) U.S. Department of Agriculture, 1979.

TABLE C4.7
NEW MEXICO MEAT PRODUCTION
FOR CATTLE, COWS, SHEEP, AND LAMBS[1]

YEAR	ALL CALVES AND CATTLE x 10^3 (head)	SLAUGHTERS x 10^3 (head)	TOTAL LIVE WEIGHTS OF SLAUGHTERS x 10^3 (pounds)	ALL SHEEP AND LAMBS x 10^3 (head)	SLAUGHTERS x 10^3 (head)	TOTAL LIVE WEIGHTS OF SLAUGHTERS x 10^3 (pounds)
1975	1,720	576.6	551858	578	95.3	10098
1976	1,650	524.5	522998	590	92.1	9445
1977	1,500	573.6	574986	560	85.7	9893
1978	1,500	539.4	516530	571	82.5	9876
1979	1,500	506.8	499984	604	79.9	9779
Five Year Average	1,584	544.2	533271	581	87.1	9818

(1) U.S. Department of Agriculture, 1979.

TABLE C4.8

NEW MEXICO MILK PRODUCTION FOR COWS[1]

YEAR	POUNDS MILK/COW/YEAR
1976	13065
1977	13742
1978	13879
1979	14457
TOTAL	55143
AVERAGE	13786 = 6253 kg milk/cow/year

(1) U.S. Department of Agriculture, 1979.

TABLE C4.9

SUMMARY TABLE OF FOOD CHAIN PARAMETERS USED IN MILDOS

PARAMETER DESCRIPTION	VARIABLE NAME IN MILDOS[1]	VALUE
Individual annual feed requirement satisfied by pasture grass	FFORI	1.0
Population annual feeding requirement satisfied by pasture grass	FFORP	1.0
Individual annual feed requirement satisfied by hay	FHAYI	0.0
Population annual feed requirement satisfied by hay	FHAYP	0.0
Food production rate - vegetables	FPR (1)	207.0 $kg/yr/km^2$
Food production rate - meat	FPR (2)	134.0 $kg/yr/km^2$
Food production rate - milk	FPR (3)	109.0 $kg/yr/km^2$

(1) Strange and Bander, 1981.

TABLE C4.10

POPULATION PROJECTIONS FOR MCKINLEY COUNTY(1)

YEARS	PERCENT POPULATION INCREASE
1980-1985	32
1985-2001	44
2001-2006	2

(1) University of New Mexico, 1981.

TABLE C4.11

ANNUAL 40 CFR 190 DOSE (mrem/yr)
AFTER 20-YEARS OPERATION
WITHOUT CONTRIBUTION OF TAILINGS

LOCATION	CHILD'S BONE	CHILD'S LUNG	CHILD'S BRONCHIAL TUBES
North Boundary	14.5	45.5	0.7
Northeast Boundary	3.7	10.0	0.2
Southeast Boundary	0.3	0.9	0.01
Southwest Boundary	1.2	4.1	0.05
Nearest Resident	16.0	53.9	0.75
Environmental Monitoring Station A	7.26	23.7	0.31
Nearest Downwind Resident	0.0	2.8	0.05
Nearest Community	0.04	0.1	0.00
Nearest Downwind Community	0.01	0.04	0.00
Nearest Grazing Area	0.8	2.3	0.04
Gallup	0.01	0.03	0.00
Springstead Trailer Court	0.1	0.3	0.00
Navajo Grazing Area	6.1	17.0	0.3

TABLE C4.12

ANNUAL TOTAL DOSE (mrem/yr)
AFTER 20 YEARS OF MILL OPERATION
INCLUDING CONTRIBUTION OF TAILINGS
AND RN-222

LOCATION	CHILD'S BONE	CHILD'S LUNG	CHILD'S KIDNEY	CHILD'S BRONCHIAL TUBES
North Boundary*	32.0	49.9	9.17	459.0
Northeast Boundary*	317.0	85.4	105.0	70.8
Southeast Boundary*	14.0	4.3	4.6	4.5
Southwest Boundary*	7.2	5.6	2.3	9.3
Nearest Resident	27.2	56.1	6.7	69.3
Environmental Monitoring Station A	21.5	26.6	5.76	51.3
Nearest Downwind Resident	20.3	7.7	6.7	6.7
Nearest Community	0.5	0.3	0.2	0.2
Nearest Downwind Community	0.3	0.1	0.1	0.2
Nearest Grazing Area*	416.0	98.9	139.0	84.3
Gallup	0.04	0.02	0.02	0.2
Springstead Trailer Court	0.2	0.4	0.06	0.4
Navajo Grazing Area*	38.2	25.0	12.1	31.0

*No residents at these locations.

TABLE C4.13

ANNUAL POPULATION DOSE COMMITMENTS (person-rem/yr)
AFTER 20 YEARS OF MILL OPERATION
INCLUDING CONTRIBUTION OF TAILINGS,
RN-222, AND ITS DAUGHTER PRODUCTS

EXPOSURE PATHWAY	EXPOSED ORGAN			
	WHOLE BODY	BONE	LUNG	BRONCHIAL TUBES
Inhalation	0.08	2.18	4.89	13.3
Ground	0.46	-	-	-
Cloud	0.21	-	-	-
Vegetable Ingestion	0.27	3.44	-	-
Meat Ingestion	0.02	0.30	-	-
Milk Ingestion	0.02	0.20	-	-

TABLE C4.16

INDIVIDUAL AIRBORNE PARTICULATE CONCENTRATIONS (picocuries/m^3) AT RECEPTORS AS CALCULATED BY MILDOS AFTER 20 YEARS)

RECEPTOR	U-238	TH-230	RA-226	PB-210
North Boundary	2.0×10^{-2}	1.1×10^{-3}	4.3×10^{-4}	5.6×10^{-4}
Northeast Boundary	6.2×10^{-3}	1.7×10^{-2}	6.8×10^{-3}	9.1×10^{-3}
Southeast Boundary	4.6×10^{-4}	7.7×10^{-4}	3.1×10^{-4}	4.1×10^{-4}
Southwest Boundary	1.8×10^{-3}	3.5×10^{-4}	1.4×10^{-4}	1.8×10^{-4}
Nearest Resident	2.3×10^{-2}	8.2×10^{-4}	3.2×10^{-4}	4.0×10^{-4}
Environmental Monitoring Station A	1.0×10^{-2}	9.7×10^{-4}	3.8×10^{-4}	4.8×10^{-4}
Nearest Downwind Resident	1.3×10^{-3}	1.1×10^{-3}	4.6×10^{-4}	6.1×10^{-4}
Nearest Community	5.9×10^{-5}	2.8×10^{-5}	1.1×10^{-5}	1.5×10^{-5}
Nearest Downwind Community (Crownpoint)	2.0×10^{-5}	2.1×10^{-5}	8.5×10^{-6}	1.1×10^{-5}
Nearest Grazing Area (within restricted area)	3.4×10^{-3}	2.1×10^{-2}	8.6×10^{-3}	1.2×10^{-2}
Gallup	1.2×10^{-5}	1.6×10^{-6}	6.3×10^{-7}	8.3×10^{-7}
Springstead Trailer Court	1.4×10^{-4}	6.8×10^{-4}	2.7×10^{-6}	3.5×10^{-6}
Navajo Grazing Area	7.4×10^{-3}	1.9×10^{-3}	7.5×10^{-4}	1.0×10^{-3}
Maximum Permissible Concentrations(1)	5.0	8.0×10^{-2}	3.0	4.0

(1) Maximum permissible concentrations were obtained from 10 CFR 20, Appendix B, Table II, Column 1, Soluble.

TABLE C5.1

Boiler[1] Stack Emissions and Relevant Standards

Parameter[2]	Average Annual Discharge Rate[3] lb/hr	Maximum Hourly Discharge Rate[4] lb/hr	Average Annual Conc.[3,5] lb/ft^3	Maximum Conc.[4,5] lb/ft^3	Discharge per Energy Output $lb/10^6$ BTU	NM Emission Standard NMSA 1978
particulate [6]	1.25	3.10	$5.2x10^{-7}$	$1.29x10^{-6}$	0.045 0.11 (hourly max[4])	0.03 $lb/10^6$ BTU
SO_2 [6]	10.4	25.9	$4.33x10^{-6}$	$1.08x10^{-5}$		does not apply [8]
SO_3 [6]	0.13	0.33	$5.4x10^{-8}$	$1.38x10^{-7}$		none
CO	0.98	2.44	$4.08x10^{7}$	$1.0x10^{-6}$		none
hydrocarbons	0.20	0.49	$8.3x10^{-8}$	$2.0x10^{-7}$		none
NO_x, as NO_2 [7]	5.01	12.7	$2.11x10^{-6}$	$5.29x10^{-6}$		does not apply (8)

(1) Industrial-type boiler, $51.4x10^6$ BTU/hr capacity ($45,000x10^6$ BTU/yr cap.).
(2) Calculated according to U.S. E.P.A., 1977a.
(3) Based on average annual consumption of 1,708,700 gal/yr No. 6 fuel oil.
(4) Based on hourly maximum consumption of 487 gal/hr No. 6 fuel oil (UNC, 1976).
(5) Based on 40,000 ft^3/min stack flow rate.
(6) Sulfur content = 0.34% by weight (Plateau Oil, pers. comm., 1981).
(7) Based on estimated N content, 0.1% N by weight (Plateau Oil, pers. comm., 1981).
(8) Standard applies only to oil fired plants generating $1,000,000x10^6$ BTU/yr or more

TABLE C5.2

Direct Employment and Income, UNC Mining and Milling Operations, 1980-1981[1]

Year	Hourly Employees	Average Annual Earnings	Salaried Employees	Average Annual Salary	Approximate Total Annual Payroll
1980	451	$32,200	218	$37,848[2]	$22,773,064
1981	373	$24,925[3]	169	$29,260	$14,241,965

(1) Fourth quarter 1981 figures are estimated.

(2) The 1980 average annual salary figure is inflated because many salaried employees were laid off during the year and these individuals received severance bonuses.

(3) The 1981 average annual earnings for hourly employees is substantially lower than the 1980 figure because overtime benefits and production bonuses were reduced.

Table C5.3

Taxes Generated by UNC Mining and Milling Operations,

1980 and 1981 Averages[1]

Tax	Amount Paid to the Federal Government	Amount Paid to the State Government
Paid by UNC		
Severance Tax	-	$2,835,000
Processors Tax	-	615,000
Conservation Tax	-	40,000
Continued Care Tax	-	135,000
Property Tax	-	915,000
Unemployment	$ 45,000	150,000
FICA	1,135,000	-
Sales Tax	-	700,000
Total Paid by UNC	$1,180,000	$5,390,000
Withheld from Employees		
Income Tax	$3,695,000	$ 475,000
FICA	1,135,000	-
Total Withheld	$4,830,000	$ 475,000
Grand Total	$6,010,000	$5,865,000

1. Averages are based on the actual totals for all of 1980 and the first three quarters of 1981; fourth quarter 1981 figures were estimated.

TABLE C5.4

Government Expenditures for Direct and Indirect Population in McKinley County and Gallup, FY81-82[1]

CATEGORY	McKINLEY COUNTY PER CAPITA EXPENDITURE (dollars)	McKINLEY COUNTY DIRECT POPULATION[2] (thousands of dollars)	McKINLEY COUNTY INDIRECT POPULATION[3] (thousands of dollars)	McKINLEY COUNTY TOTAL (thousands of dollars)	GALLUP PER CAPATA EXPENDITURE (dollars)	GALLUP DIRECT POPULATION[4] (thousands of dollars)	GALLUP INDIRECT POPULATION[5] (thousands of dollars)	GALLUP TOTAL (thousands of dollars)	TOTAL CITY-COUNTY EXPENDITURES DIRECT POPULATION (thousand of dollars)	TOTAL CITY-COUNTY EXPENDITURES INDIRECT POPULATION (thousand of dollars)
Administration	20.17	29.27	27.09	56.36	54.36	53.10	49.36	102.46	82.37	76.45
Public Safety	13.14	19.07	17.65	36.72	174.99	170.97	158.89	329.86	190.04	176.54
Public Works/ Transportation	13.47	19.54	18.09	37.63	763.52	745.96	693.28	1439.24	765.50	711.37
Economic Development and Assistance	--	--	--	--	68.88	67.30	62.54	129.84	67.30	62.54
Health/Welfare	5.06	7.34	6.80	14.14	--	--	--	--	7.34	6.80
Recreation	0.06	0.09	0.08	0.17	79.83	77.99	72.49	150.48	78.08	72.57
Education	643.52[6]	933.75	864.25	1798.00	--	--	--	--	933.75	864.25
Debt Service	--	--	--	--	57.02	55.71	51.77	107.48	55.71	51.77
Miscellaneous	0.46	0.67	0.62	1.29	11.06	10.81	10.04	20.85	11.48	10.66
TOTAL	695.91	1009.73	934.58	1944.31	1209.66	1181.84	1098.37	2280.21	2191.57	2032.95

1. Data from FY81-82 budgets for Gallup and McKinley County.
2. Based on an estimated direct population residing in McKinley County of 1451.
3. Based on an estimated indirect population residing in McKinley County of 1343.
4. Based on an estimated direct population residing in Gallup of 977.
5. Based on an estimated indirect population residing in Gallup of 908.
6. McKinley County and Gallup have a consolidated school system.

TABLE C6.1

RADIONUCLIDE CONCENTRATIONS FOUND IN WATERWAYS FOLLOWING BREACH

Radionuclides	Maximum River Water Concentration (dissolved)(1) (pCi/l)	Concentration at Site SW-5 on 8/30/79(2) (pCi/l)	Concentration at Site RWS-25 on 8/30/79(3) (pCi/l)	Maximum Permissible Concentration Above Background (dissolved)(4) (pCi/l)
Natural Uranium (U-nat)	8.80×10^3	4.20×10^2	4.27×10^2	3.0×10^4
Thorium-230 (Th-230)	4.8×10^4	3.8	4.7	2.0×10^3
Radium-226 (Ra-226)	5.5×10^2	2.3	1.8	3.0×10^1
Lead-210 (Pb-210)	1.3×10^3	5.3	4.7	1.0×10^2
Polonium-210 (Po-210)	1.3×10^3	ND(5)	ND	7.0×10^2

(1) Public Health Service, 1980.

(2) UNC Data; SW-5 is a surface water sampling site 5 miles downstream from mill.

(3) UNC Data; RWS-25 is a surface water sampling site 4.5 miles downstream from mill.

(4) Appendix A, Table II, Column 2, part 4, Standards for Protection Against Radiation, Radiation Protection Regulations, New Mexico. Environmental Improvement Division, April 21, 1980. MPC is based on an annual mean.

(5) No Data.

TABLE C6.2

Average Radionuclide Concentrations In Alluvial Wells[1]

WELL NUMBER[2]	AVERAGED CONCENTRATIONS			
	Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
TWQ-111D	0.86	0.40	1.4	3.3
TWQ-105A	0.0	0.57	0.5	1.1
TWQ-7D	0.9	0.9	2.0	2.1
TWQ-103A	N/A	2.4	1.3	3.3
TWQ-102A	0.7	1.0	0.4	2.7
TWQ-101A	0.0	0.0	0.4	4.3
TWQ-25D	2.8	0.59	0.8	3.2
TWQ-24D	9.5	0.0	0.6	1.8
TWQ-22M	4.7	0.47	0.8	2.2
TWQ-29A	10.0	0.0	0.4	5.7
TWQ-28D	0.0	0.13	0.7	0.7
TWQ-30D	0.0	0.0	0.5	3.6
TWQ-23A	0.0	2.2	2.1	4.2

(1) Reference: SAI, 1981e.

(2) See Figure C6-1 for well locations.

TABLE C6.3

Average Radionuclide Concentrations In Dilco Coal Wells[1]

WELL NUMBER[2]	AVERAGED CONCENTRATIONS Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
TWQ-115D	6.9	1.7	1.7	12.0
TWQ-114D	4.6	0.27	1.2	6.3
TWQ-123	3.1	0.15	1.1	8.5
TWQ-9D	2.2	1.1	3.2	3.7
TWQ-106D	2.9	7.1	1.3	4.1
TWQ-104D	0.4	0.57	1.3	3.2
TWQ-4D	0.6	0.84	1.9	7.3
TWQ-3D	0.5	0.61	1.4	8.2
TWQ-155	21.0	12.0	1.6	4.1
TWQ-10D	1.1	1.4	2.1	2.9

(1) Reference: SAI, 1981e.

(2) See Figure C6-1 for well locations.

TABLE C6.4

Average Radionuclide Concentrations In Zone 3 Wells[1]

WELL NUMBER[2]	AVERAGED CONCENTRATIONS			
	Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
402	8.4	0.0	0.6	7.9
TWQ-124	1780	7.8	1.9	10.0
TWQ-125	5.5	0.0	0.5	7.7
TWQ-121	11.0	1.4	0.6	1.7
TWQ-27A	0.0	0.7	0.4	1.6

(1) Reference: SAI, 1981e.

(2) See Figure C6-1 for well locations.

TABLE C6.5

Average Radionuclide Concentrations In Zone 1 Wells(1)

WELL NUMBER(2)	AVERAGED CONCENTRATIONS Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
TWQ-139	12.0	0.66	1.4	5.5
TWQ-140	5.3	1.8	0.4	2.1
TWQ-141	15.8	2.4	0.6	3.0
TWQ-142	0.0	0.1	0.4	2.2
TWQ-143	0.0	0.86	2.3	3.9
TWQ-144	15.9	2.3	4.5	2.5
TWQ-147	5.7	0.0	4.5	4.5
TWQ-138	37.6	2.7	1.0	3.1
TWQ-120	6140	2.0	0.8	3.4
314	2430	18.0	1.1	5.0
320	1700	11.0	0.7	5.7
319	5420	0.0	1.1	2.1
318	884	1.9	2.0	4.2
317	5090	5.7	4.0	41.0
316	1690	0.99	1.1	6.8
315	16.0	0.99	0.6	3.0
305	1.7	0.22	0.3	3.5
306	1.3	3.7	1.2	2.3
307	N/A	1.4	1.1	1.5
313	27.0	2.7	4.9	17.0
312A	130.0	20.0	2.0	13.0
311	29.0	0.3	0.3	3.3
310	0.21	1.7	0.3	3.8
304	0.15	0.25	1.1	3.1
303	38.0	0.15	0.4	1.7
302	17.0	1.3	0.35	2.1

TABLE C6.5

(Continued)

WELL NUMBER[2]	AVERAGED CONCENTRATIONS Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
301	0.2	0.0	0.4	4.8
309	75.0	N/A	0.5	2.9
308	16.0	1.9	0.7	1.6
339	0.0	0.0	9.2	4.0
TWQ-132	2.7	0.0	1.1	6.2
TWQ-20DM	1210	2.2	0.4	1.0
TWQ-35M	0.0	0.1	1.0	2.9
TWQ-31M	15.0	4.8	0.5	2.8
TWQ-34M	23.0	0.0	1.0	2.5

(1) Reference SAI, 1981 e.

(2) See Figure C6-1 for well locations.

TABLE C6.6

Average Radionuclide Concentrations In Composite Wells(1)

WELL NUMBER(2)	AVERAGED CONCENTRATIONS Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
TWQ-117D	7.8	0.5	1.1	2.3
TWQ-116D	0.95	0.46	1.1	4.5
401	0.0	0.0	4.6	12.0
TWQ-148	24.3	1.0	8.5	12.0
TWQ-149	1.9	0.0	2.7	2.8
TWQ-137	0.0	1.0	1.1	3.5
TWQ-136	0.0	16.9	0.8	2.5
TWQ-118D	13.3	0.16	1.3	3.1
TWQ-126	3.5	1.2	4.9	20.0
TWQ-127	14.3	0.64	2.1	7.0
TWQ-150	9.3	0.0	9.5	8.5
TWQ-110D	4.5	0.73	1.1	1.8
TWQ-134	3.4	2.8	1.7	6.7
TWQ-5D	1.1	1.5	1.4	7.8
TWQ-119	28.1	1.4	0.7	12.0
TWQ-129	1349	0.73	0.6	4.7
321	641	5.5	1.5	15.0
322	1360	6.6	1.8	9.6
324	5358	3.4	3.6	14.0
325	8509	3.3	2.0	7.7
326	2928	1.05	1.1	3.1
327	3769	2.2	1.0	11.0
328	397	0.71	1.0	4.8
329	29.9	24.0	3.0	7.5
330	10.7	15.4	1.3	5.5
331	9.9	1.3	0.7	8.4

TABLE C6.6
(Continued)

WELL NUMBER[(2)]	AVERAGED CONCENTRATIONS			
	Thorium-230 pCi/l	Lead-210 pCi/l	Radium-226 pCi/l	Radium-228 pCi/l
332	55.3	0.7	2.0	5.1
333	N/A	N/A	7.5	N/A
334	0.0	3.9	14.3	2.4
340	0.0	24.9	5.8	0.5
335	14058	4.7	1.9	2.0
341	10580	N/A	2.3	3.4
336	403	6.7	8.8	11.0
337	75.0	5.9	2.9	9.1
338	245.0	2.9	N/A	14.0
TWQ-17DM	1.2	5.6	0.2	1.4
TWQ-130	0.0	0.28	0.8	3.1
TWQ-26D	2.3	0.0	0.9	2.0
TWQ-131	0.07	0.68	2.2	1.8
TWQ-33M	0.0	0.0	2.0	5.8

(1) Reference: SAI, 1981e.

(2) See Figure C6-1 for well locations.

TABLE C7.1

SUMMARY OF ACCIDENTAL TAILINGS SLURRY RELEASES 1959 TO 1979[1]

CAUSE	SOLIDS RELEASED (kg)	LIQUIDS RELEASED (liters)	REACHED WATERCOURSE
Flash flood	14×10^6	1.2×10^7 [2]	Yes
Dam failure	9×10^5 [2]	9.1×10^5	Yes
Dam failure	5×10^5	4×10^5 [2]	No
Dam failure	2×10^5	2×10^5 [2]	Yes
Pipeline failure	3×10^5	2×10^5	Yes
Flooding	1×10^8 [2]	8.7×10^7	Yes
Pipeline failure	6.4×10^4 [2]	6.1×10^4	Small amount
Pipeline failure	2×10^6 [2]	1.7×10^6	Yes
Dam failure	$1\text{-}14 \times 10^6$ [2]	$1\text{-}11 \times 10^6$	Yes
Pipeline failure	1×10^5 [2]	1.3×10^5	Yes
Dam failure	9×10^3 [2]	8×10^3	No
Pipeline failure	4.5×10^7	$8\text{-}30 \times 10^6$	No
Dam failure	8.2×10^6 [2]	7.6×10^5	No
Pipeline failure	1.1×10^3	1.5×10^4	Yes
Dam failure	1.0×10^6	3.8×10^8	Yes
Pipeline failure/ Dam failure	No quantitative information		

(1) U.S. Atomic Energy Commission, 1974 and Teknekron, 1978.

(2) This value is based on the assumption that equal weights of solids and liquids are released and that the density of the liquids is approximately 1.6 g/cm3 (100 lb/ft).

TABLE C7.2

ESTIMATED PROBABILITIES OF TRUCK ACCIDENTS INVOLVING YELLOWCAKE CONTAINERS AND CORRESPONDING PACKAGE RELEASE FRACTIONS[1,2]

ACCIDENT SEVERITY CATEGORY	FRACTIONAL PROBABILITY OF ACCIDENT	MODEL I[3]	MODEL II[4]
I	0.55	0	0
II	0.36	1.0	0.01
III	0.07	1.0	0.1
IV	0.016	1.0	1.0
V	0.0028	1.0	1.0
VI	0.0011	1.0	1.0
VII	8.5×10^{-5}	1.0	1.0
VIII	1.5×10^{-5}	1.0	1.0

(1) U.S. NRC, 1980.

(2) Assumes low specific activity and type A containers.

(3) Assumes total loss of drum contents.

(4) Assumes partial loss of drum contents.

TABLE C8.1

Current Operational Environmental Radiological Monitoring Program Summary

TYPE OF SAMPLE	NUMBER	SAMPLE COLLECTION LOCATION (s)	METHOD	FREQUENCY	ANALYSIS PARAMETERS	SAMPLE LOCATIONS	DATA	REMARKS
Stack-particulates	3	Yellowcake Dryer Stack (Large Stack)	Isokinetic	Quarterly	U natural Ra-226 Th-230 Pb-210 Po-210 Flow rate total particulates	Fig. C4-2	Appendix D, Table D-1	32 point traverse, 2 min. per point
Stack-particulates	3	Yellowcake Packaging and Precipitation Stack (Small Stack)	Isokinetic	Quarterly	same	Fig. C4-2	Appendix D, Table D-1	4 point traverse, 1½ min. per point
Air particulates	8	Perimeter sites (A,B1, C,D,E,F); OCR/IX; Background site (Springstead)	Continuous (low-volume)	Weekly samples composited quarterly	U natural Ra-226 Th-230 Pb-210 Po-210 total suspended particulates	Fig. C8-1	Appendix D, Table D-2	Site A: nearest residence Site B1: nearby occupied structure
Air-radon	8	same as air particulates	Continuous (Tracketch)	Monthly	Rn-222	Fig. C8-1	Appendix D, Table D-3	Type F radon cup; samples radon only
Air-gamma radiation (direct radiation)	8	same as air particulates	Continuous (TLD)	Quarterly	gamma exposure rate	Fig. C8-1	Appendix D, Table D-4	Type 100 LiF TLD's
Groundwater	5	Downgradient (GW-4, GW-D1) Upgradient (GW-3) Lateral (GW-1, GW-2)	Bailed	Quarterly	Total uranium Ra-226 Th-230	Fig. C8-1	Tables B3.17-B3.21	non-radiological parameters are monitored

TABLE C8.1

Current Operational Environmental Radiological Monitoring Program Summary
(Continued)

TYPE OF SAMPLE	NUMBER	SAMPLE COLLECTION LOCATION (s)	METHOD	FREQUENCY	ANALYSIS PARAMETERS	SAMPLE LOCATIONS	DATA	REMARKS
urface Water	2	SW-3, SW-5	Grab	Quarterly	Total uranium Ra-226 Th-230 Gross Alpha	Fig. C8-1 SW-3 (NE of tailings) SW-5 (5 mi. downstream from mill)	Tables B3.7-B3.8	non-radiological parameters are monitored; additional surface water samples taken after spill (Table C8.3)
rinking water	1	Mill or mine fountains	Grab	Annually	Gross alpha Total uranium Ra-226 Total lead		Appendix D, Table D-5	non-radiological parameters are monitored; Pb-210 is not specifically monitored
egetation	5	East of tails (A-1,A-2) North of tails (B-1,B-2,C-1)	Grab	Annually	U natural Ra-226 Th-230 Pb-210 Po-210	Fig. C8-1	Appendix D, Table D-6	
oil	8	same as air particulates	Grab	Annually	U natural Ra-226 Th-230 Pb-210 Po-210	Fig. C8-1	Appendix D, Table D-7	

TABLE C8.2

Current Operational Mill and Occupational Radiological Monitoring Program Summary

TYPE OF SAMPLE	NUMBER	SAMPLE COLLECTION LOCATION (s)	METHOD	FREQUENCY	ANALYSIS PARAMETERS	SAMPLE LOCATIONS	DATA	REMARKS
ir-particulates	10	YC dryer; Grizzly sump; Leach platform; YC change room; YC packaging area; SAG mill feed platform; YC centrifuge platform; Feed belt platform; Below primary thickner	Grab-Low volume	Monthly	total uranium	Fig. C8-2	Appendix E, Table E-1	Pump rate = 30 lpm for at least 1 hour
orking levels - adon daughters	5	Grizzly sump; Halfway up conveyor; SAG mill feed pit; Trommel screen; SAG mill sump	Instant working level meter	Monthly	working level	Fig. C8-2	Appendix E, Table E-2	other areas are irregularly monitored
lpha surface ontamination	varies	varies	Scintillometer	Monthly	alpha	Fig. C8-2	Appendix E, Table E-3	monitored in areas of suspected contamination; smeers collected if scintillometer count >100 cpm
amma monitoring	about 116	multiple measurements in 17 mill areas: YC bin platform; YC dryer platform; Precip. control room and precip. tanks; Metalurg. lab and YC analysis lab; Chem lab; Conveyor and grizzly sump; Feed belt platform; Scale house and bucking room; Grinding and control room; YC drum storage; YC packaging; Precipitation area; Boiler room and sand filters; Leach platform; CCD ground floor; CCD 2nd floor	Scintillometer	Monthly	gamma (mrem/hr)	Fig. C8-2	Appendix E, Table E-4	
ontinuous gamma xposure	24 total	Control TLD, Scale house; SAG mill; CCD; Precipitation; Packaging; YC change room; Chem lab; YC drum storage; Conveyor; Leach platform; Security, Metalurgical lab; Environmental lab; NECR/IX; "Floating TLD"	Continuous (TLD)	2 series: quarterly (10) monthly (14)	gamma exposure	Fig. C8-2	Appendix E, Table E-5	Type 100 LiF TLD's

TABLE C8.2

Current Operational Mill and Occupational Radiological Monitoring Program Summary
(Continued)

TYPE OF SAMPLE	NUMBER	SAMPLE COLLECTION LOCATION (s)	METHOD	FREQUENCY	ANALYSIS PARAMETERS	SAMPLE LOCATIONS	DATA	REMARKS
Employees' gamma exposure	varies	selected mill employees	Continuous (TLD)	quarterly	gamma exposure (mrem/ period exposure	employees	Appendix E, Table E-6	program concentrates on employees who work in areas with high exposure potential
Uranium inhalation	varies	selected mill employees	calculated from time cards and suspended particulate data	quarterly	uranium exposure	employees	Appendix E, Table E-7	program concentrates on employees who work in areas with high exposure potential
Bioassay	varies	selected mill employees	Fluorometric	biannually	uranium concentration in urine	employees	Appendix E, Table E-8	program concentrates on employees who work in areas with high exposure potential

TABLE C8.3

Current Spill-Related Radiological Environmental Monitoring Program Summary

TYPE OF SAMPLE	NUMBER	SAMPLE COLLECTION LOCATION (S)	METHOD	FREQUENCY	ANALYSIS PARAMETERS	SAMPLE LOCATIONS	DATA	REMARKS
Air-particulates	3	Pinedale 16K-336 Gallup	3 hr high volume (Pinedale, 16K-336), low volume continuous (Gallup)	monthly; weekly samples composited monthly (Gallup)	U natural Ra-226 Th-230 Pb-210 Po-210	Appendix F, Table F-1	Appendix F, Table F-1	
Surface water	5	"Above the Falls" RWS-25 RWS-26 RWS-27 RWS-28	Grab	quarterly	Gross Alpha Total U RA-226 Th-230 Pb-210	Fig. C8-1, also see Tables B3.9 to B3.13	Table B3.9 to B3.13	
Alluvial Wells	5	Parker Spring, Sunnyside, 16K-336, 16T-339, 16K-340	Bailed	quarterly	Gross Alpha Total U Ra-226 Th-230 Pb-210	Tables B3.22 to B3.26	Tables B3.22 to B3.26	Well 16K-336 has been dry since July 1980 sampling
Sediment	Varies	Varies	Five-spot Grab	As requested by NMEID	U natural Ra-226 Th-230 Pb-210	Varies up to about 25 miles downstream from mill	BPNL, 1981	Continuation of 1979 and 1980 programs.
Ambient Radon (NMEID-Milan)	9	600-607, 610	Tedlar bags 48 hour	monthly	radon activity	Appendix F, Table F-3	Appendix F, Table F-3	

TABLE C.9.1

REVEGETATION SEED MIXTURE

SCIENTIFIC NAME	COMMON NAME	VARIETY	GROWTH HABIT(1)	SEEDING RATE(2) LBS. OF PURE LIVE SEED/ACRE	NUMBER OF SEEDS/SQUARE FOOT
Grasses					
Agropyron smithii	Western Wheatgrass	Arriba	NS	4.8	2.9
Sporobolus airoides	Alkali Sacaton	-------	NB	0.5	20.1
Oryzopsis hymenoides	Indian Ricegrass	Paloma	NB	3.2	13.8
Bouteloua curtipendula	Sideoats Grama	Vaughn	NB	1.6	7.0
Forbs					
Penstemon strictus	Rocky Mtn. Penstemon	Bandera	N	0.3	---

(1)N = Native, B = Bunchgrass, S = Sod-forming Grass

(2)Seeding rate is for drill seeding. If broadcast seeding is used, these rates will be doubled.

TABLE C.9.2

PREPARATORY CROP SEED RATES

SPECIES SCIENTIFIC NAME	COMMON NAME	GROWTH HABIT	SEEDING RATE(1) LBS. OF PURE LIVE SEED/ACRE
Hordeum vulgare	Barley	IB	25.0
or	or		
Triticum aestivum	Wheat		25.0

(1)Seeding Rate is for drill seeding. If broadcast seeding method is used, these rates will be doubled.

I = Introduced, B = Bunchgrass, S = Sod-forming grass

TABLE C9.3

200-YEAR FLOODPLAIN CHARACTERISTICS

CROSS(1) DAM SECTION	CHANNEL BOTTOM ELEVATION (FEET)	WATER SURFACE ELEVATION (FEET)	TOP WIDTH (FEET)	CHANNEL VELOCITY (FPS)	ELEVATION OF(2) TOE OF (FEET)
1	6878.0	6882.1	65.6	15.5	N/A
2	6886.0	6891.3	48.2	21.0	6936
3	6915.0	6922.7	194.6	10.2	6940
4	6922.0	6926.5	241.4	16.1	6941
5	6924.0	6930.9	49.4	13.3	6939
6	6929.0	6934.3	39.7	21.22	6942
7	6939.5	6946.06	135.2	11.27	6950
8	6945.0	6950.3	396.3	8.3	6955
9	6945.0	6951.5	469.3	2.9	6960
10	6948.0	6951.8	197.7	5.1	6960
11	6946.7	6952.4	370.2	2.5	6948
12	6947.2	6952.6	505.3	2.8	6949
13	6949.6	6953.2	576.3	3.7	6956
14	6952.0	6954.6	400.8	6.1	6956
15	6954.5	6958.0	567.2	4.7	N/A
16	6964.3	6966.2	489.1	4.1	N/A

(1)See Figure B3-4 for cross section locations
(2)SAI, 1980a

TABLE C9.4

ESTIMATED SHEET AND RILL EROSION RATES

(a) Erosion Rates with Mulch Cover - No Vegetation Established

Area[1]	FACTORS[2] R	K	L	S	LS	C	P	Estimated Soil Loss (T/Ac/Yr.)	Area (Acres)	Estimated Soil Loss from Area (Tons/Year)
A	20	0.40	1,575	3%	0.66	0.05	0.50	0.132	52.6	6.94
B	20	0.40	575	10%	4.0	0.05	0.60	0.96	13.6	13.06
C	20	0.40	725	2%	0.37	0.05	0.50	0.074	39.6	2.93
D	20	0.40	1,725	2%	0.48	0.05	0.50	0.096	48.0	4.61
E	20	0.40	575	6%	1.6	0.05	0.50	0.32	27.2	8.70
Total for Tailings Disposal Area								0.20	181.0	36.24
Facilities Area	20	0.40	650	1%	0.23	0.05	0.50	0.046	21.3	0.98
Stockpile Area	20	0.40	825	4%	0.93	0.05	0.50	0.186	8.7	1.62
Totals for All Disturbed Areas								0.18	211.0	38.84

(b) Erosion Rates Following Vegetation Establishment

Area[1]	FACTORS[2] R	K	L	S	LS	C	P	Estimated Soil Loss (T/Ac/Yr.)	Area (Acres)	Estimated Soil Loss from Area (Tons/Year)
A	20	0.40	1,575	3%	0.66	0.15	0.50	0.396	52.6	20.83
B	20	0.40	575	10%	4.0	0.15	0.60	2.88	13.6	39.17
C	20	0.40	725	2%	0.37	0.15	0.50	0.222	39.6	8.79
D	20	0.40	1,725	2%	0.48	0.15	0.50	0.288	48.0	13.82
E	20	0.40	575	6%	1.6	0.15	0.50	0.96	27.2	26.11
Total for Tailings Disposal Area								0.60	181.0	108.72
Facilities Area	20	0.40	650	1%	0.23	0.15	0.50	0.138	21.3	2.95
Stockpile Area	20	0.40	825	4%	0.93	0.15	0.50	0.558	8.7	4.85
Totals for All Disturbed Areas								0.55	211.0	116.52

(c) Erosion Rates for Vegetation Established in Areas of 5H:1V Slopes

Area[1]	FACTORS[2] R	K	L	S	LS	C	P	Estimated Soil Loss (T/Ac/Yr)	Area (Acres)	Estimated Soil Loss from Area (Tons/Year)
H	20	0.40	311	20%	7.1	0.15	0.50	4.26	5.2	22.2
I	20	0.40	134	20%	4.7	0.15	0.50	2.82	1.6	4.5
J	20	0.40	223	20%	6.05	0.15	0.50	3.63	2.9	10.5
Total for Areas								3.8	9.7	37.2

(1) Tailings disposal area was subdivided into 5 subareas according to percent slope and length of slope.

(2) R = Rainfall factor; K = Soil erodibility factor; L = Slope length; S = Percent slope; LS = Length and slope factor; C = Cover factor; P = Contouring factor.

TABLE C9.5
INPUT PARAMETERS FOR CALCULATING TRANSPORT OF
Rn-222 THROUGH COVER MATERIAL

Parameter	Description	Units	Input Value	References
J_t	Radon flux from bare tailings	pCi/m^2-s	333	UNC data
J_c	Radon flux from cover	pCi/m^2-s	-	Calculated
D_t/P_t	Tailings diffusion coefficient	cm^2/s	$4.7x10^{-2}$	GEIS[1] Appendix P, p. P-4
D_c/P_c	Cover diffusion coefficient	cm^2/s	$1.4x10^{-2}$	GEIS[1] p. 9-26
x_c	Cover thickness	cm	66	26 in = 66 cm
λ	Radon decay constant	sec^{-1}	$2.1x10^{-6}$	GEIS[1], Appendix P, p. P-2
b_c	Attenuation values of cover $(\lambda\ P_c/D_c)^{1/2}$	cm^{-1}	$1.2x10^{-2}$	Calculated from λ, D_c/P_c values

(1) U.S. NRC (1980)

TABLE C9.6

RECLAMATION COSTS

ITEM	COST (1981 DOLLARS)
Decommissioning & Decontamination Materials	0[1]
Cut & Fill Dike Area - 89,500 cy @ 112 hrs. 214 hrs. x $125.00/hr	26,750[2]
Replacement of Cover Material 367,000 cy. x $1.25/cy.	458,750[2]
Grading - $65/hr x 211 acres (1 acre/hr.)	13,700[2]
Ripping of Facilities Area 18 hrs. x $125/hr.	2,250[2]
Seedbed Preparation, Fertilization, and Mulching - $984/acre x 211 acres	207,600[3]
Seed Costs - $91,000/acre x 211 acres	19,200[4]
Total Costs	$ 728,250
Costs/Acre	$ 3,451

(1) USNRC, 1980, Appendix K, K-33.

(2) Achhorner, 1981.

(3) Boatright, 1981.

(4) Rocky Mountain Seed Co. 1981.

TABLE C10.1

BASIC JOB REQUIREMENTS FOR KEY MILLING PERSONNEL

1. Radiation Safety Officer	A college degree in a technical field with at least two years of practical experience in radiation safety or radiological health. Familiarity in dealing with various State and/or Federal regulatory agencies is preferred.
2. General Manager - Milling and Ion Exchange	A B.S. in Chemical or Metallurgical Engineering with at least ten years of experience. Five years of this experience should be in milling supervisory positions. Should be knowledgeable in all phases of mill design, including uranium acid leaching and solvent extraction. Must be able to communicate well, to organize personnel, and to maintain good labor relations as well to excercise judgement consistent with good engineering and metallurgical practice.
3. Vice President - Environmental and Safety Services	A B.S. in Mining, Metallurgical or Chemical Engineering with at least 15 years experience at all levels in various phases of mining and milling operations. Individual should possess proven managerial and communications skills and be knowledgeable in all levels of regulatory (both state and federal) requirements for both environment and related issues. In addition, the individual must be able to maintain good labor relations, and to provide a good working relationship with state and federal regulatory agencies.
4. Director - Tailings Management	A B.S. in Mining, Metallurgical, or Civil Engineering, or related field with at least 15 years experience in all phases of mining, milling operations, and tailings management. Individual must have a proven record of management skills. Must be familiar with both federal and state regulations dealing with tailings management, embankment stability, and health and safety. Individual must be able to maintain good labor relations and provide positive communications within the organization as well as with regulatory agencies.
5. Director - Environmental Operations	Technical degree with at least five years experience with mining-related environmental/radiological programs. Experience should include familiarity with regulations. Individual must be able to develop and maintain monitoring programs, supervise and organize personnel, and maintain positive working relationships with the regulatory agencies.
6. Director - Mill Security	Individual must have at least five years of experience in security or with a police department. Must be able to provide direction for security staff, to communicate effectively, and to be familiar with all regulations pertaining to security.

Project No. NM81-433
Dec. 81

D'APPOLONIA

Volume II
Figures

State of New Mexico Environmental Improvement Division
Uranium Mill License Renewal Application-Environmental Report
License No. NM-UNC-ML

UNC Mining and Milling
Church Rock Operations
Division of United Nuclear Corporation

Church Rock Mill
Gallup, New Mexico

UNC

Project No. NM81-433
Dec. 81

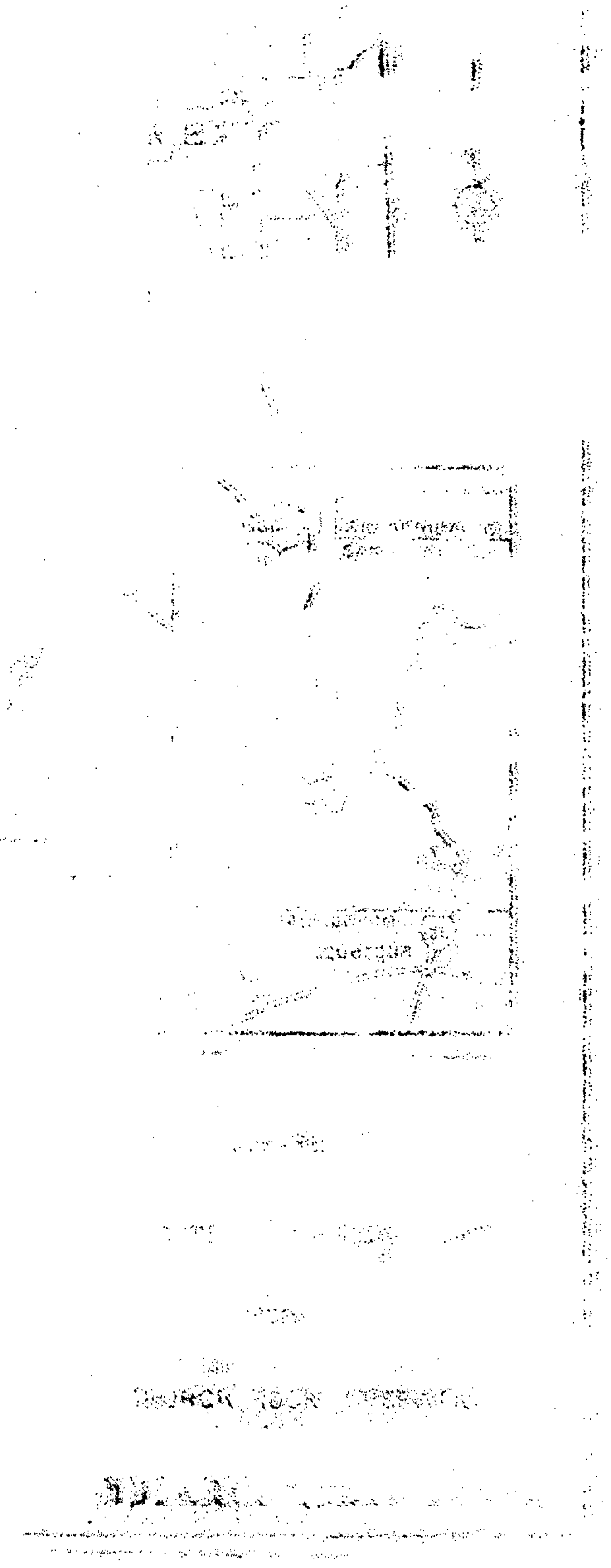
D'APPOLONIA

Volume II
Figures

State of New Mexico Environmental Improvement Division Uranium Mill License Renewal Application-Environmental Report License No. NM-UNC-ML

UNC Mining and Milling
Church Rock Operations
Division of United Nuclear Corporation

Church Rock Mill
Gallup, New Mexico



VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I TABLE OF CONTENTS

PAGE NO.

VOLUME I

LIST OF TABLES

VOLUME I

LIST OF TABLES (CONT'D)

VOLUME I

LIST OF TABLES
(CONT'D)

LIST OF TABLES
(CONT'D)

VOLUME II

LIST OF FIGURES

VOLUME II

LIST OF FIGURES
(CONT'D)

VOLUME II

LIST OF FIGURES
(CONT'D)

VOLUME III

LIST OF APPENDICES

DRAWN BY	EF 10/29/81	CHECKED BY	D.M. 2/31/81	DRAWING NUMBER	NM8... 3-A1
		APPROVED BY	KGK 12/21/81		

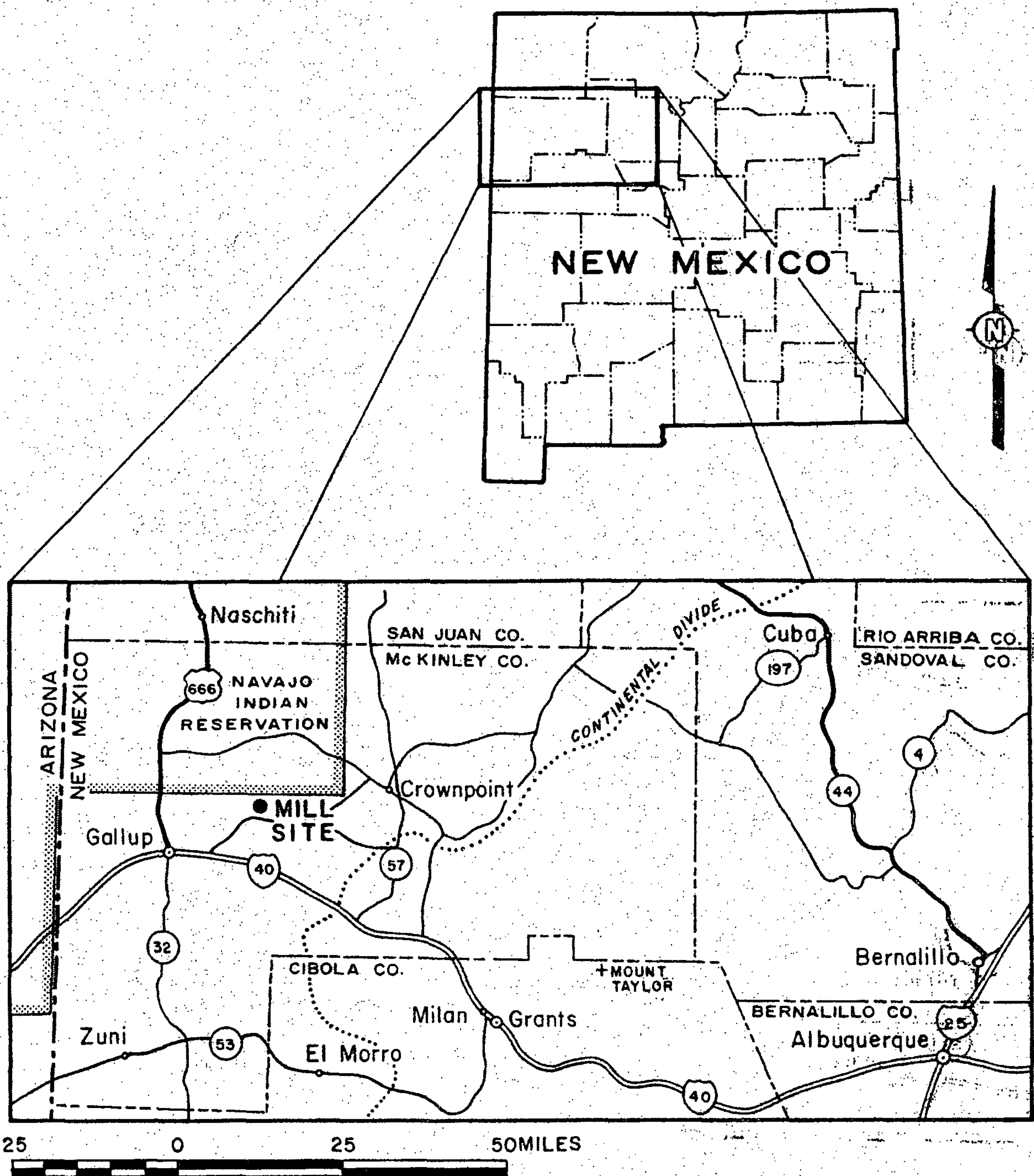


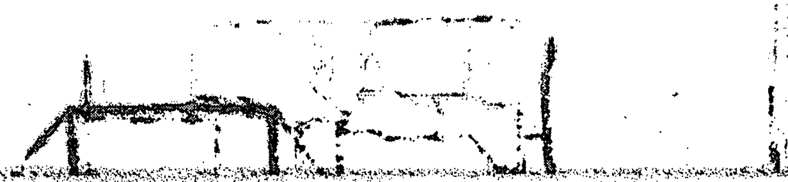
FIGURE A1-1

SITE LOCATION MAP

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA



400 0 400 800 1200 FEET

SCALE

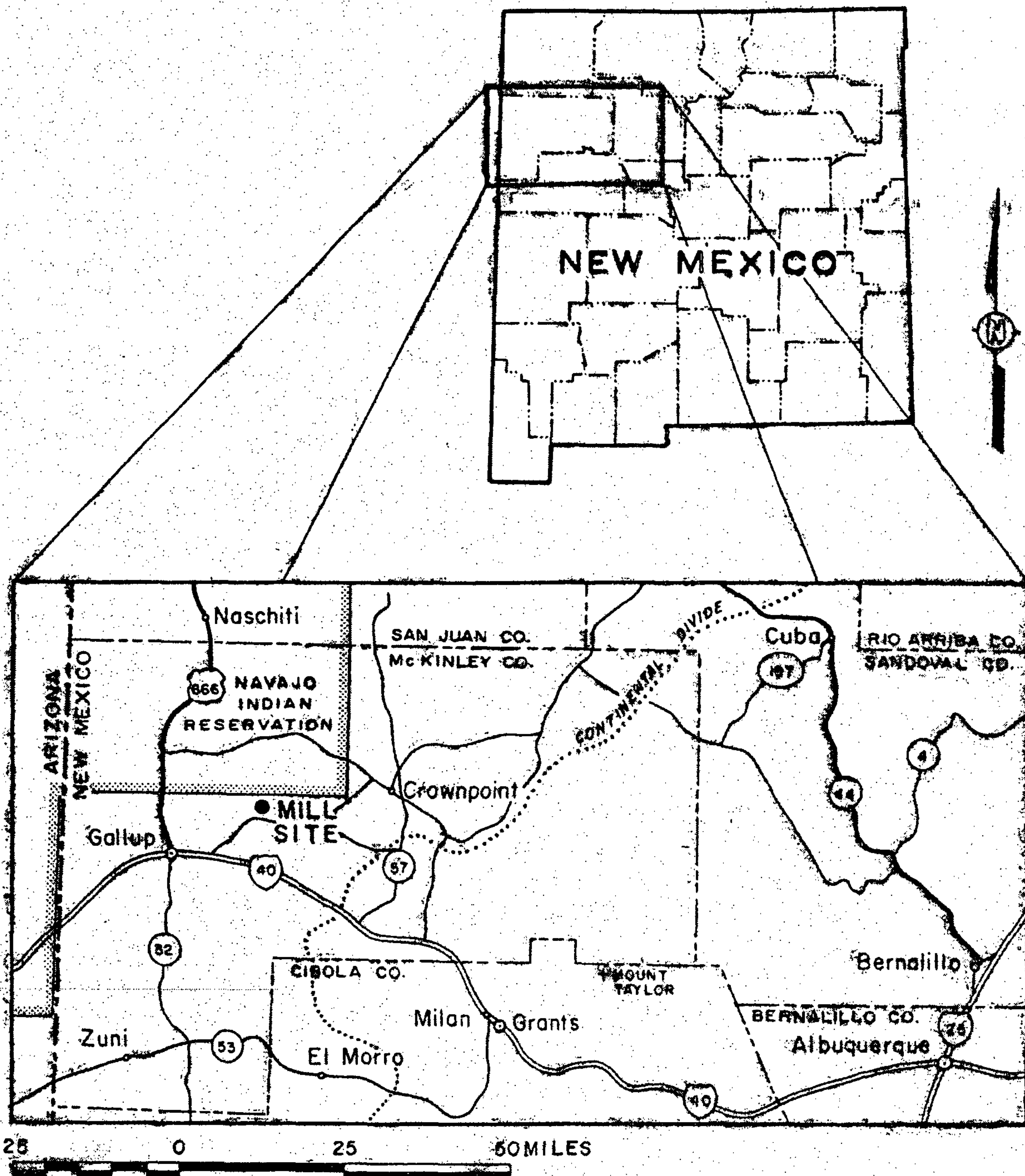
FIGURE A1-2

MILL FACILITIES AND TAILINGS DISPOSAL AREA

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA



DRAWN BY EF 10/29/81 | CHECKED BY WAC 12/21/81 | APPROVED BY KGR 12/21/81 | DRAWING NUMBER NM81-4-A2

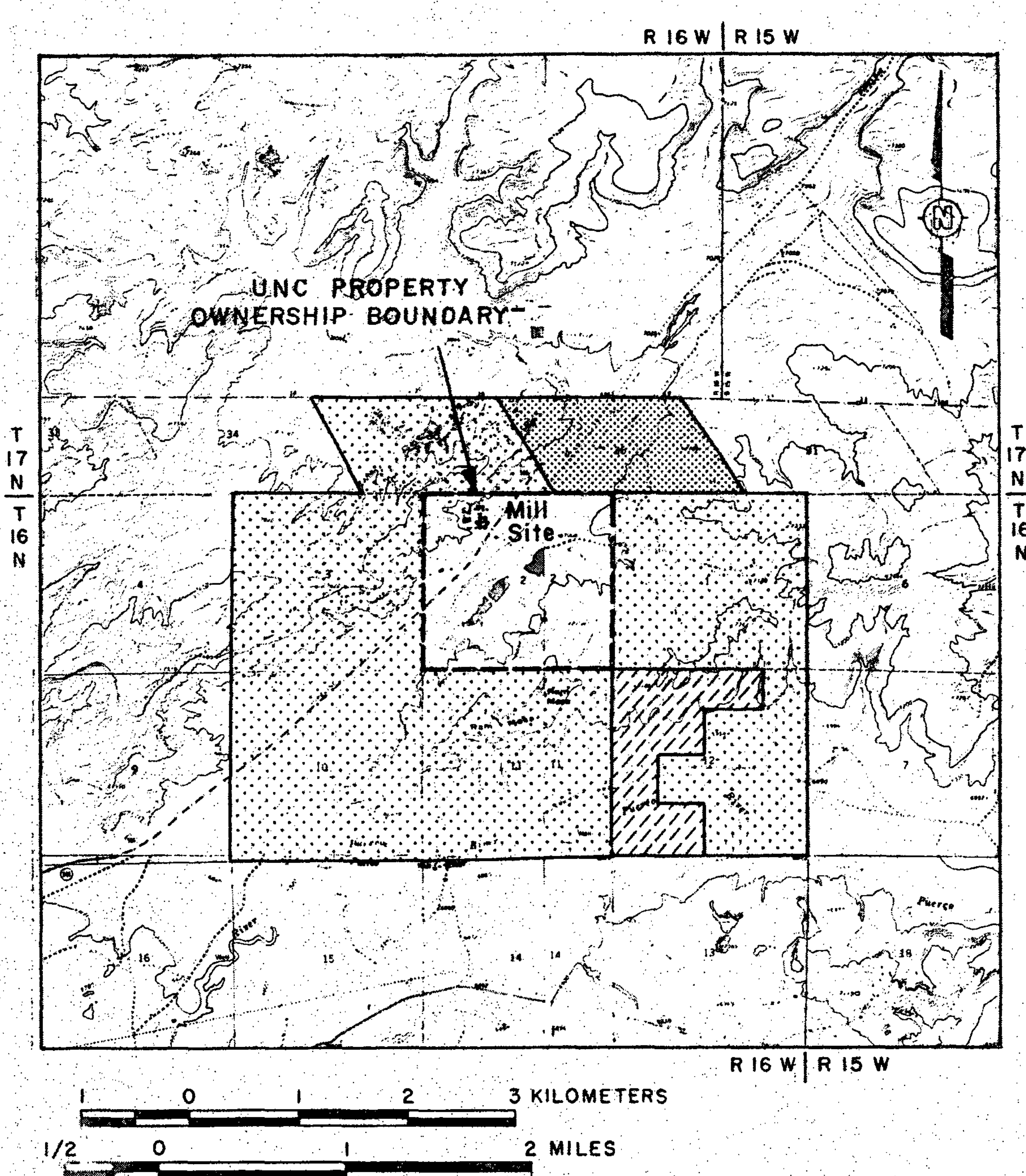
FIGURE B1-1

REGIONAL POPULATION CENTERS

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA



LEGEND

FEDERAL LANDS

INDIAN LANDS

STATE LANDS

FIGURE B1-2

ADJACENT
LAND OWNERSHIP

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

References: USGS 7 1/2 min Quadrangle Sheets and New Mexico Land Status Map, 1979.

D'APPOLONIA

DRAWN BY	EF	10/29/81
CHECKED BY	SH	12-17-81
APPROVED BY		12-21-81
DRAWING NUMBER	NM81-433-A3	

FIGURE B1-3

POPULATION IN
80 KILOMETER RADIUS
STUDY AREA

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

FIGURE B1-4

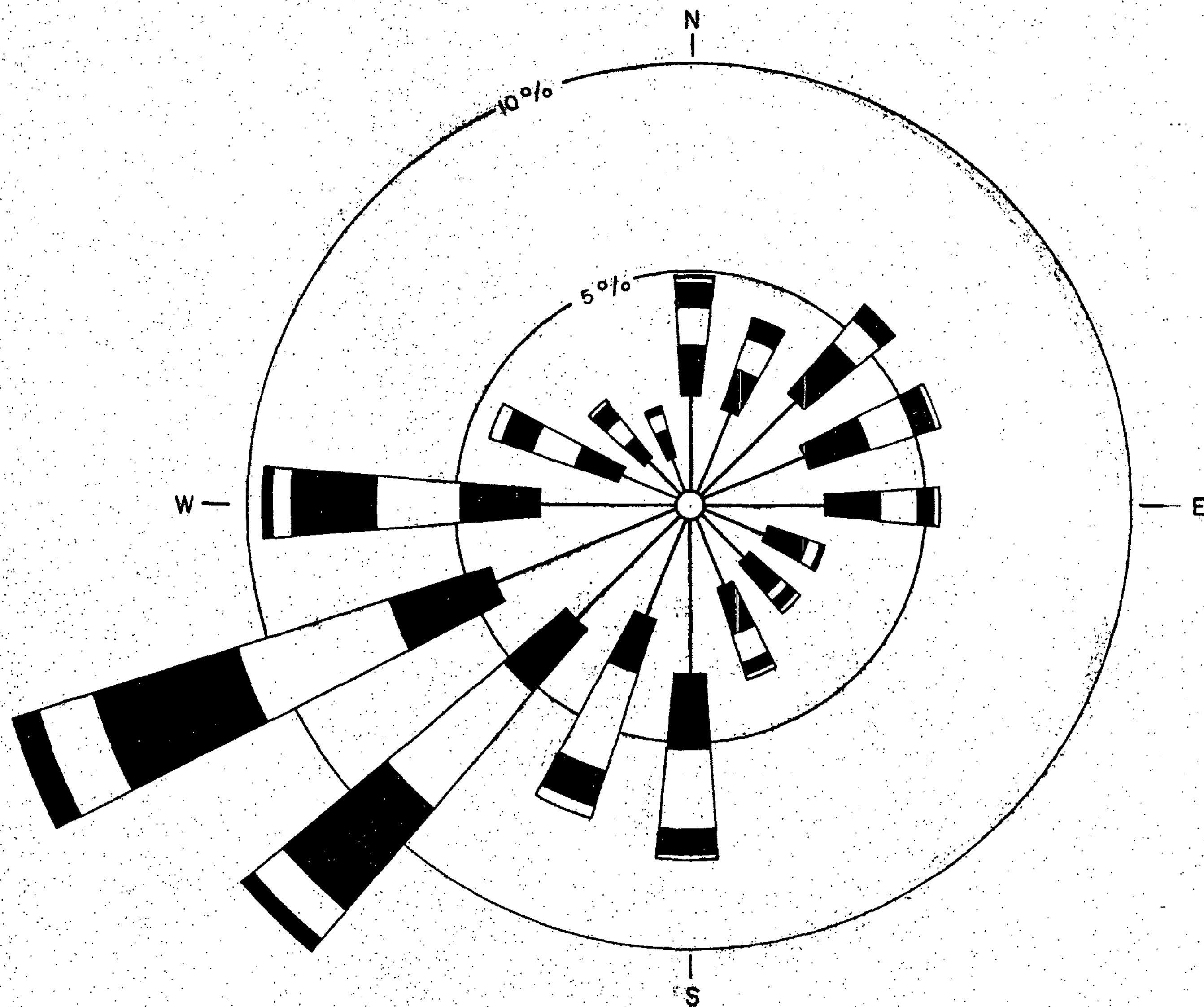
POPULATION IN
8 KILOMETER RADIUS
STUDY AREA

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY EF 10/25/81 | CHECKED BY JSH [illegible] | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-433-A4



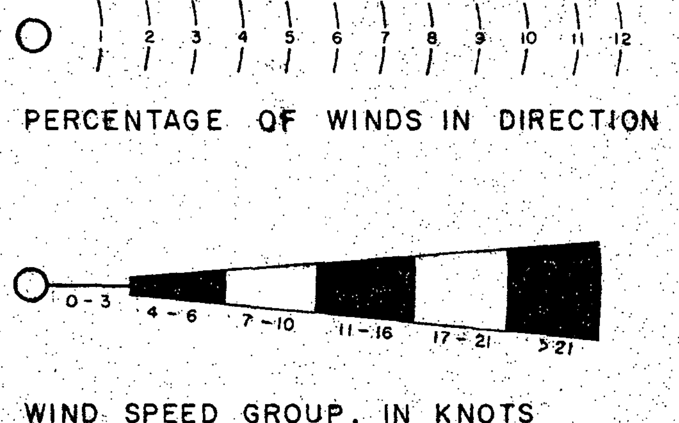


FIGURE B2-1

WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE ANNUAL CONDITIONS
1976 - 1980

PREPARED FOR

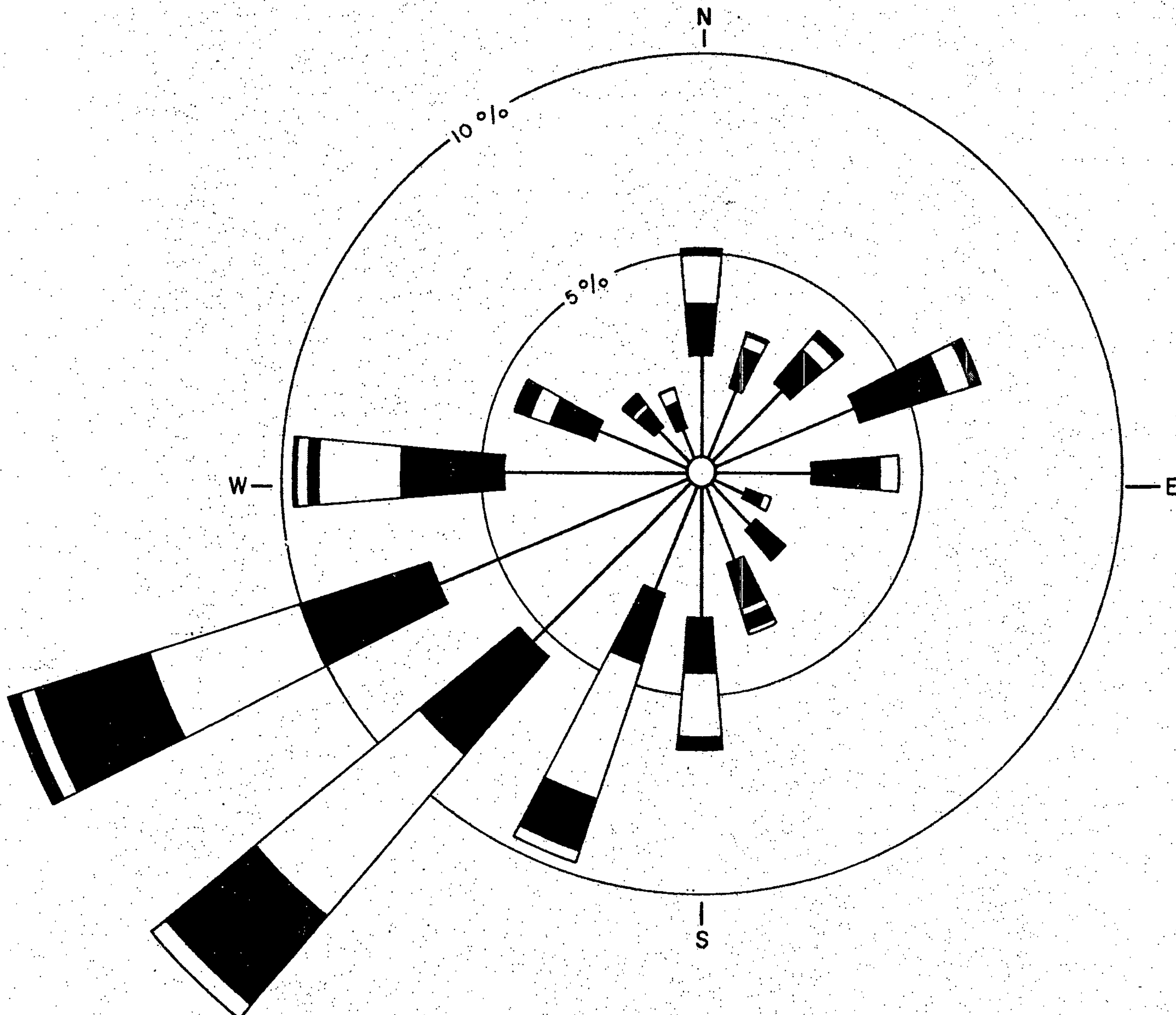
UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

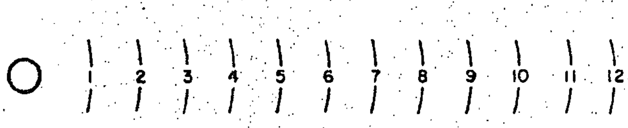
Reference : U.S. Dept. of Commerce, NOAA, 1981

D'APPOLONIA

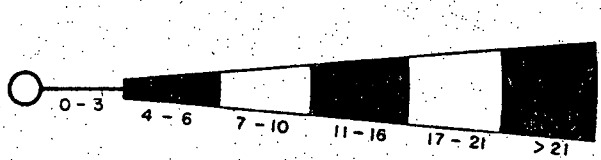
19 1253 HERCULENE. A&B SMITH CO., PGH., PA LT1530-1079

DRAWN BY EF 10/21/81 | CHECKED BY JSH 12-17-81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-J-A5





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-2

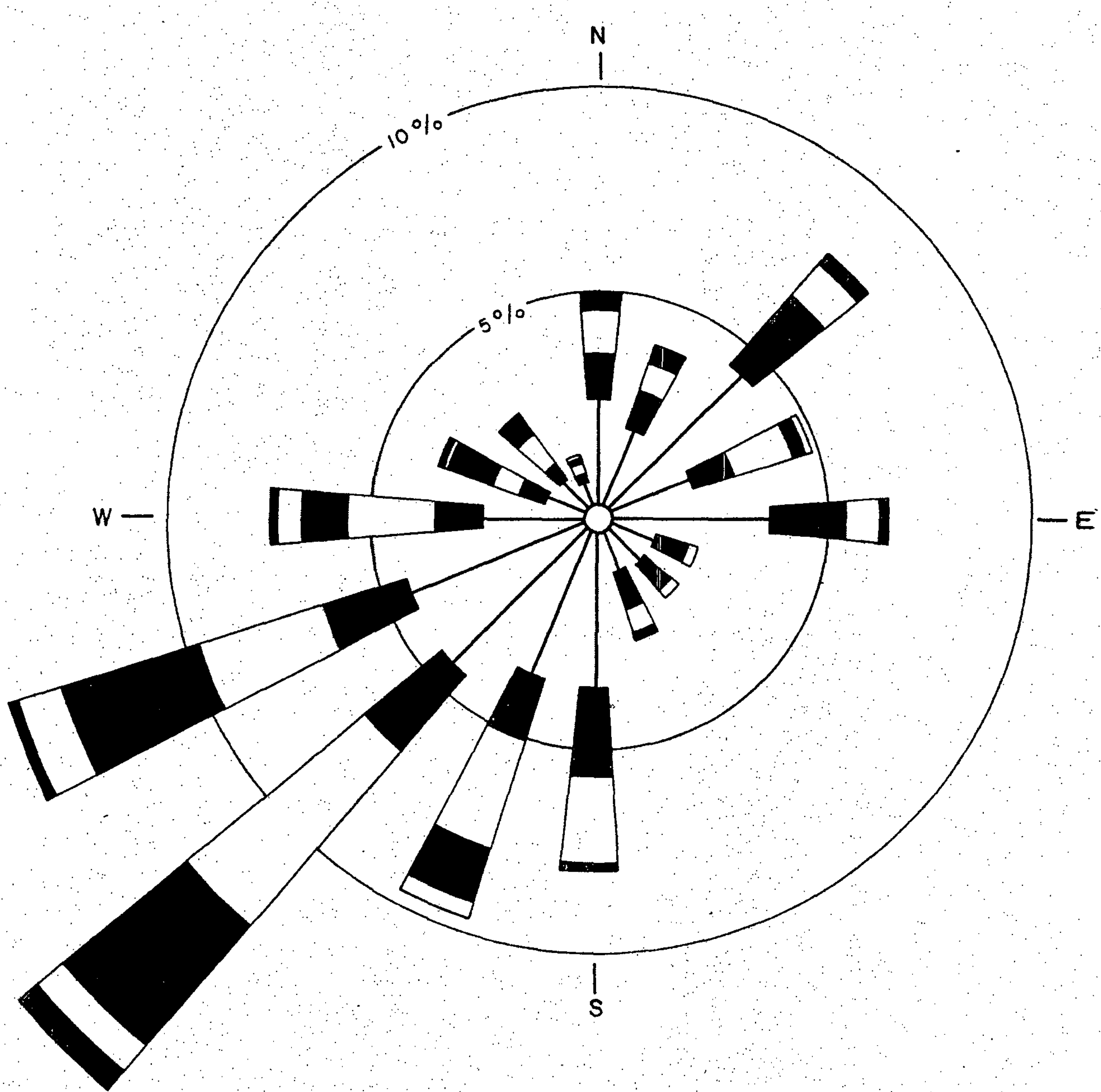
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE JANUARY CONDITIONS
1976 - 1980

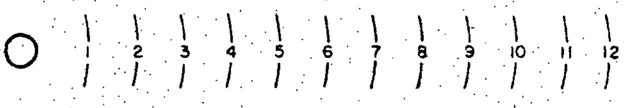
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

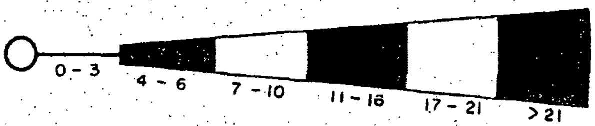
D'APPOLONIA

DRAWN BY EF 10/25/81 | CHECKED BY JSH 12-17-81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-433-A6





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-3

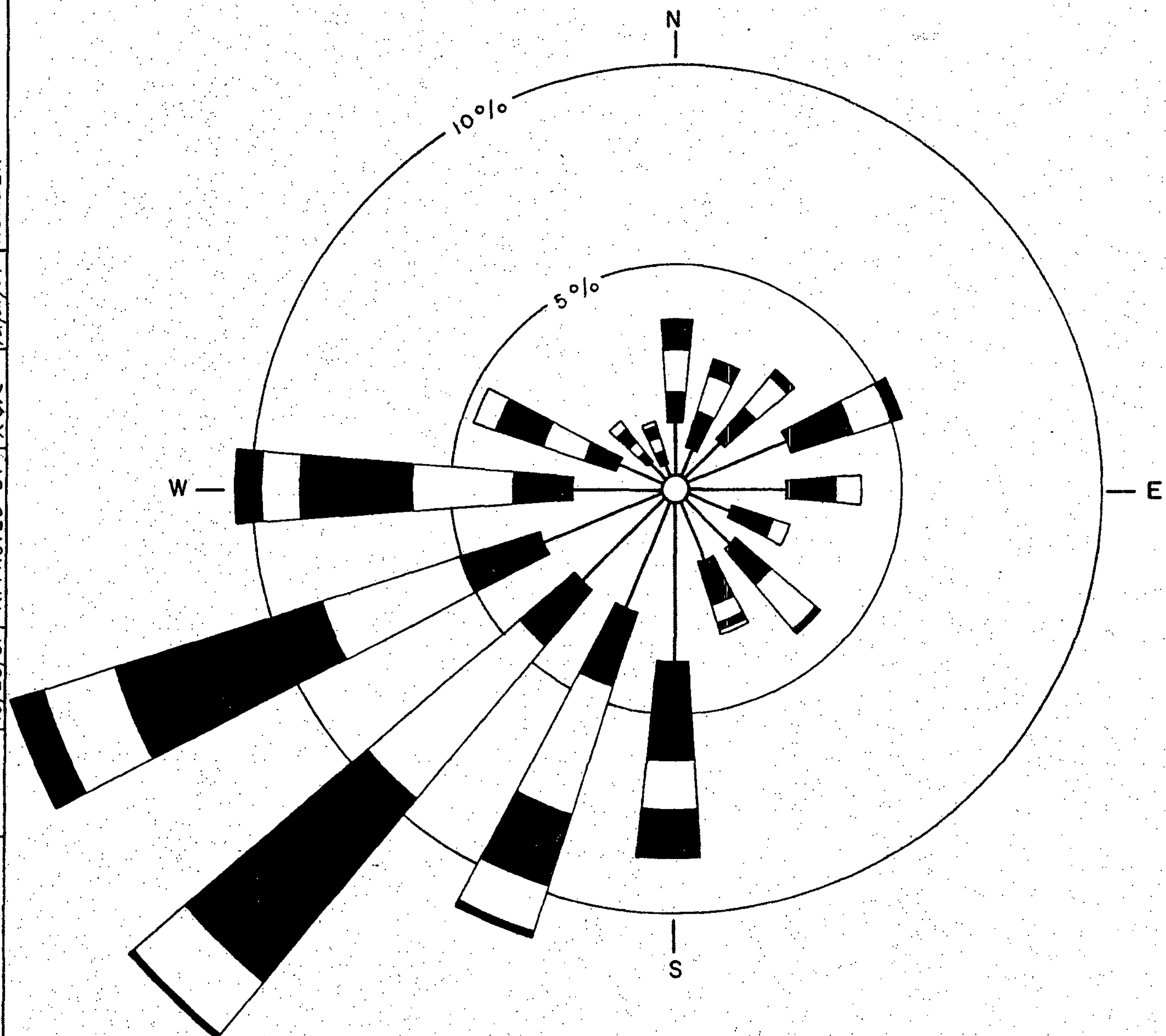
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE FEBRUARY CONDITIONS
1976 - 1980

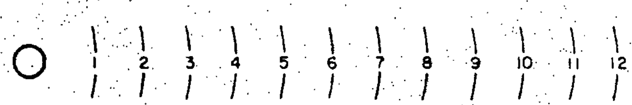
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

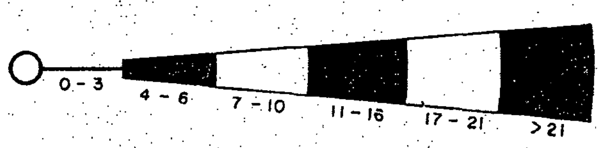
D'APPOLONIA

DRAWN BY EF 10/23/81 | CHECKED BY [initials] 12-7-81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-433-A7





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

FIGURE B2-4

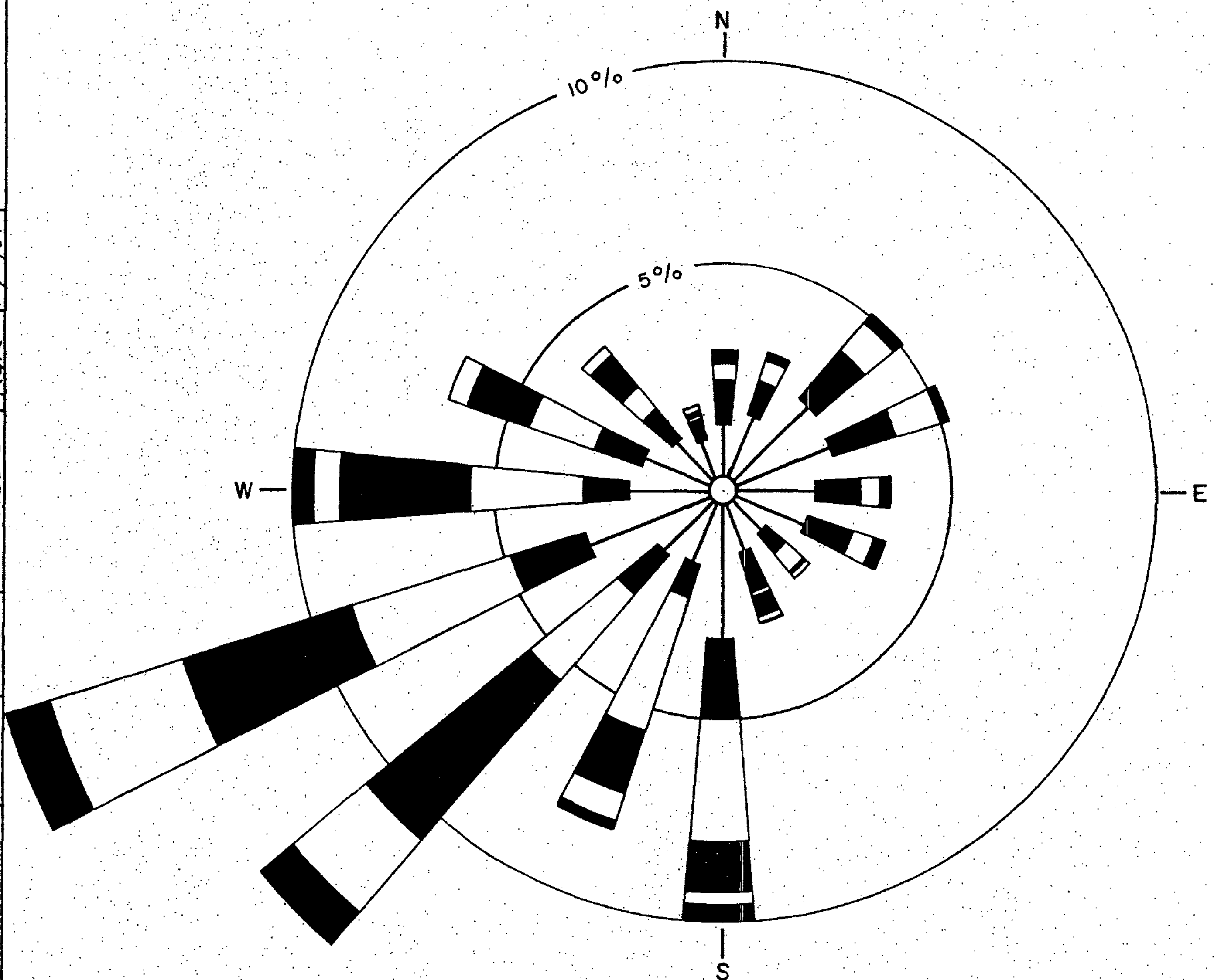
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE MARCH CONDITIONS
1976 - 1980

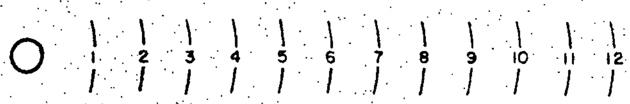
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

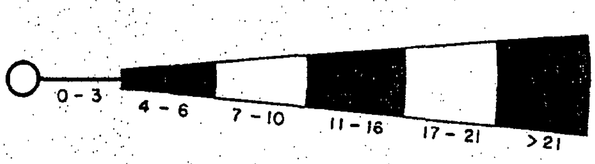
Reference: U.S. Dept. of Commerce, NOAA, 1981

D'APPOLONIA





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

FIGURE B2-5

WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE APRIL CONDITIONS
1976 - 1980

PREPARED FOR

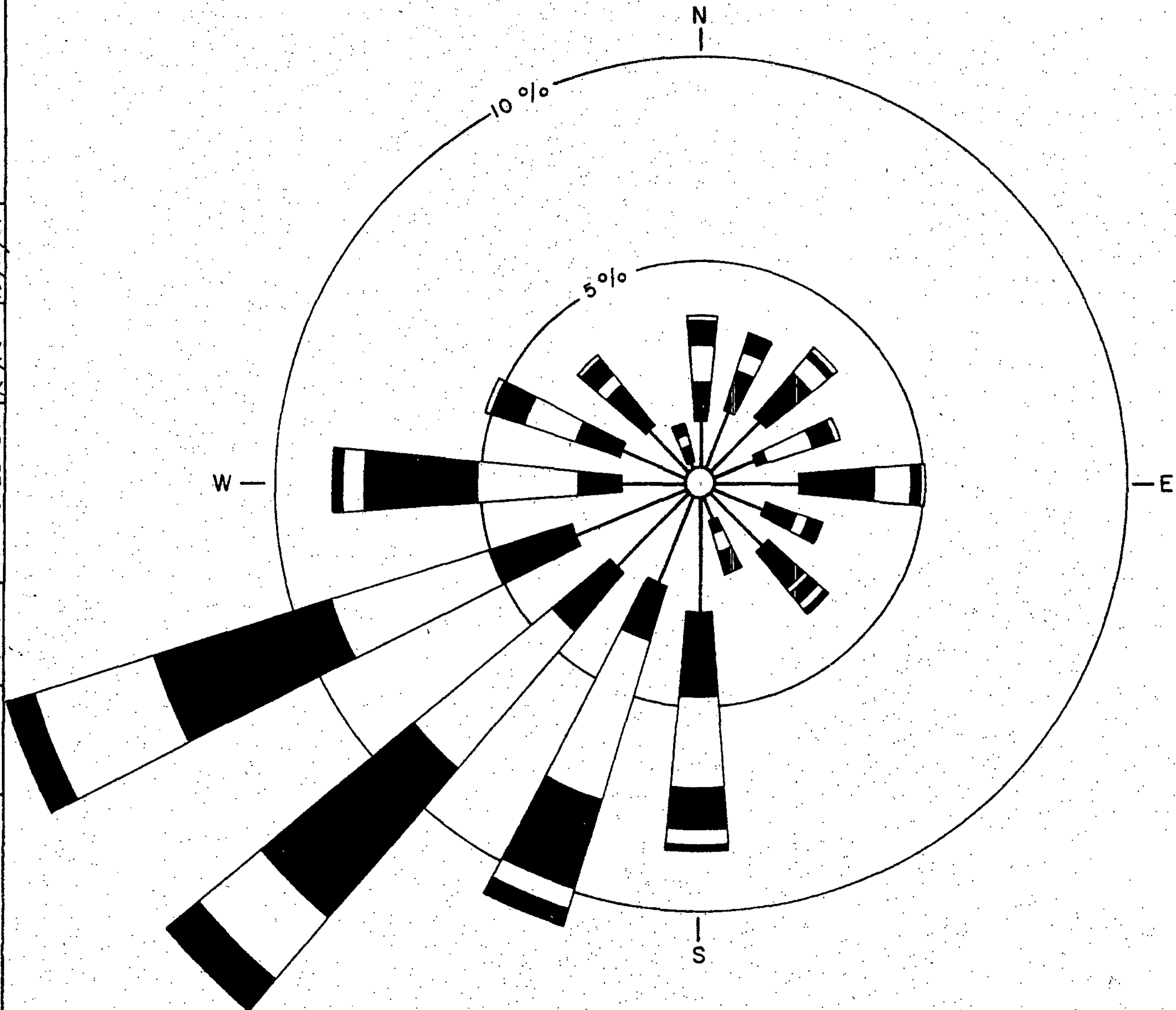
UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

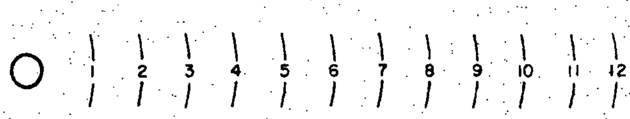
Reference: U.S. Dept. of Commerce, NOAA, 1981

D'APPOLONIA

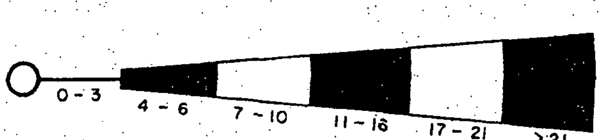
DRAWN BY	CHECKED BY		DRAWING NUMBER
E.F. 10/23/81	JSH	12-17-81	NM81-433-A8
	APPROVED BY KGK	12/21/81	

DRAWN BY EF 10/22/81 | CHECKED BY KH 12-17-81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-433-A9





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-6

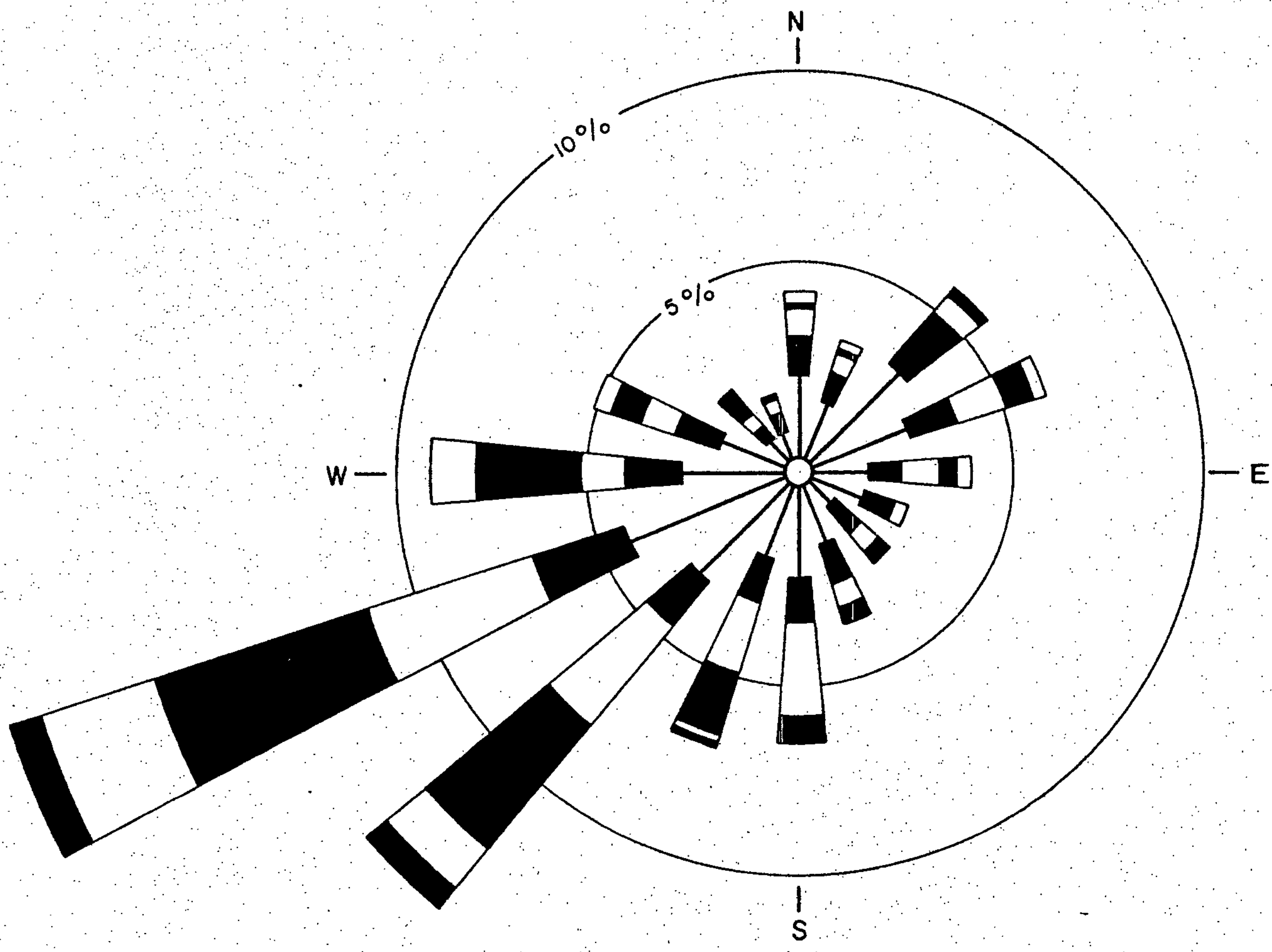
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE MAY CONDITIONS
1976 - 1980

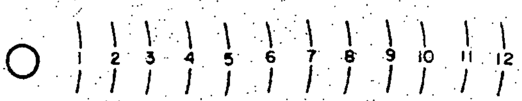
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

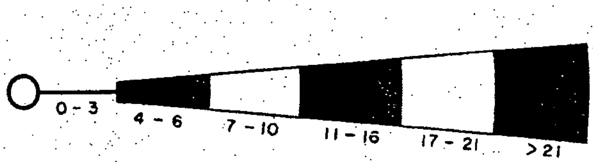
D'APPOLONIA

DRAWN BY	EF 10/22/81	CHECKED BY JSH 12-17-81	DRAWING NUMBER NM81-433-A10
		APPROVED BY KGK 12/21/81	





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

FIGURE B2-7

WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE JUNE CONDITIONS
1976 - 1980

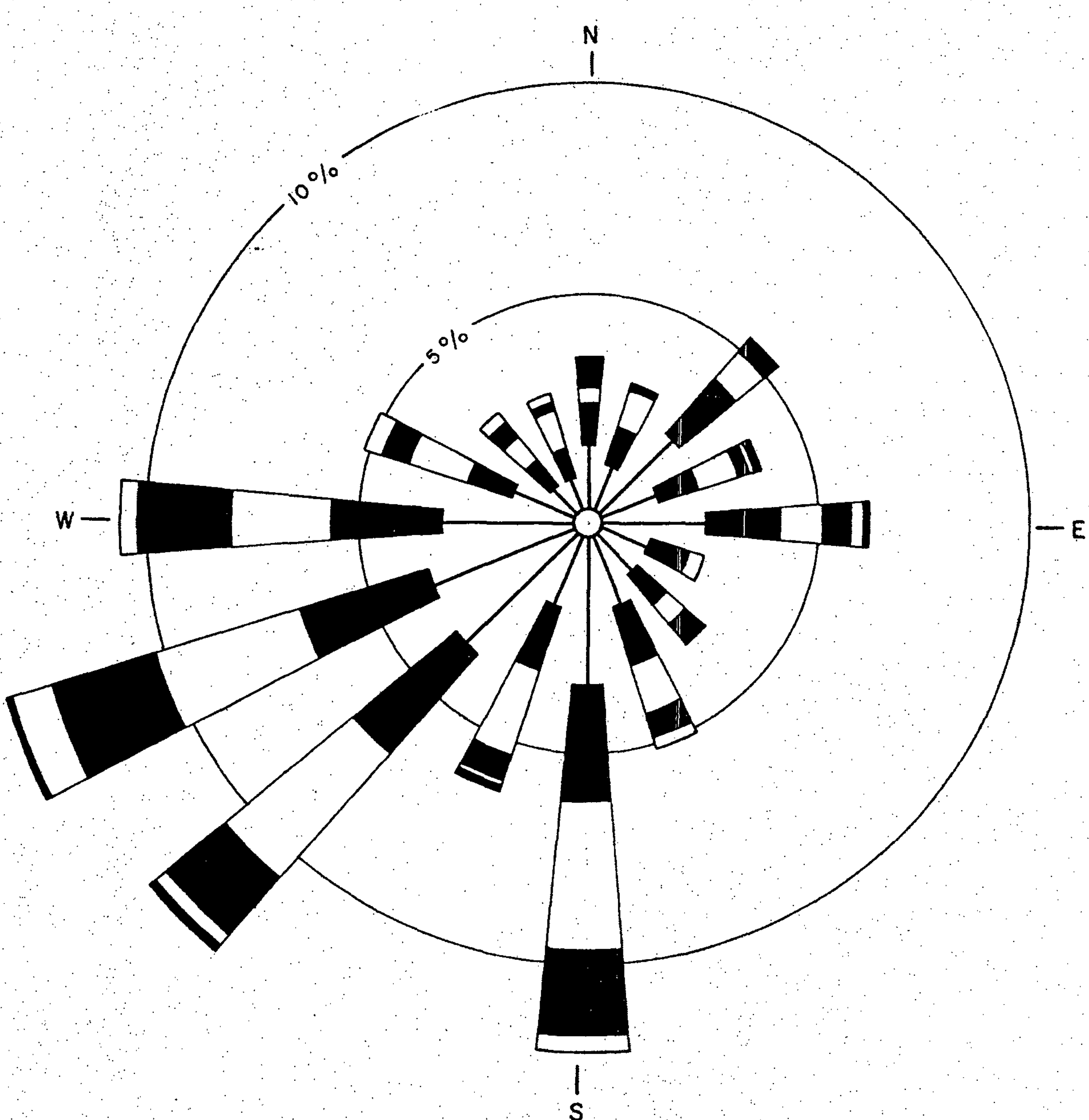
PREPARED FOR

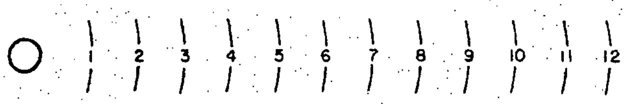
UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

Reference: U.S. Dept. of Commerce, NOAA, 1981

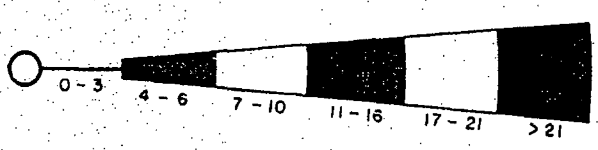
D'APPOLONIA

19 1253 HERCULENE. A&B SMITH CO., PGH., PA LT1530-1079





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-8

WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE JULY CONDITIONS
1976 - 1980

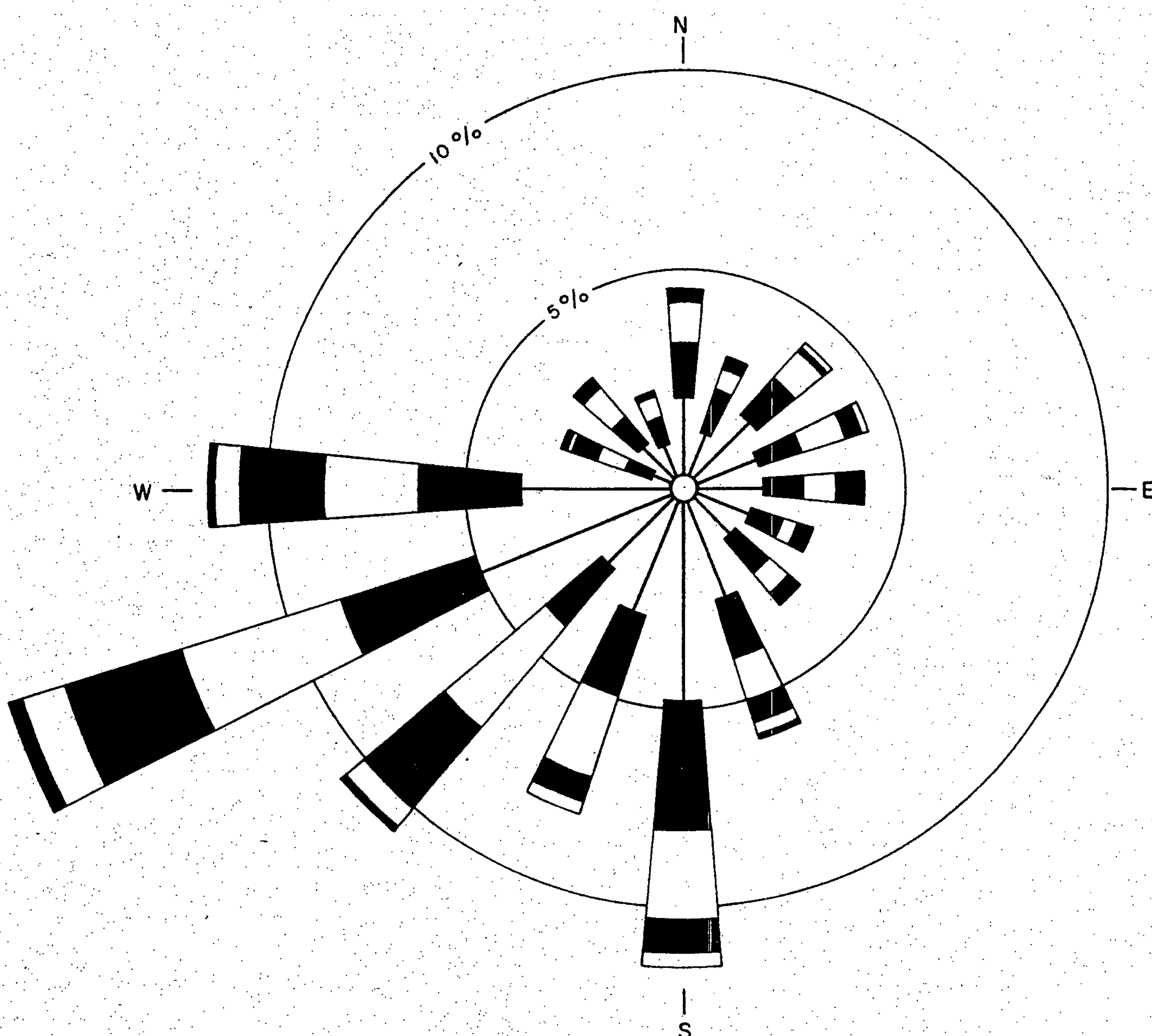
PREPARED FOR

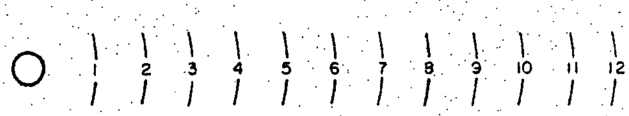
UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

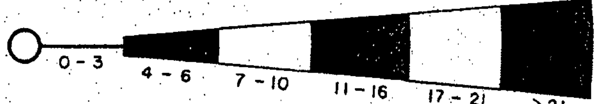
DRAWN BY	EF	10/22/81	CHECKED BY	JSH	12-7-81	DRAWING NUMBER	NM81-453-A11
			APPROVED BY	KGK	12/21/81		

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
EF 10/22/81	JSH 12-17-81	KGK 12/21/81	NM81-433-A12





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-9

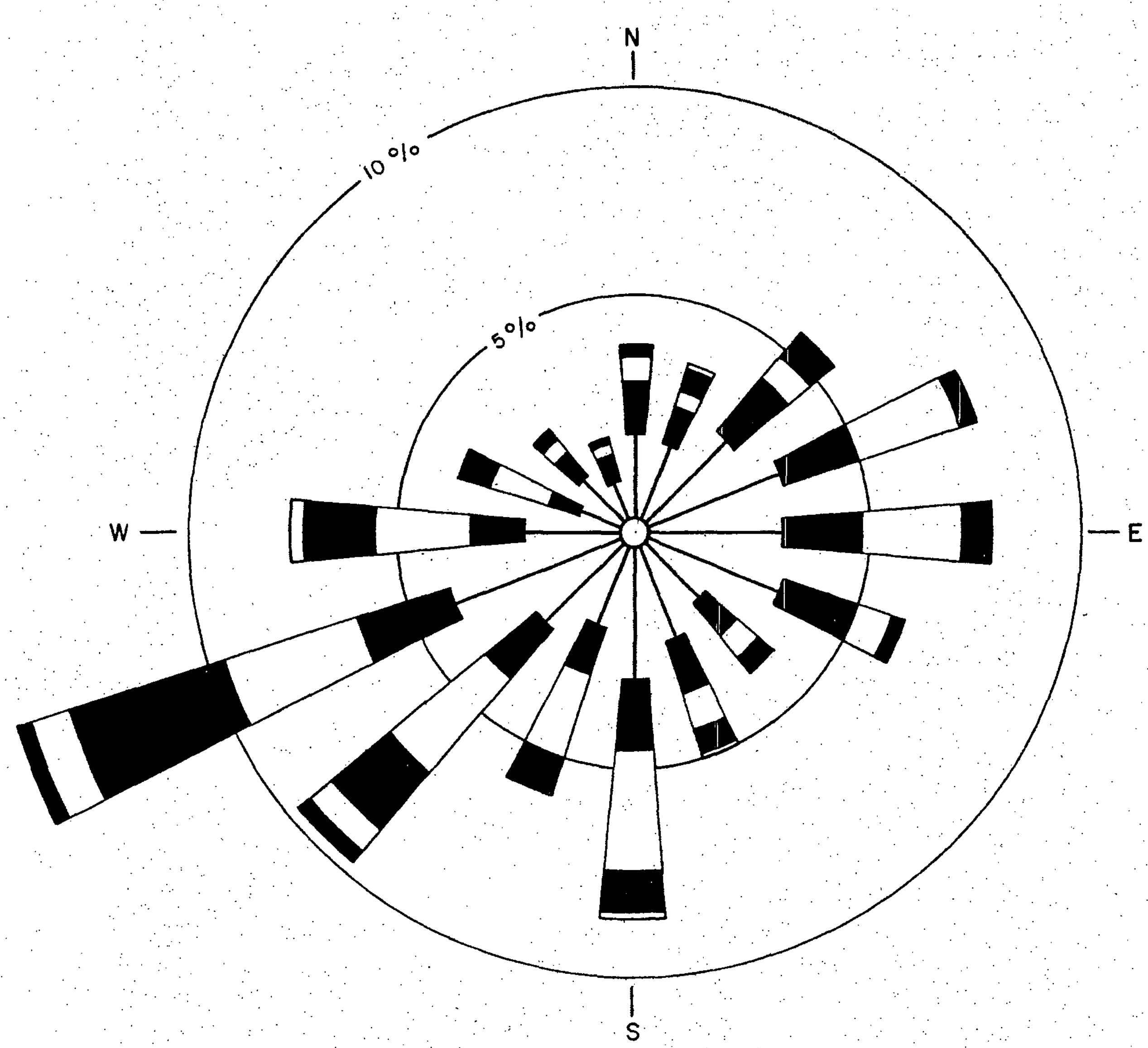
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE AUGUST CONDITIONS
1976 - 1980

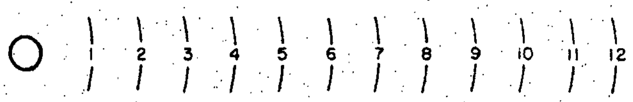
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

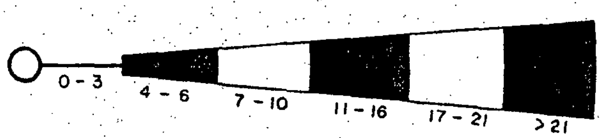
D'APPOLONIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
EF 10/22/81	JH 12-17-81	KGK 12/21/81	NM81-455-A13





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

FIGURE B2-10

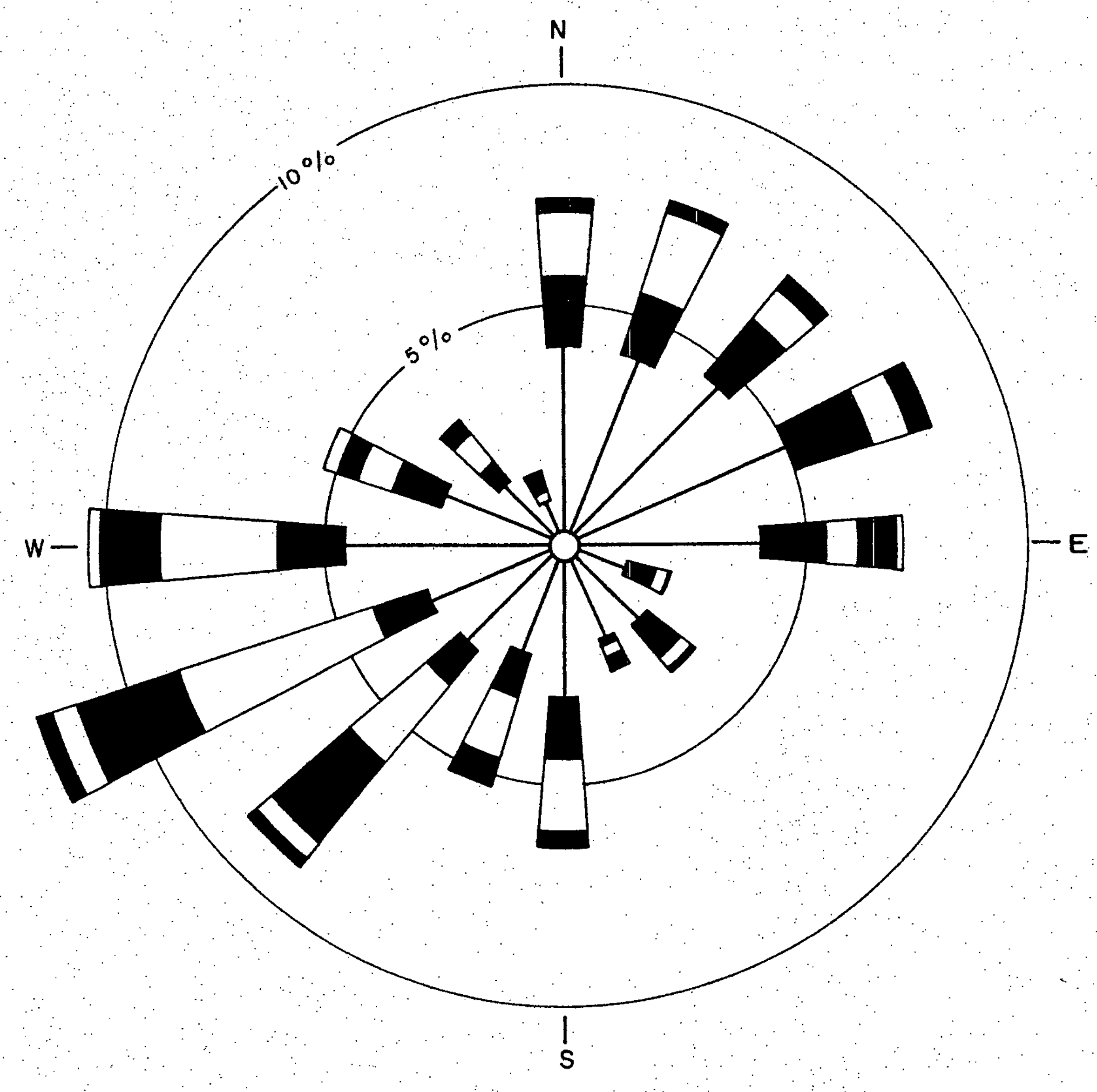
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE SEPTEMBER CONDITIONS
1976 - 1980

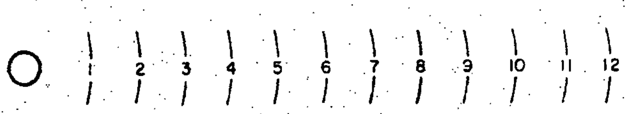
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

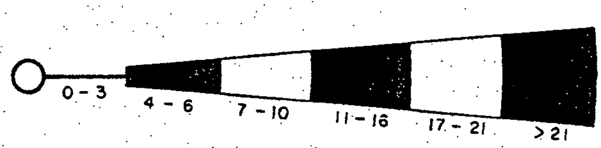
Reference: U.S. Dept. of Commerce, NOAA, 1981

D'APPOLONIA





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-11

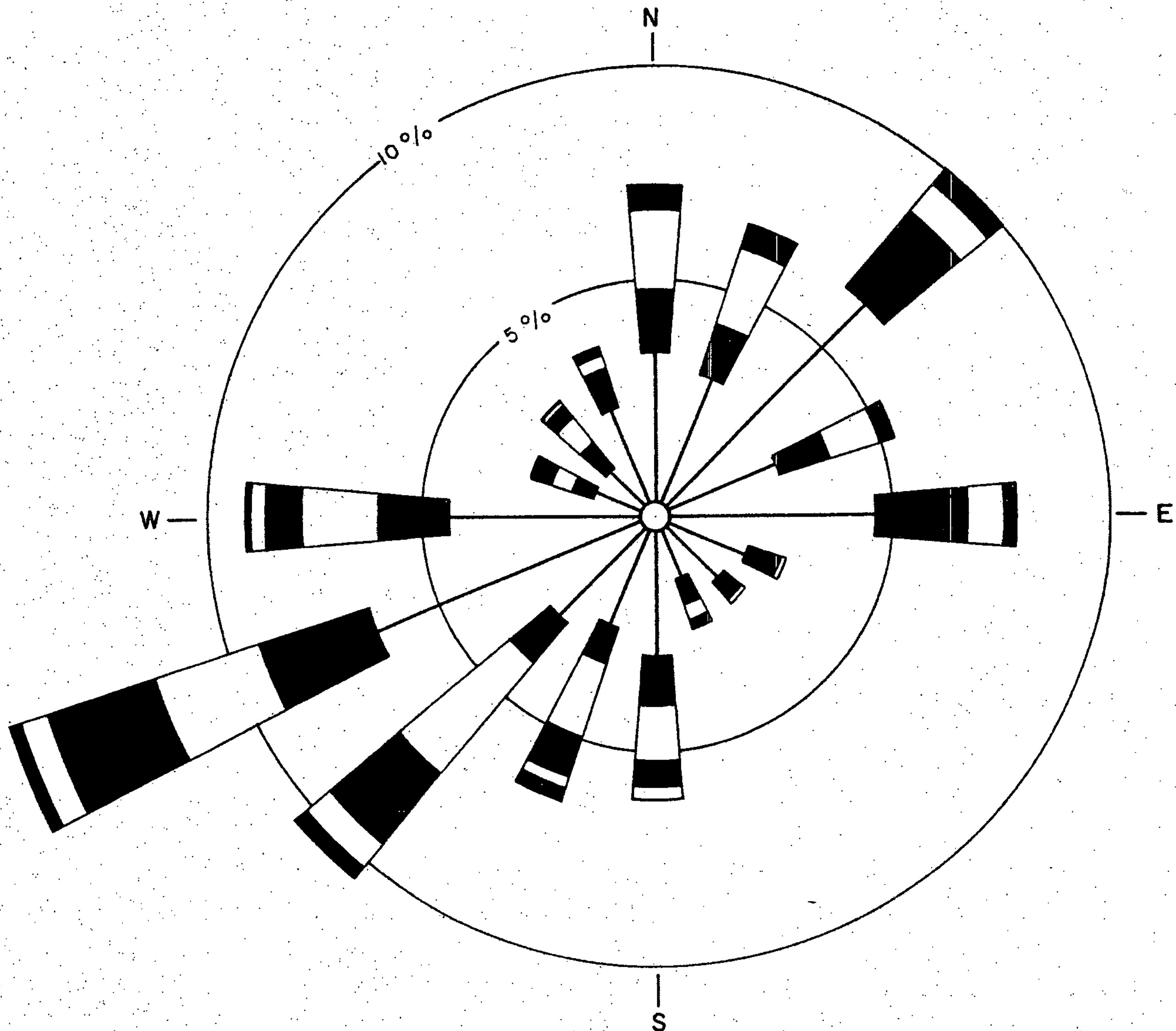
WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE OCTOBER CONDITIONS
1976 - 1980

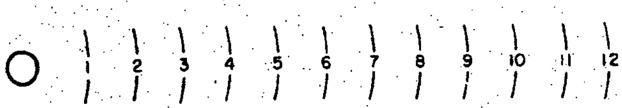
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

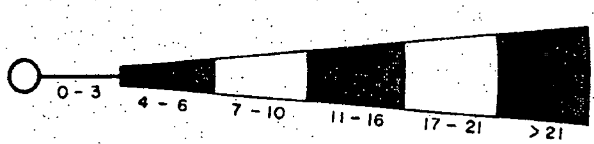
D'APPOLONIA

DRAWN BY	EF 10/21/81	CHECKED BY JSH 12-17-81	DRAWING NUMBER NM81-453-A14
		APPROVED BY KGK 12/21/81	





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

FIGURE B2-12

WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE NOVEMBER CONDITIONS
1976 - 1980

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

Reference: U.S. Dept. of Commerce, NOAA, 1981

D'APPOLONIA

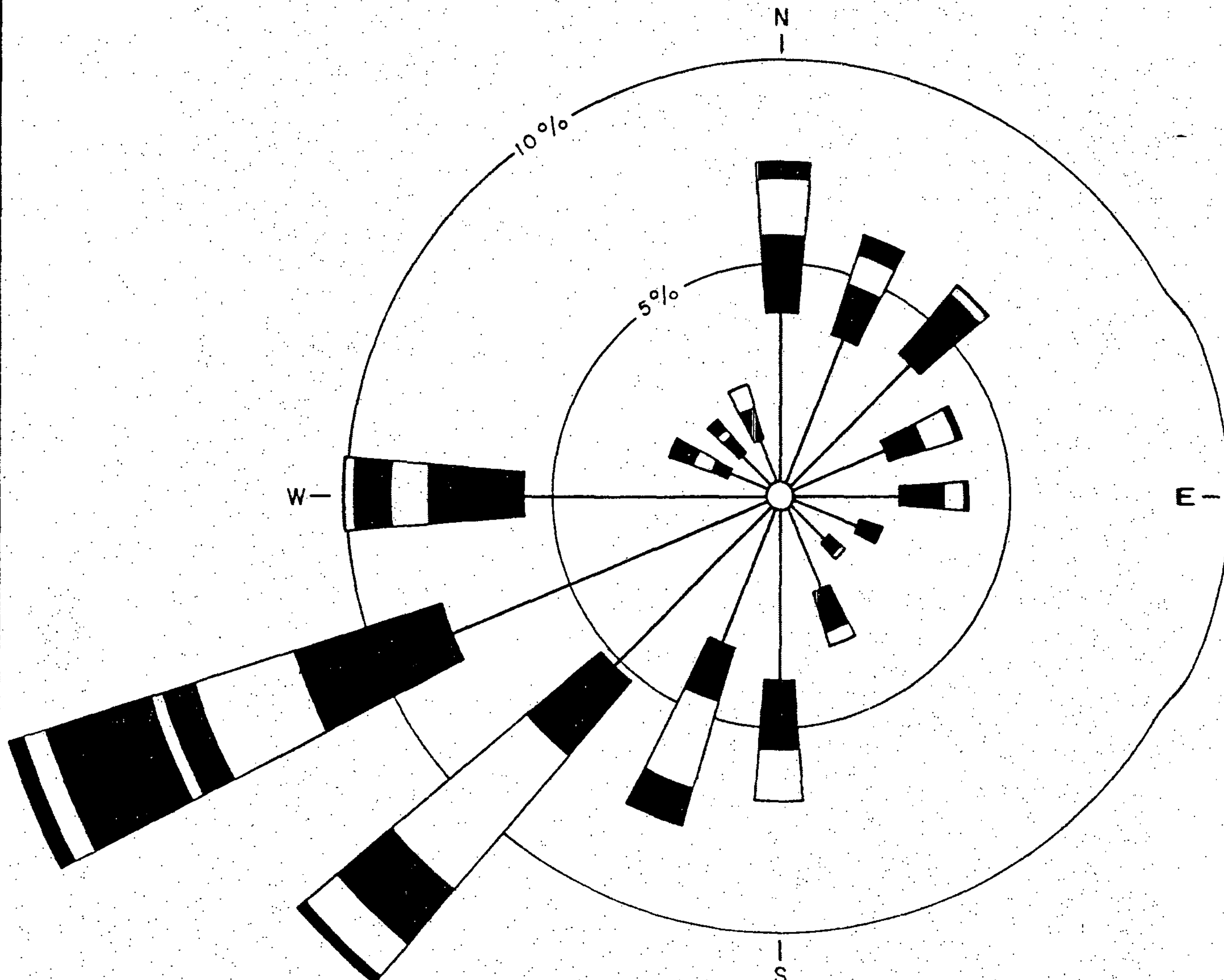
DRAWN BY	EF	10/21/81
CHECKED BY	JSH	12-17-81
APPROVED BY	KGK	12/21/81
DRAWING NUMBER	NM81-433-A15	

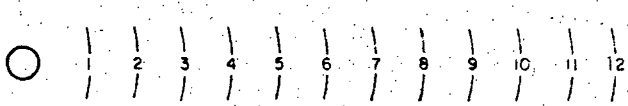
DRAWN BY EF 11/2/81

CHECKED BY [signature] 12-17-81

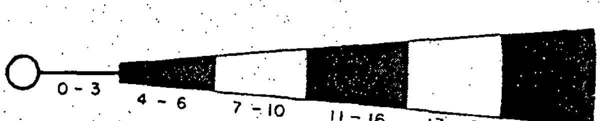
APPROVED BY [signature] 12/21/81

DRAWING NUMBER NM81-?3-A16





PERCENTAGE OF WINDS IN DIRECTION



WIND SPEED GROUPS, IN KNOTS

Reference: U.S. Dept. of Commerce, NOAA, 1981

FIGURE B2-13

WIND ROSE
FOR GALLUP, NEW MEXICO
AVERAGE DECEMBER CONDITIONS
1976 - 1980

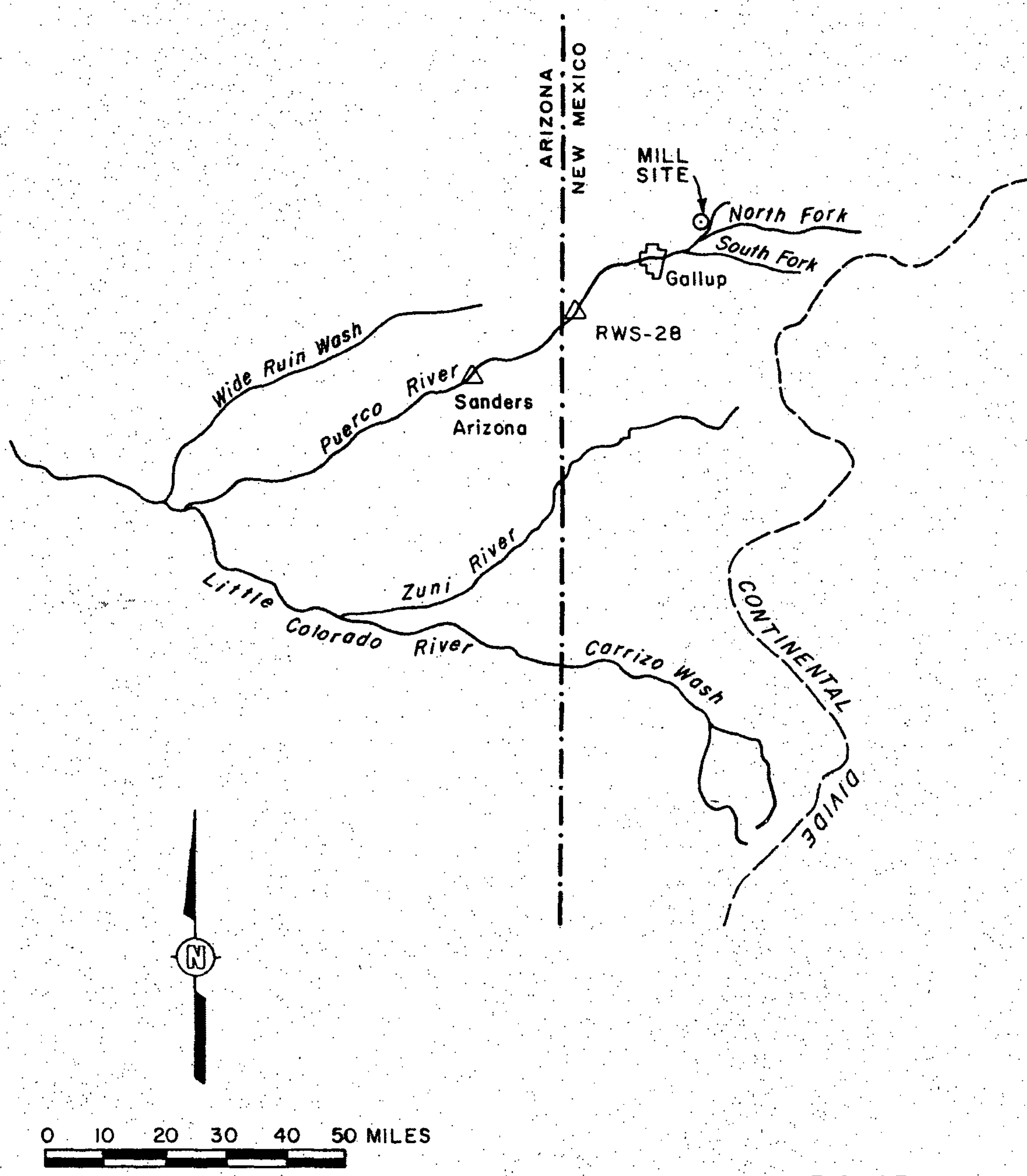
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

19 1253 HERCULENE. A&B SMITH CO., PGH., PA LT1530-1079

DRAWN BY EF 10/1/81 | CHECKED BY WEF 12/17/81 | APPROVED BY KSK 12/21/81 | DRAWING NUMBER NM81-433-A17



△ WATER QUALITY SAMPLING POINT

Reference: Arizona State and New Mexico State Highway Maps

FIGURE B3-1

REGIONAL DRAINAGE SYSTEM WITH SPILL RELATED SURFACE WATER QUALITY SAMPLING POINTS

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY EF 10/5/81 | CHECKED BY WEo 12/11/81 | APPROVED BY KSK 12/21/81 | DRAWING NUMBER NM81-433-A18

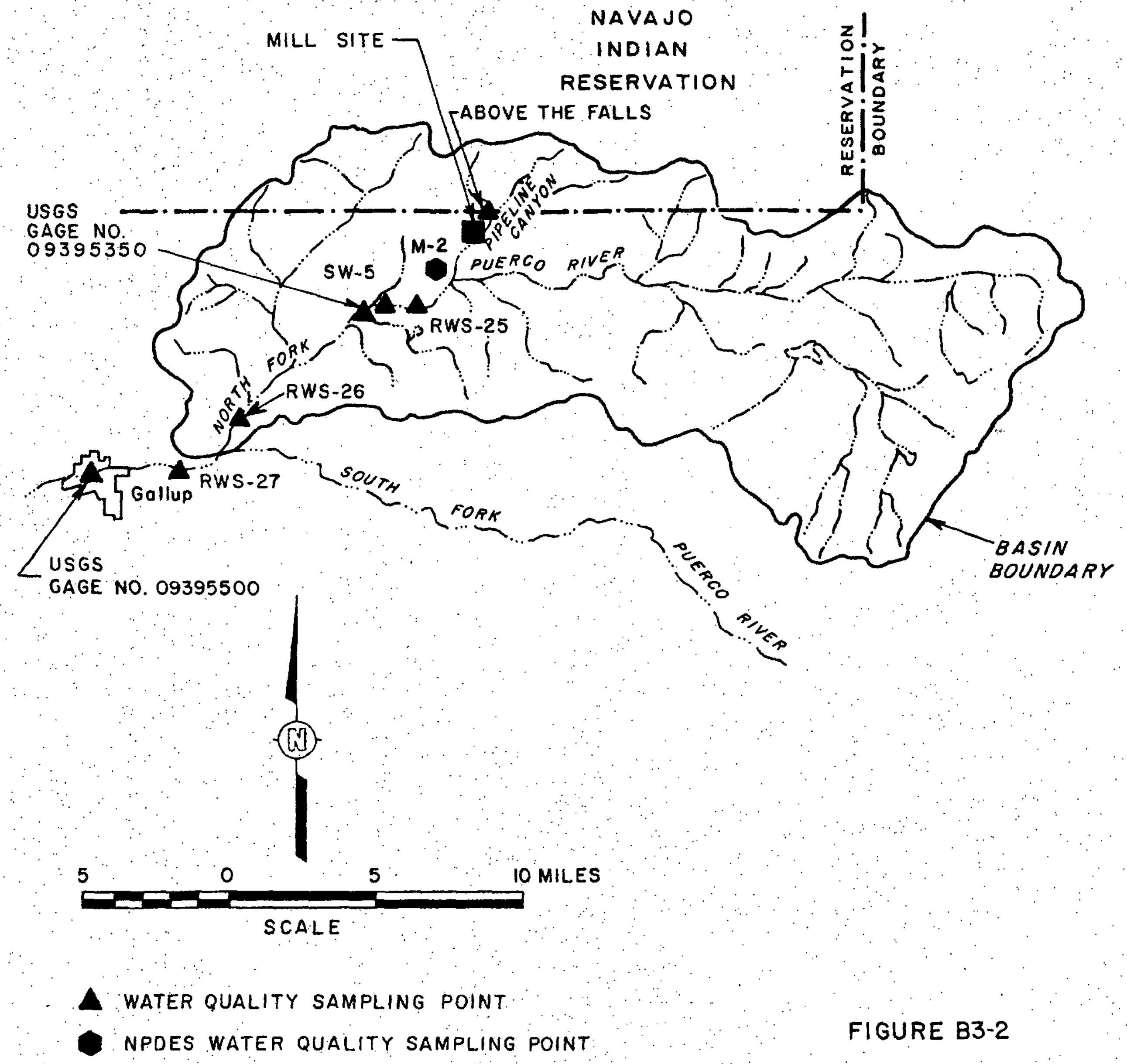


FIGURE B3-2

NORTH FORK PUERCO RIVER BASIN
WITH USGS GAGE LOCATIONS
AND SAMPLING LOCATIONS

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

Reference: USGS Topographic Map
Gallup, New Mexico, 1970
1:250,000 scale.

D'APPOLONIA

DRAWN BY	EF	10/1/81
CHECKED BY	WES	12/17/81
APPROVED BY	KGK	12/21/81
DRAWING NUMBER	NM81-433-A19	

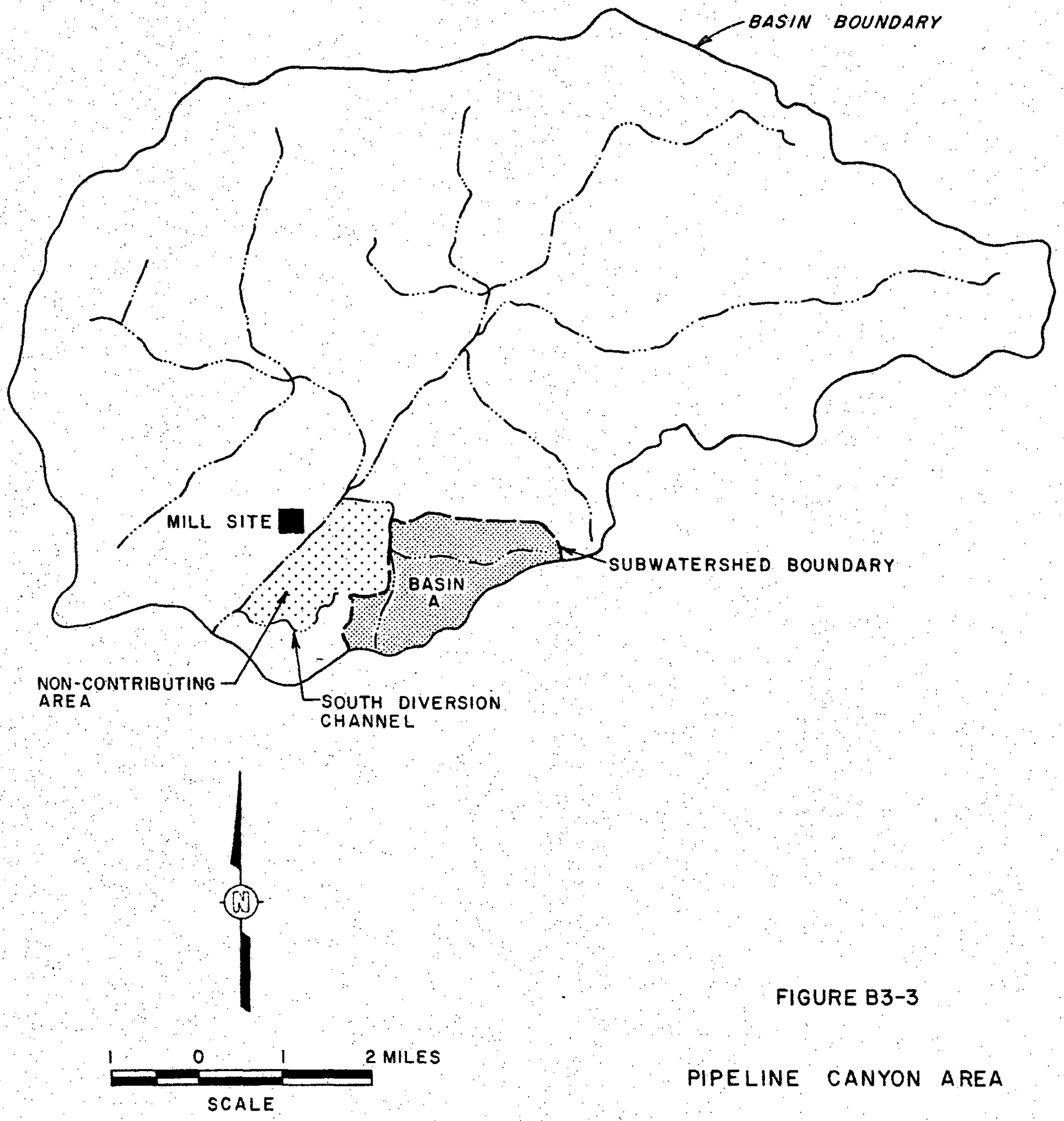


FIGURE B3-3

PIPELINE CANYON AREA

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

Reference : SAI, 1981a

D'APPOLONIA

DRAWN BY: EB 10/11/81 | CHECKED BY | APPROVED BY | DRAWING NUMBER NM81-435-A20

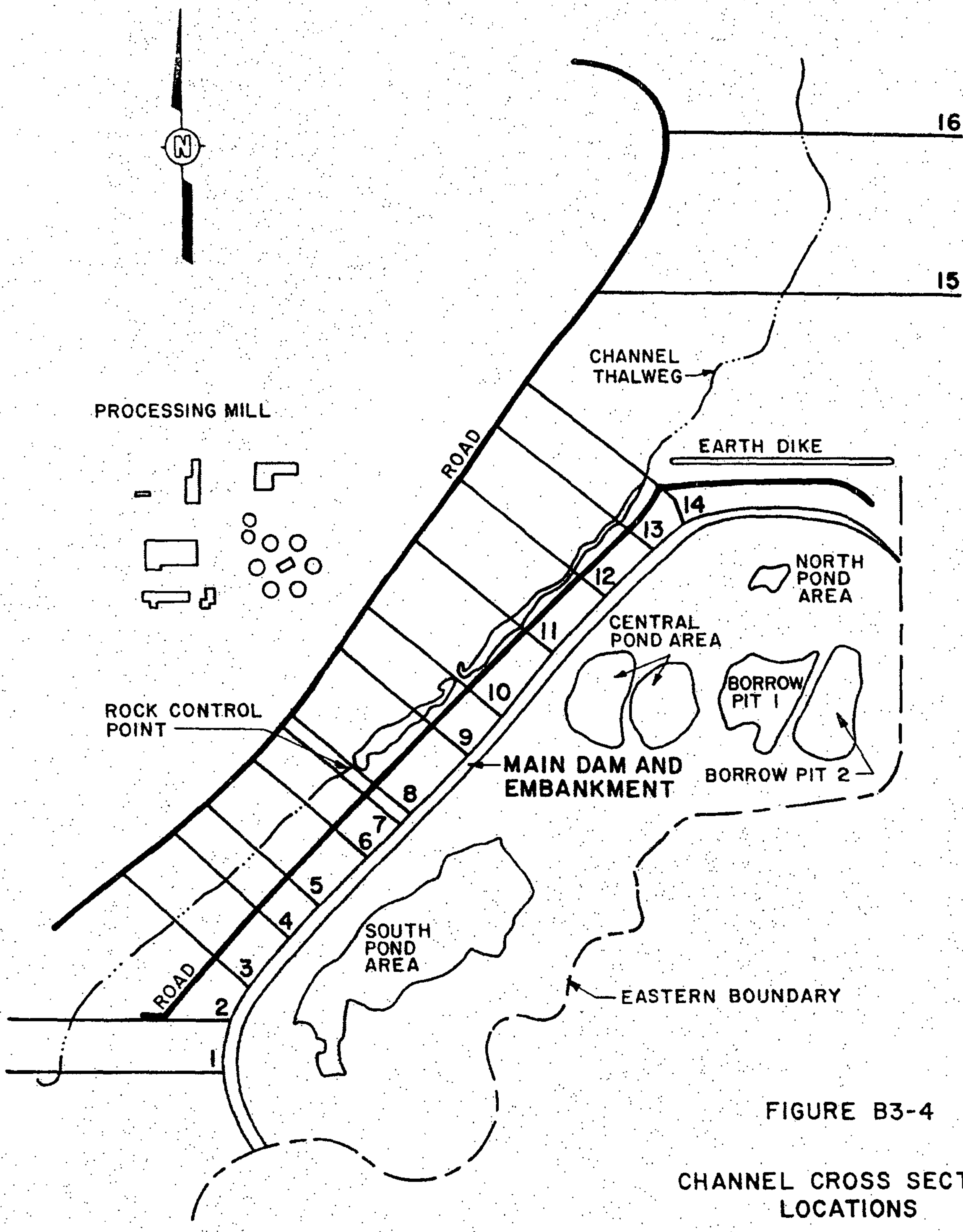


FIGURE B3-4

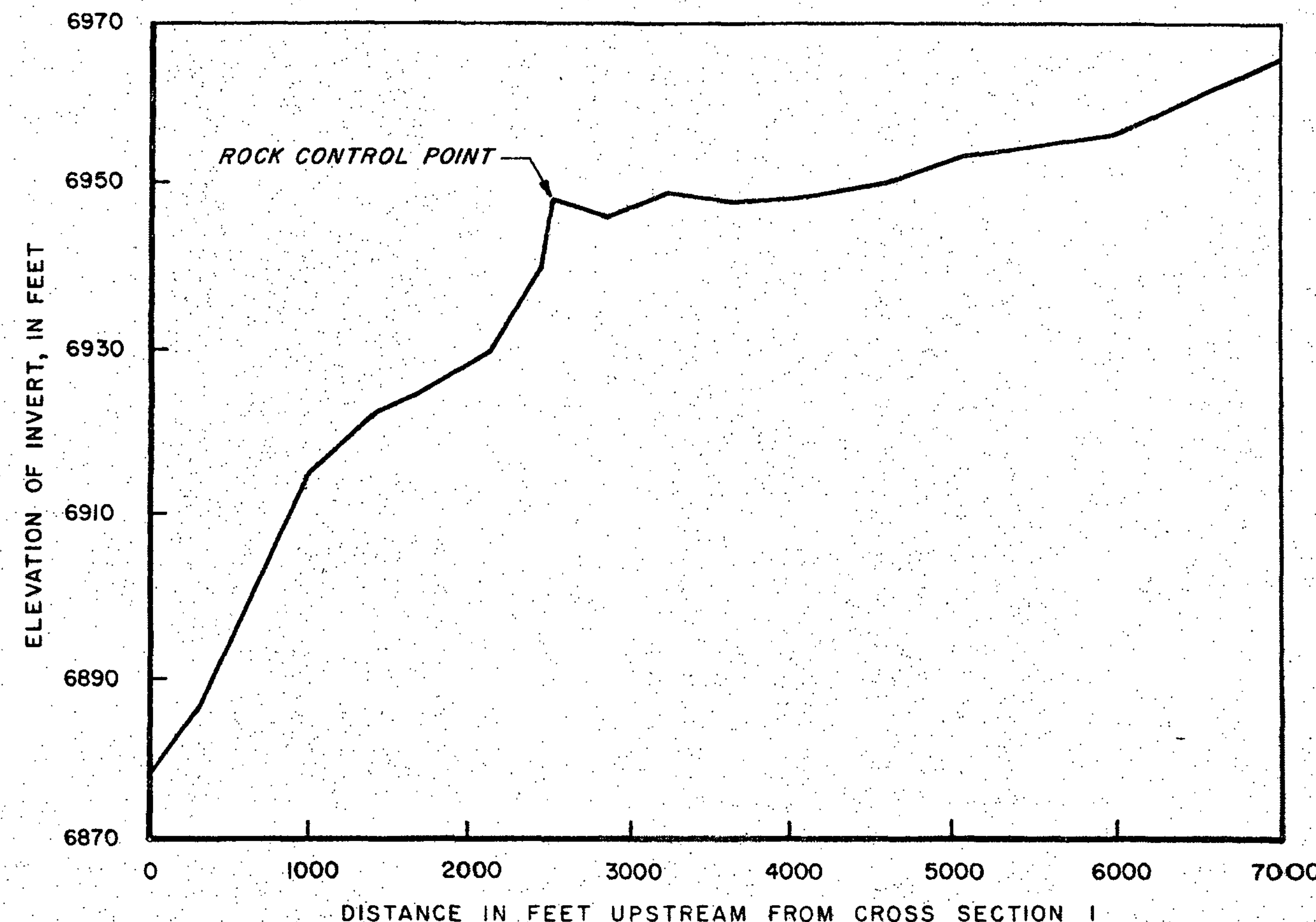
CHANNEL CROSS SECTION LOCATIONS

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

Reference: SAI, 1980a

D'APPOLONIA



Note : See Figure B3-4 for Cross Section Location.

FIGURE B3-5

PIPELINE CANYON CHANNEL PROFILE

PREPARED FOR

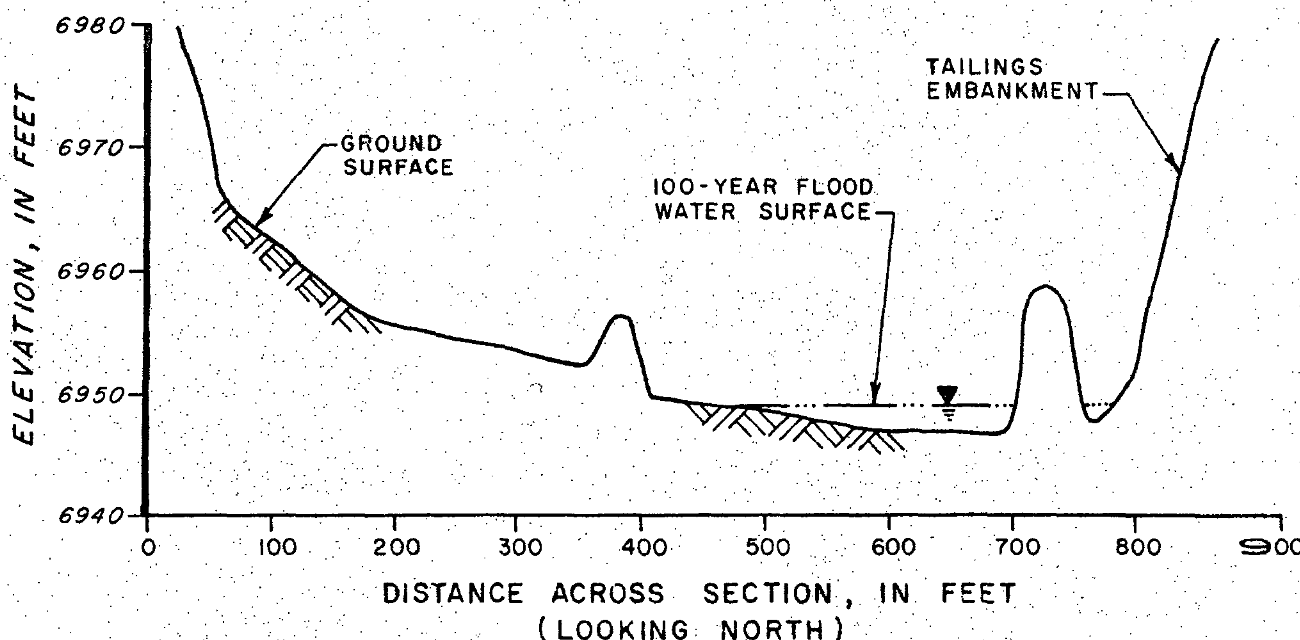
UNC MINING AND MILLING CHURCH ROCK OPERATIONS

Reference : SAI, 1980a

D'APPOLONIA

DRAWN BY EB 10/5/81 | CHECKED BY WEJ 12/17/81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-433-A21

DRAWN BY EF 11/6/81 | CHECKED BY WEJ 12/7/81 | APPROVED BY KGK 12/11/81 | DRAWING NUMBER NM81-433-A22



Note : See Figure B3-4 for Cross Section Location.

FIGURE B3-6

100-YEAR FLOOD WATER SURFACE
PROFILE AT CROSS SECTION 11

Reference : SAI, 1980a

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

400 0 400 800 1200 FEET

SCALE

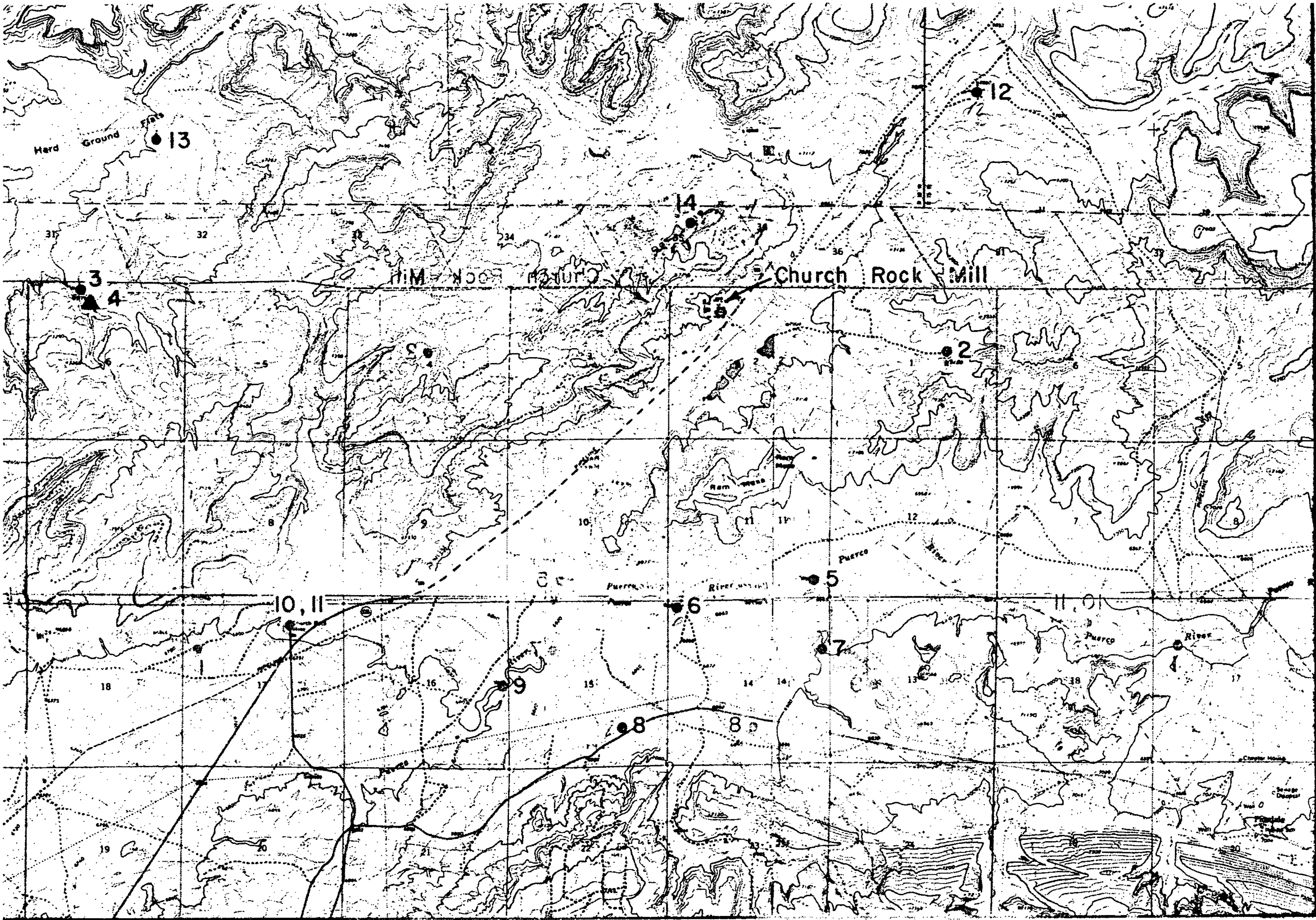
FIGURE B3-7

WATER QUALITY SAMPLING LOCATIO
AND PIEZOMETRIC SURFACE FOR
ZONE 3, UPPER GALLUP SANDSTONE

PREPARED FOR

UNC MINING AND MILLING
CHURCHROCK OPERATIONS

D'APPOLONIA



T 17 N / T 16 N

W | R 16 W

R 16 W | R 15 W

● 6
▲ 4

NOTE
SEE
AND

AND

UNC

USGS 7.5 MINUTE SERIES QUADRANGLE MAPS PINEDALE, NEW MEXICO (1963) ; OAK SPRING, NEW MEXICO (1963); HARD GROUND FLATS, NEW MEXICO (1979) ; CHURCH ROCK, NEW MEXICO (1979)

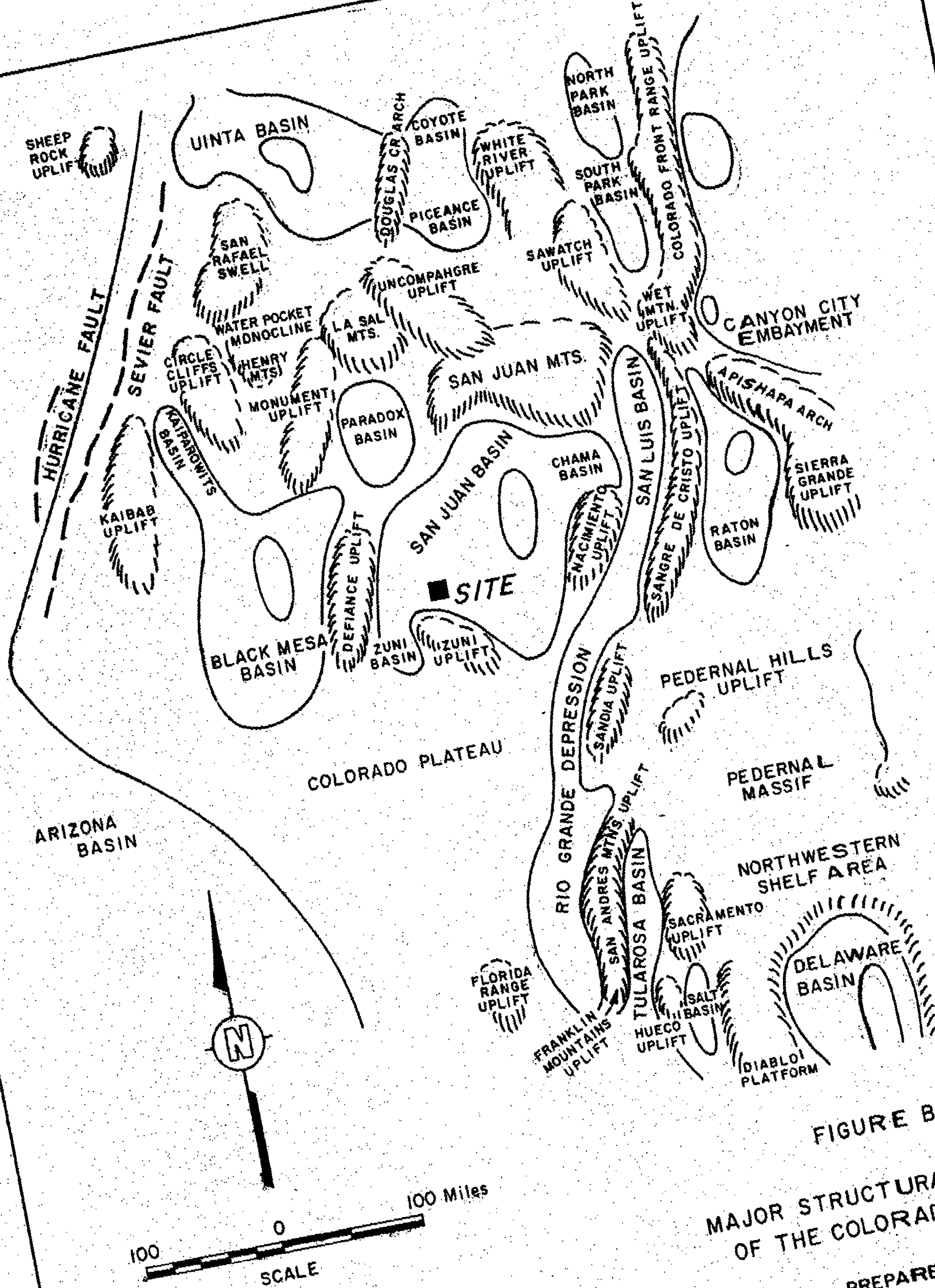


FIGURE B4-1

MAJOR STRUCTURAL ELEMENTS OF THE COLORADO PLATEAU

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

Reference: UNC, 1976

D'APPOLONIA

DRAWN BY MJG 10/27/81
CHECKED BY
APPROVED BY

SYSTEM	ROCK UNITS		Symbol	LITHOLOGY
Quaternary		Colluvium, Alluvium	Qcl, Qal	Colluvium: weathered shale, sandstone fragments, basalt fragments Alluvium: silty clay and thin gravel lenses
Tertiary		Volcanics	Tb	basalt, andesite, rhyolite, lava flows and dikes
Cretaceous	Mesa-Verde Group	Menefee Formation	Kmf	gray, brown claystone and shale, sandstone, limestone, and coal
		Point Lookout Sandstone	Kpl	dark orange to yellowish gray arkosic sandstone
		Crevasse Canyon Formation Gibson Coal Member Dalton Sandstone Member Mulatto Tongue (Mancos Shale) Dilco Coal Member	Kca Kcdo Kmm Kcdl	sandstone, claystone, shale
		Gallup Sandstone	Kg	brown sandstone
		Mancos Shale Tres Hermanos Member	Km	dark gray shale with interbedded sandstone
		Dakota Sandstone	Kd	tan to gray quartz sandstone
Jurassic		Morrison Formation Brushy Basin Member Jackpile Sandstone Poison Canyon Sandstone Westwater Canyon Member Recapture Member	Jm	sandstone mudstone and sandstone sandstone and mudstone sandstone and siltstone
		Bluff Sandstone	Jb	pale red to brown sandstone
	San Rafael Group	Summerville Formation	Js	pale brown sandstone and siltstone
		Todilto Limestone	Jt	limestone
		Entrada Sandstone	Je	fine-grained sandstone
		Carmel Formation		red, fine-grained silty sandstone
Triassic		Wingate Formation		red to tan sandstone
		Chinle Formation	Rc	red shale with interbedded red siltstone and sandstone
Permian		San Andres Formation Glorieta Member	Pg	limestone white to tan fine-grained cross-bedded sandstone

Reference: Modified from Gulf Minerals Resources Company, 1979

FIGURE B4-2

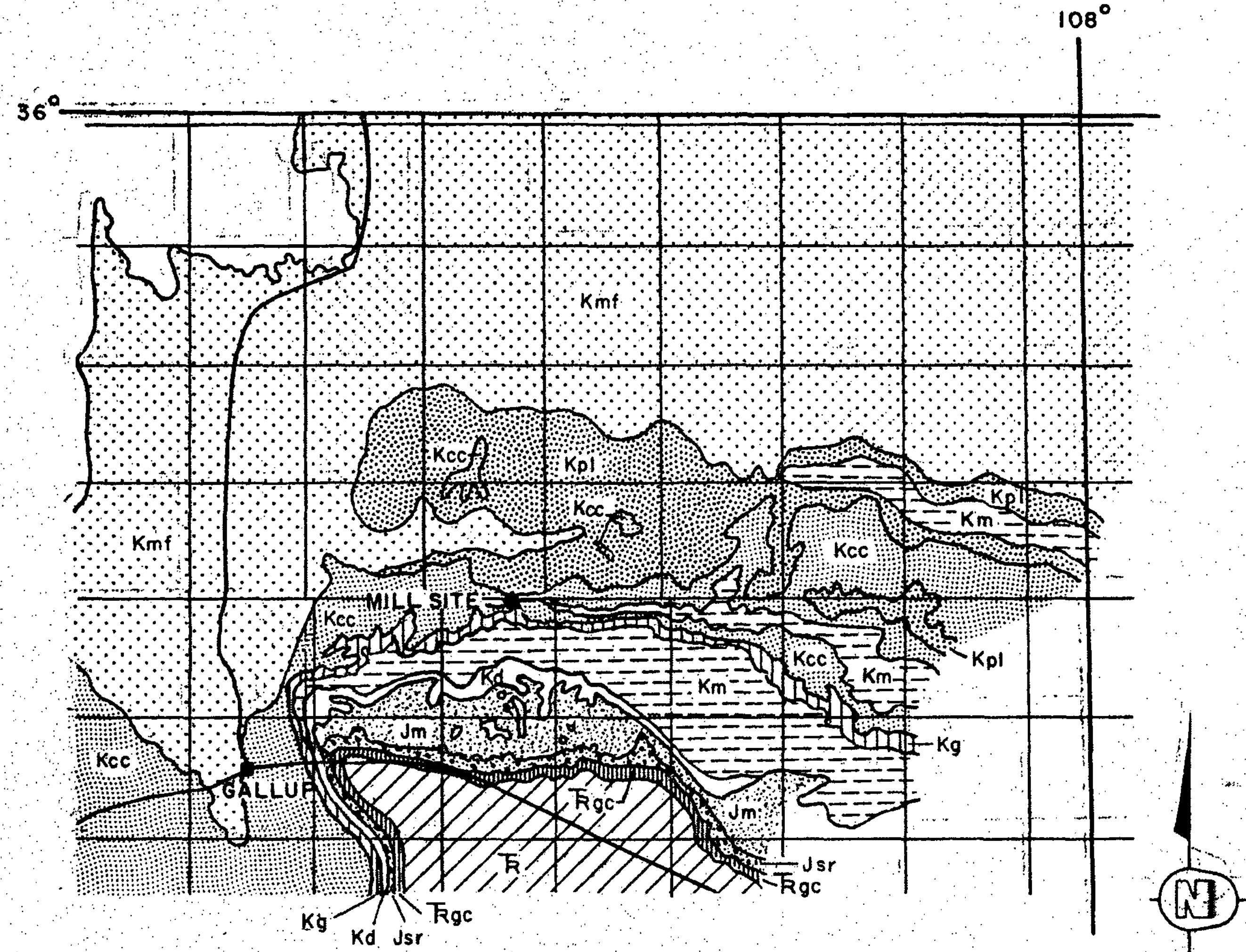
STRATIGRAPHIC COLUMN TYPICAL OF THE COLORADO PLATEAU

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY	EF	11/2/81
CHECKED BY	[illegible]	12/7/81
APPROVED BY	KGK	12/21/81
DRAWING NUMBER	NM81-4 33-A25	



10 0 10 MILES

SCALE

EXPLANATION

Kmf	MENEFEE FORMATION
Kpl	POINT LOOKOUT SANDSTONE
Kcc	CREVASSE CANYON FORMATION
Km	MANCOS SHALE
Kg	GALLUP SANDSTONE
Kd	DAKOTA SANDSTONE
Jm	MORRISON FORMATION
Jsr	SAN RAFAEL GROUP
Ʀgc	GLEN CANYON GROUP (undivided)
Ʀ	TRIASSIC ROCKS, undivided

Reference UNC, 1976

FIGURE B4-3

GEOLOGIC MAP
OF ZUNI UPLIFT AND CHACO SLOPE
NEAR GALLUP, NEW MEXICO

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
MJG 10/26/81	[illegible] 12/17/81	KGK 12/21/81	NM81-..3-A26

UNC MINING AND MILLING

SCALE

300 0 300 600 FEET

CONTOUR INTERVAL = 5 FEET

FIGURE C9-6

POST RECLAMATION TOPOGRAPHY

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA

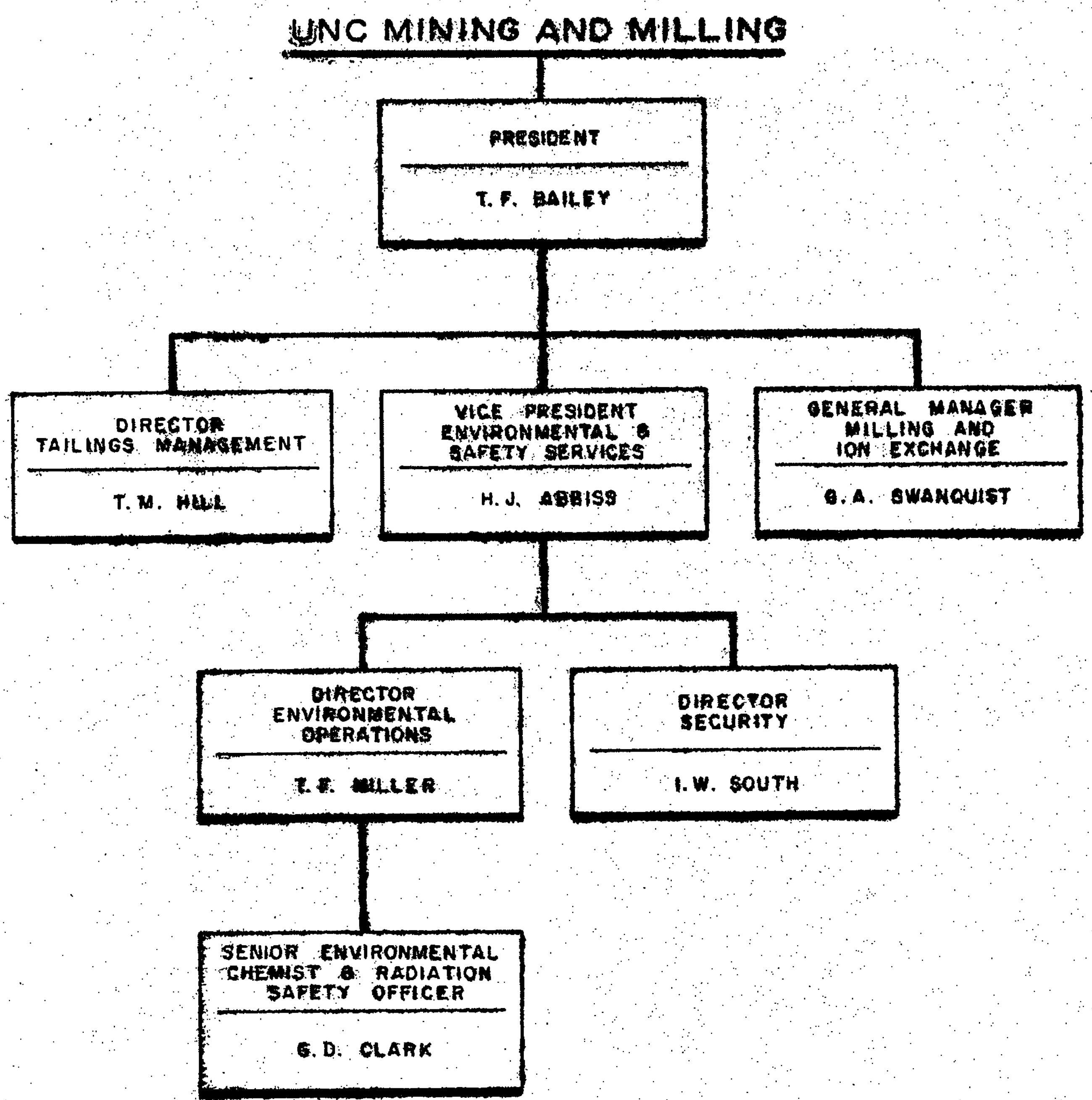


FIGURE C10-1

CORPORATE AND OPERATIONS ORGANIZATION

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

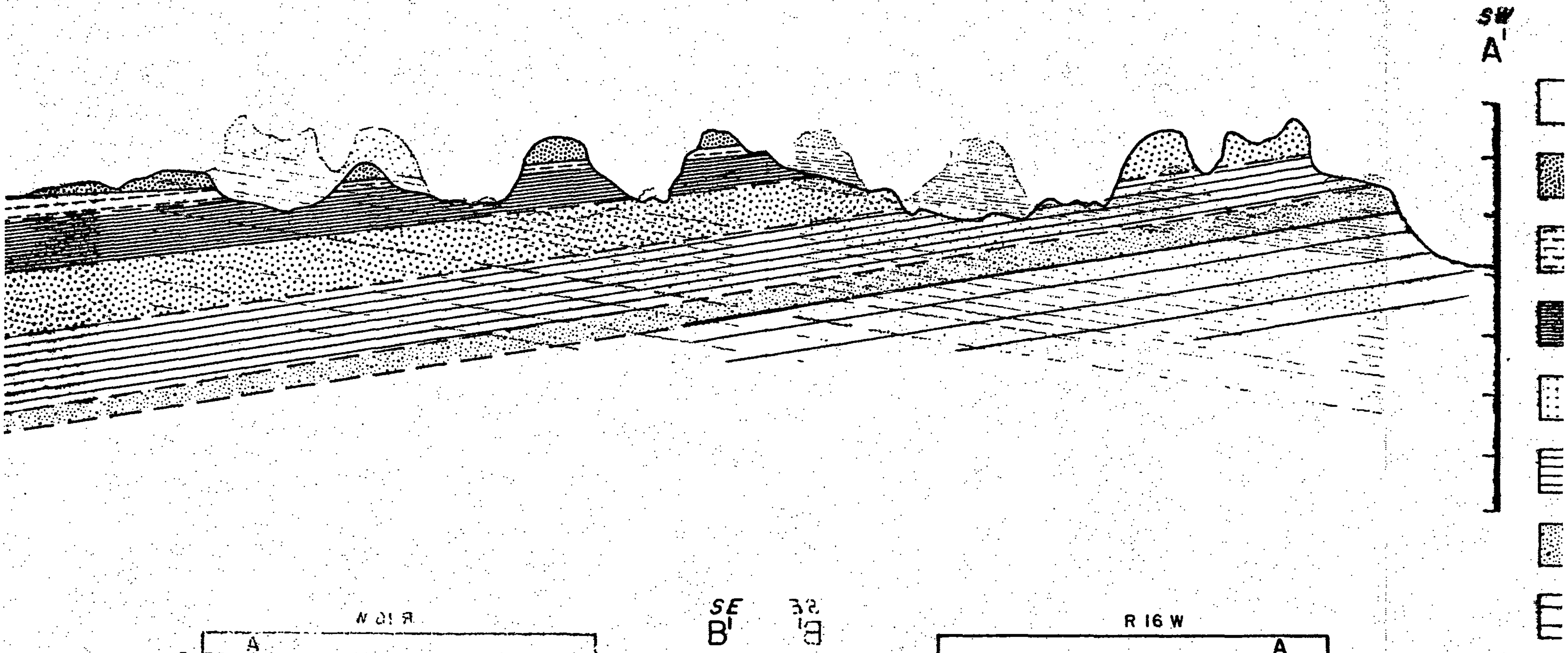
FIGURE C4-3

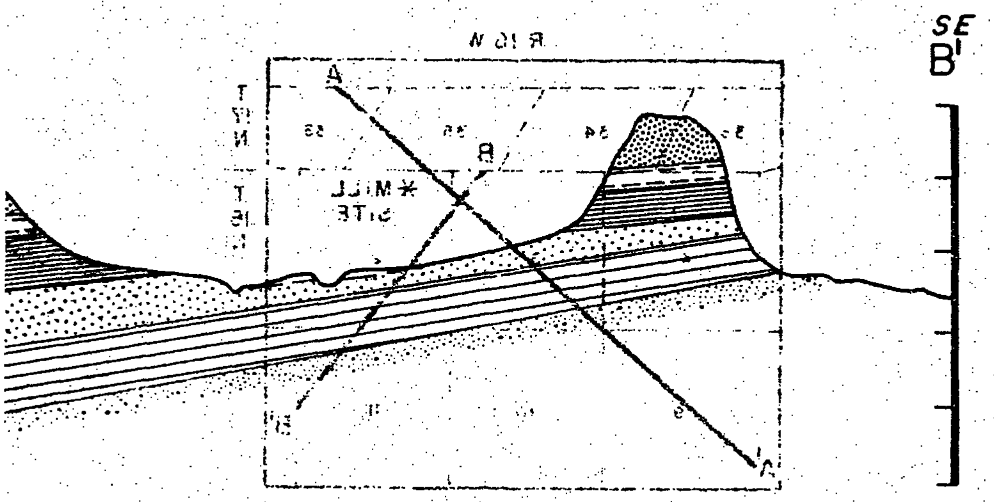
LOCATIONS OF RECEPTORS
USED IN THE MILDOS CODE

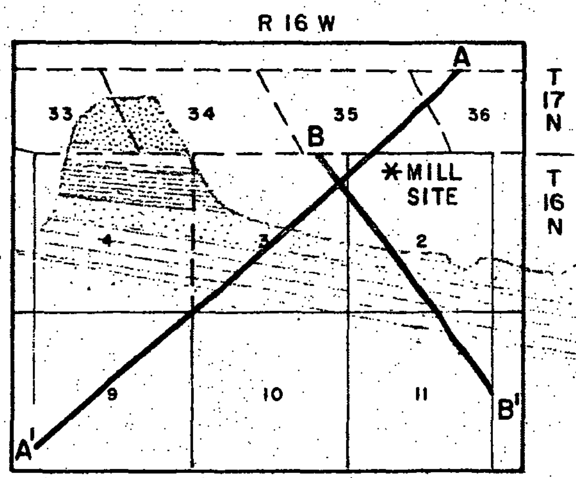
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

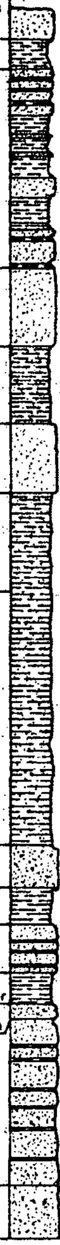






CROSS SECTION LOCATION MAP

DRAWN BY EB 12/2/81 | CHECKED BY 12/2/81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-53-A27



SYSTEM		ROCK UNIT		DESCRIPTION
CRETACEOUS SYSTEM	MESA VERDE GROUP	Crevasse Canyon Formation	Dalton Sandstone Member	Massive clean white to buff, medium to coarse-grained sandstone. This sand outcrops at the site; forms cap of Ram Mesa. Regressive coastal barrier sand. Gradational with Mulatto tongue.
			Mulatto Tongue	Chiefly dark gray mudstone and silty sandstone with scattered thin beds of sandstone. Disconformable with Dilco Coal. Offshore marine deposit.
			Dilco Coal Member	Paludal and fluvial deposits. Chiefly irregular buff to gray medium-grained sandstone, light gray clay, and lenticular coal beds and carbonaceous shales. Interfingered with underlying Gallup sandstone. Mill site complex lies in this member.
		Gallup Formation	1st Gallup Sandstone Member	Predominantly a light gray to buff, fine to coarse-grained sandstone interbedded with gray siltstone and mudstone, and minor amounts of coal. Outcrops on southwestern margin of site. Coastal barrier deposit.
			Upper D-Cross Tongue	Sandy marine shales and thin lenticular sandstones. Transgressive marine deposits.
			2nd Gallup Sandstone Member	Generally buff to light gray, fine-grained and silty becoming gradually finer grained towards the base merging with the rather thick transitions zone which comprises the upper 100 ft. or so of the underlying Mancos Shale. Regressive, littoral or nearshore deposits.
		Mancos Shale Formation	Lower D-Cross Tongue	Fissile shale with calcareous zone. Thin sandstone and/or siltstone beds. Late Cretaceous subregional marine transgression.
				Limey medium gray to black marine shale interbedded infrequently with platey laminated light gray to grayish-yellow to white limestone and gypsum.
			Two Wells Sandstone Member	
		Dakota Formation		Continental and marginal marine. Uniformly fine-grained well sorted gray to pure white sandstone, with some interbedded siltstone and coal.
JURASSIC SYSTEM		Morrison Formation	Brushy Basin Member (Poison Canyon)	A green to grayish-green mudstone of continental deposition, split occasionally by discontinuous sandstone lenses.
			Westwater Canyon Sandstone Member	Gray to light grayish-red to yellowish-gray, locally conglomeritic fine to coarse-grained sandstone characterized by scour-and-fill crossbedding and by angular grains of unweathered feldspar. Discontinuous lenses of grayish-green sandy mudstone are present.
			Cowsprings Sandstone Member	Chiefly gray to light yellowish-gray, fine to medium-grained sandstone with some interbedded siltstone.

APPROXIMATE VERTICAL SCALE: 1" = 200'

FIGURE B4-5

STRATIGRAPHIC COLUMN
AT THE NORTHEAST CHURCH ROCK
MINE SHAFT

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

References: *SAI, 1980 a*
SAI and Bearpaw, 1980
UNC, 1976

200 0 200 400 600 800 FEET

SCALE

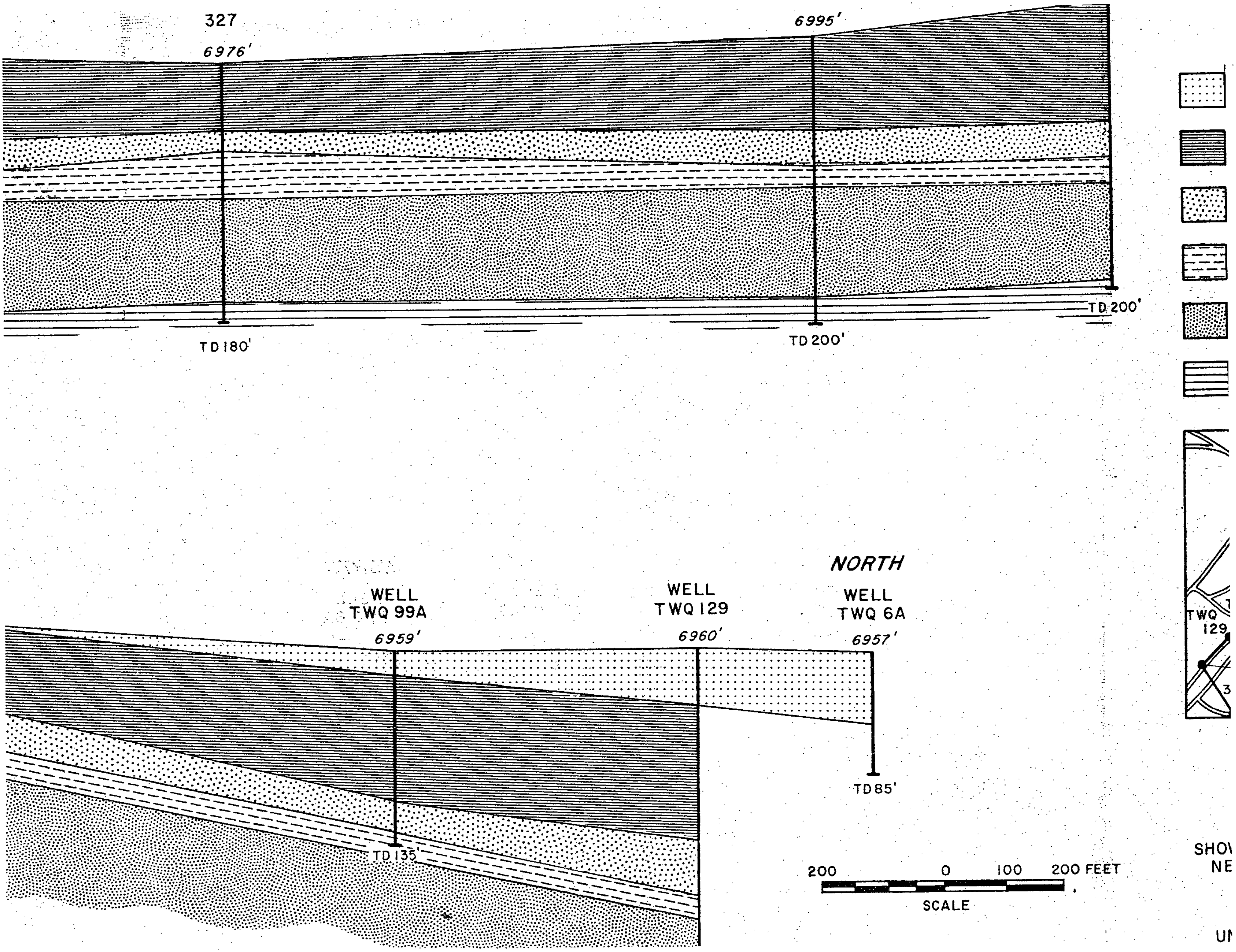
FIGURE B4-6

GEOLOGIC MAP
SEC. 2, T16N, R16W
NEW MEXICO

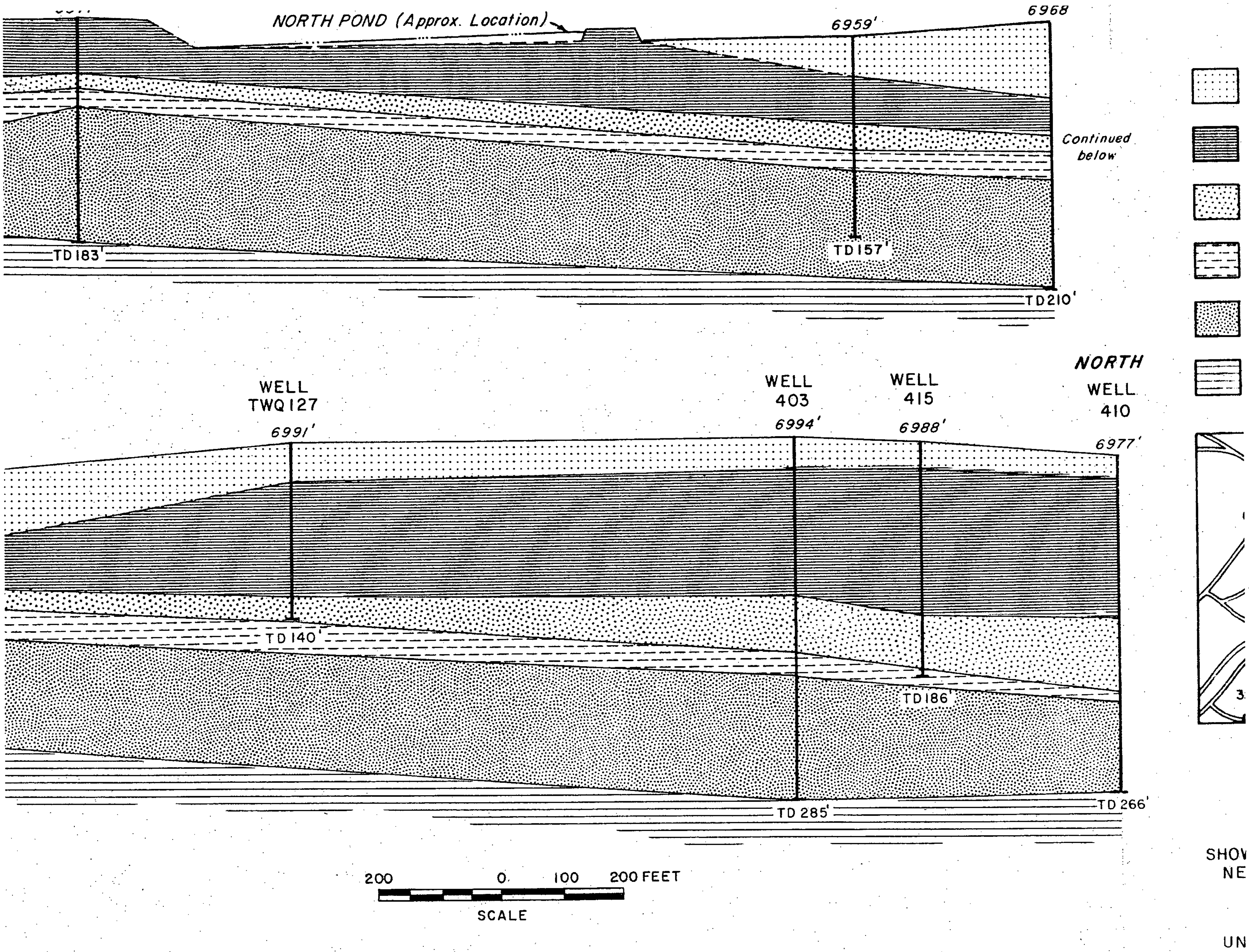
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

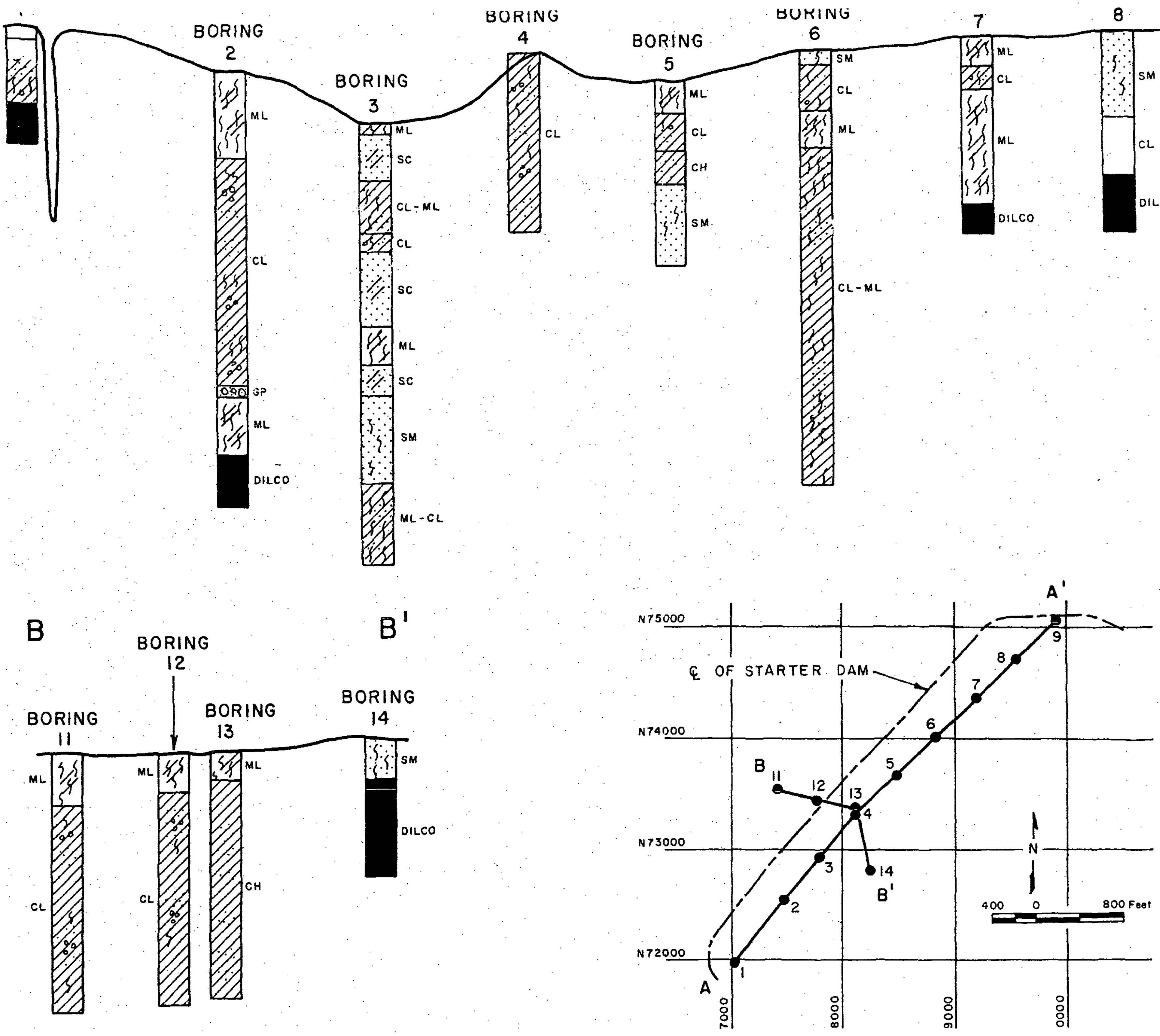
D'APPOLONIA



327
6976'
6995'
TD 180'
TD 200'
TD 200'
NORTH
WELL
TWQ 99A
6959'
WELL
TWQ 129
6960'
WELL
TWQ 6A
6957'
TD 85'
TD 135'
200
0
100
200 FEET
SCALE
TWQ
129



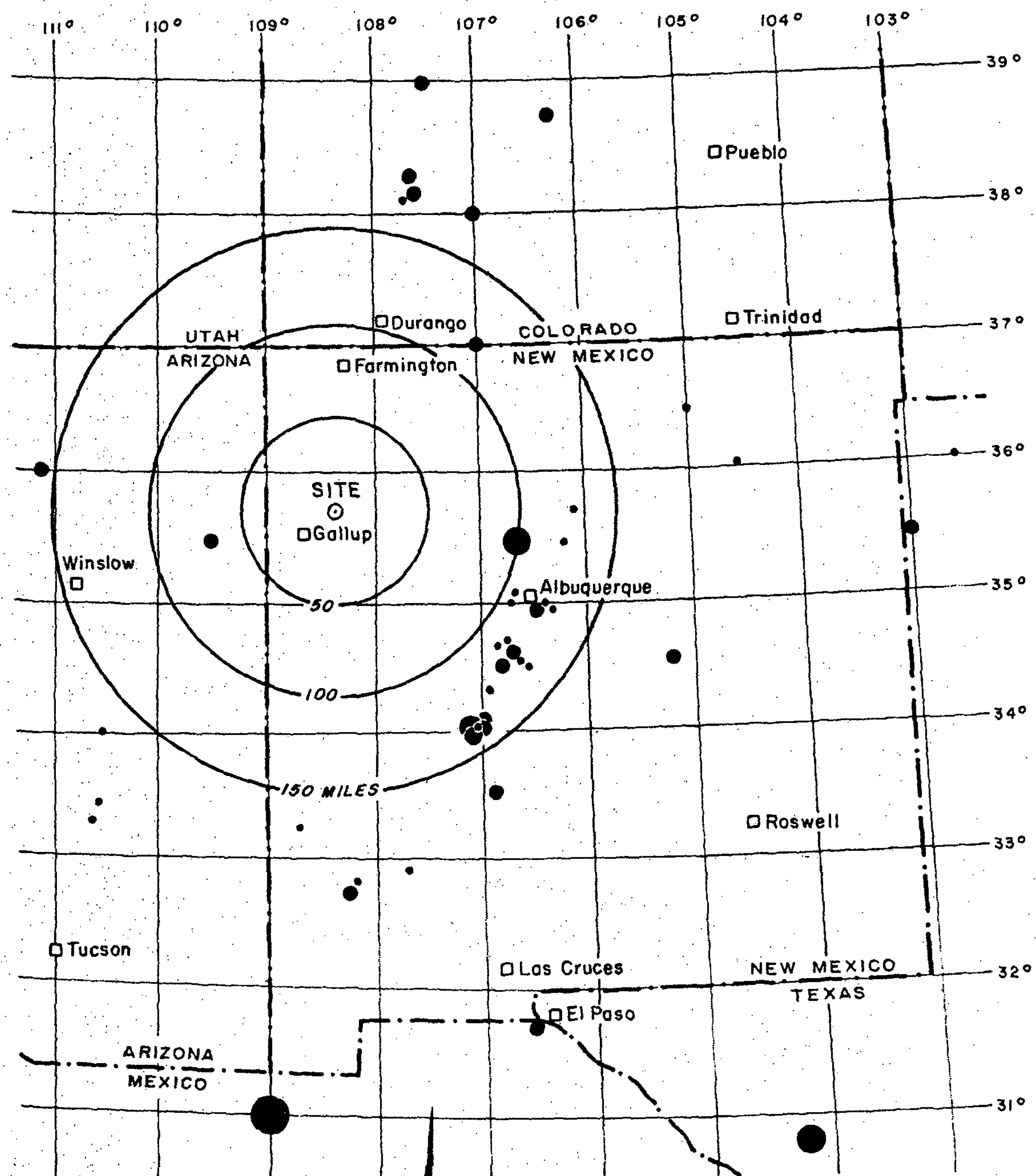
NORTH POND (Approx. Location)
6959'
6968
Continued below
TD 183'
TD 157'
TD 210'
NORTH
WELL TWQ 127
6991'
WELL 403
6994'
WELL 415
6988'
WELL 410
6977'
TD 140'
TD 186'
TD 285'
TD 266'
200 0 100 200 FEET
SCALE



BORING 2
BORING 3
BORING 4
BORING 5
BORING 6
7
8
9
ML
CL
GP
DILCO
SC
CL-ML
SM
ML-CL
CH
B
B'
BORING 11
BORING 12
BORING 13
BORING 14
A
A'
N75000
N74000
N73000
N72000
7000
8000
9000
0000
℄ OF STARTER DAM
N
400
0
800 Feet

CR
NE

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
EF 9/30/81	12/1/81	12/21/81	NM81-455-A28



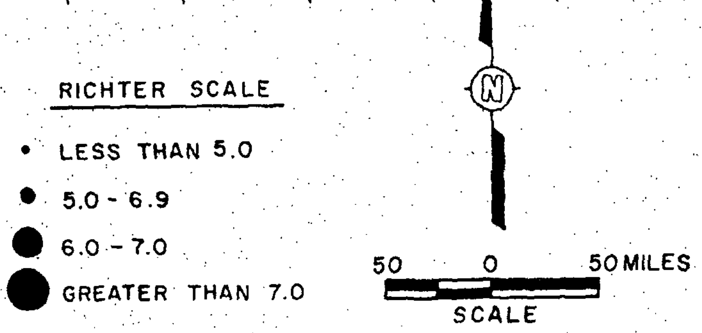


FIGURE B4-9

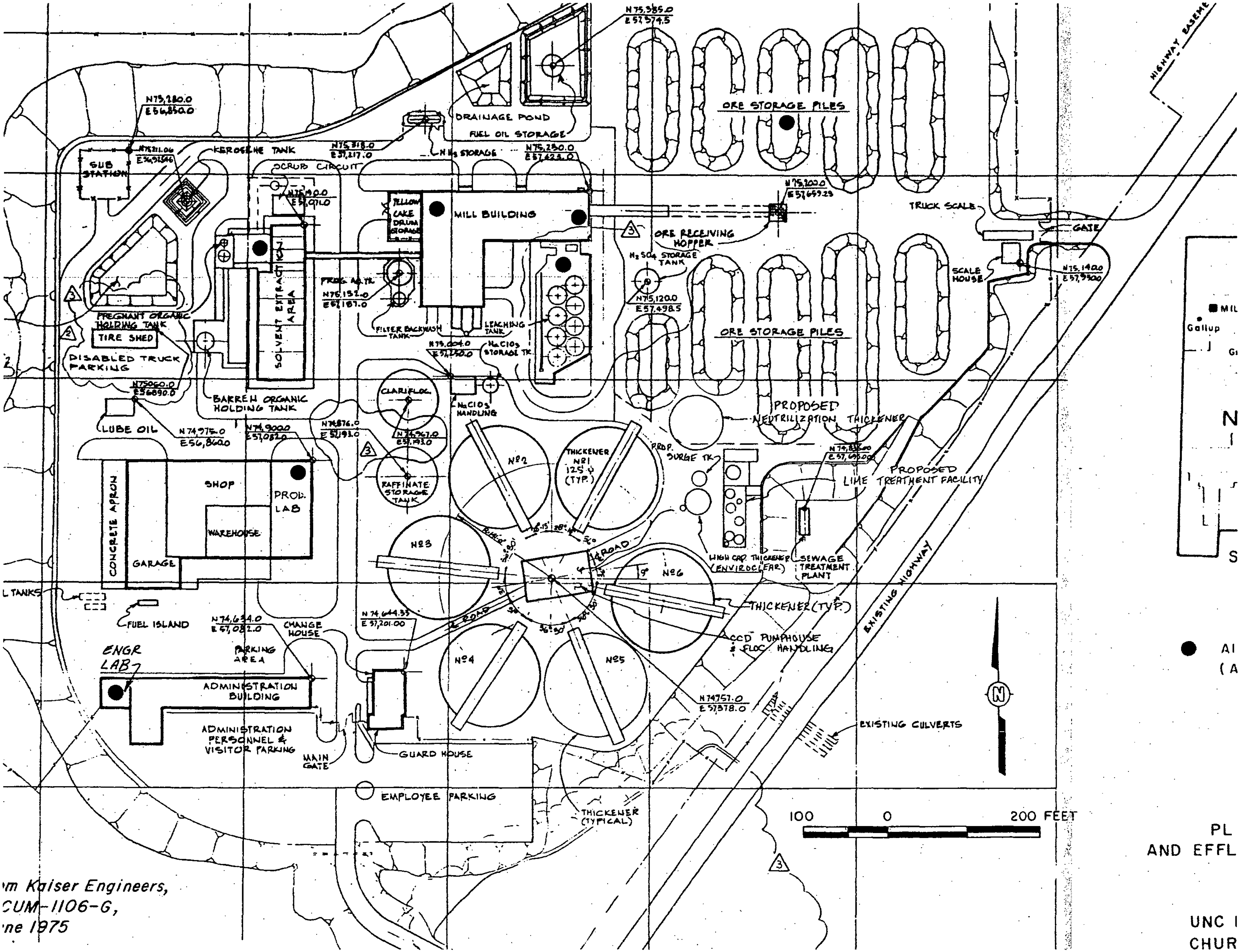
EARTHQUAKE MAGNITUDES AND EPICENTERS NEAR THE UNC CHURCH ROCK MILL

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

Reference: Sergent, Hauskins & Beckwith (1978)

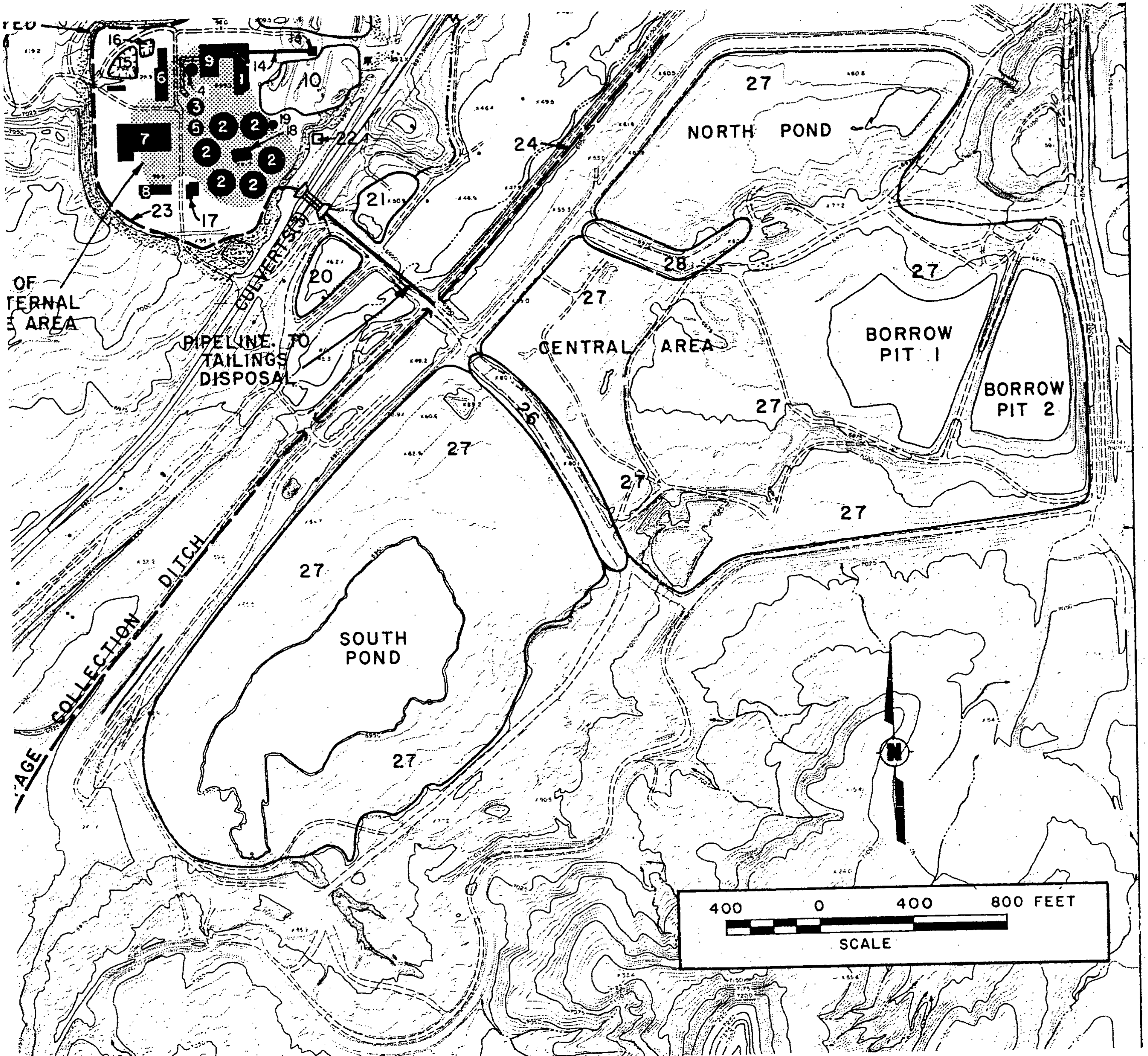
D'APPOLONIA



...m Kaiser Engineers,
...CUM-1106-G,
...ne 1975

PL
AND EFFL

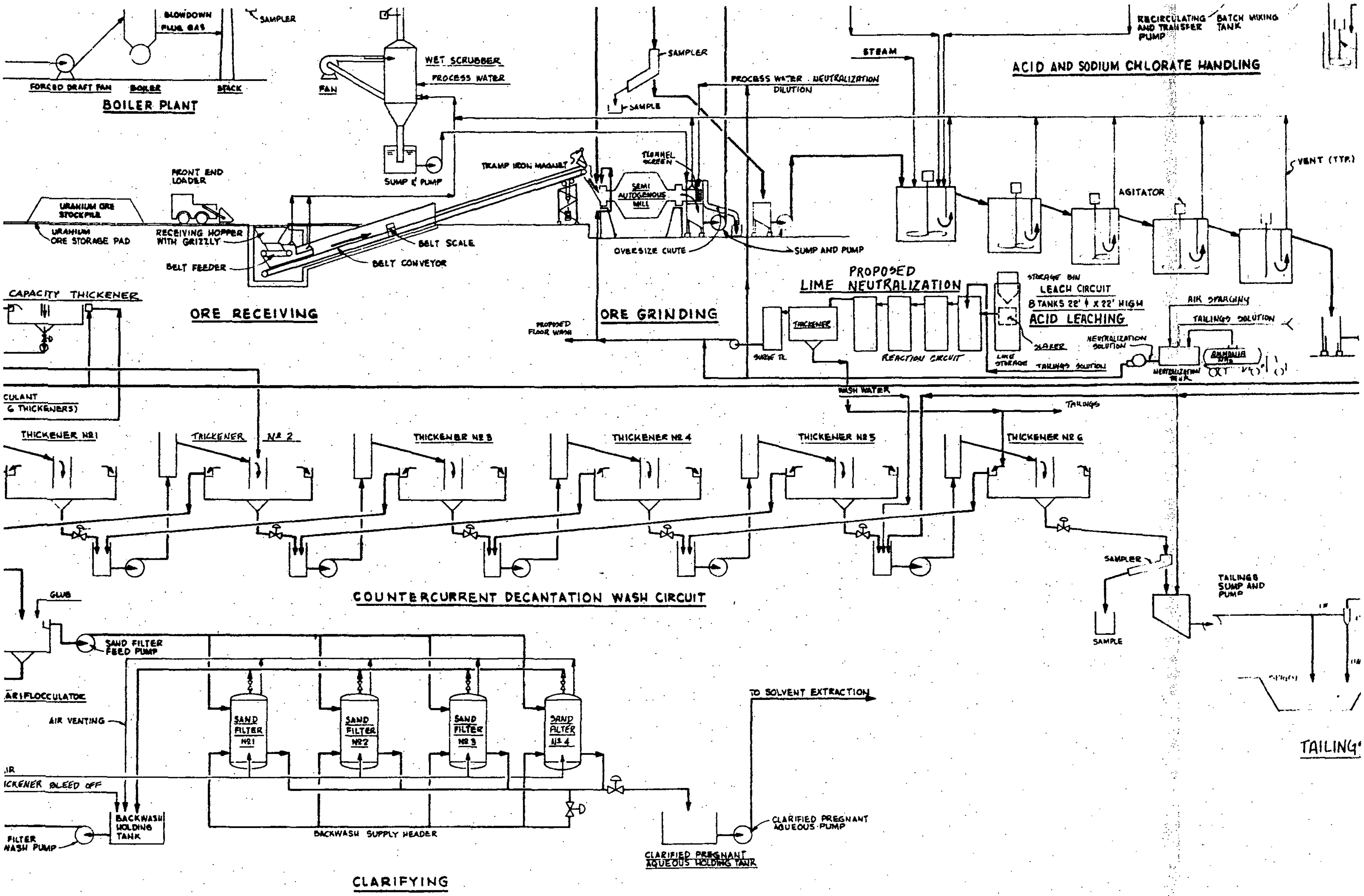
UNC I
CHUR



1 LEACH TA
2 COUNTER-
(CCD) TA
3 CLARIFLO
4 CLARIFIEI
TANK
5 RAFFINAT
6 SOLVENT I
7 GARAGE, S
LABORATC
8 ADMINIST
9 MILL BUIL
10 ORE STOR
11 STEAM CA
12 FUEL OIL
13 ORE HOPI
14 ORE CON
15 EMERGENC
16 KEROSENE
17 SECURITY
18 CCD BASEI
BACK SYS
19 HIGH CAPA
20 CCD EMER
21 STORM WA
FOR OFF-
STORAGE
22 SEWAGE
23 MILL PERII
24 SEEPAGE
25 DOWNSTRE
26 SOUTH CR
27 GENERAL
28 NORTH CR

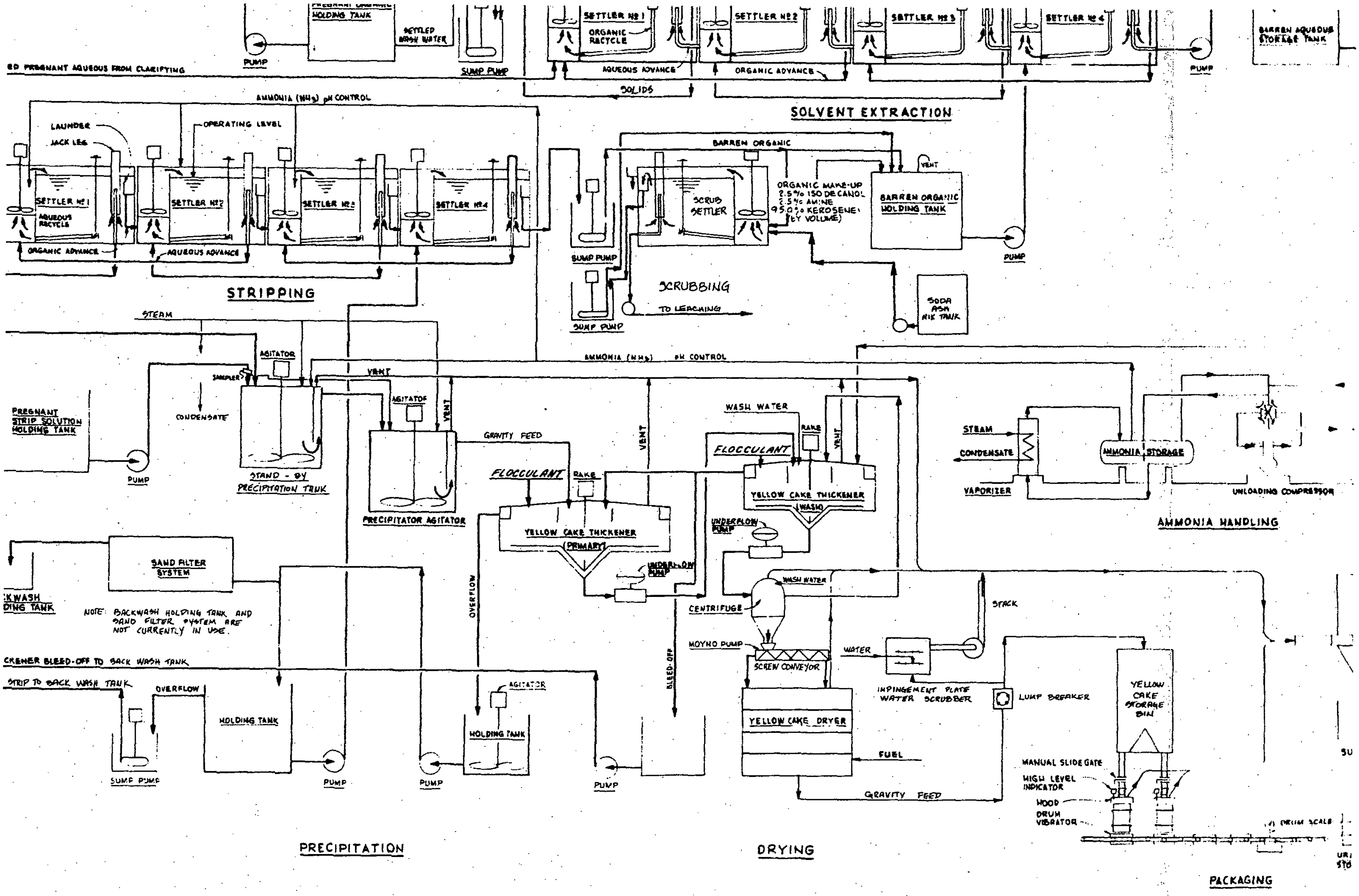
LOCATIO
AND I
FOR

UNC I
CHUR



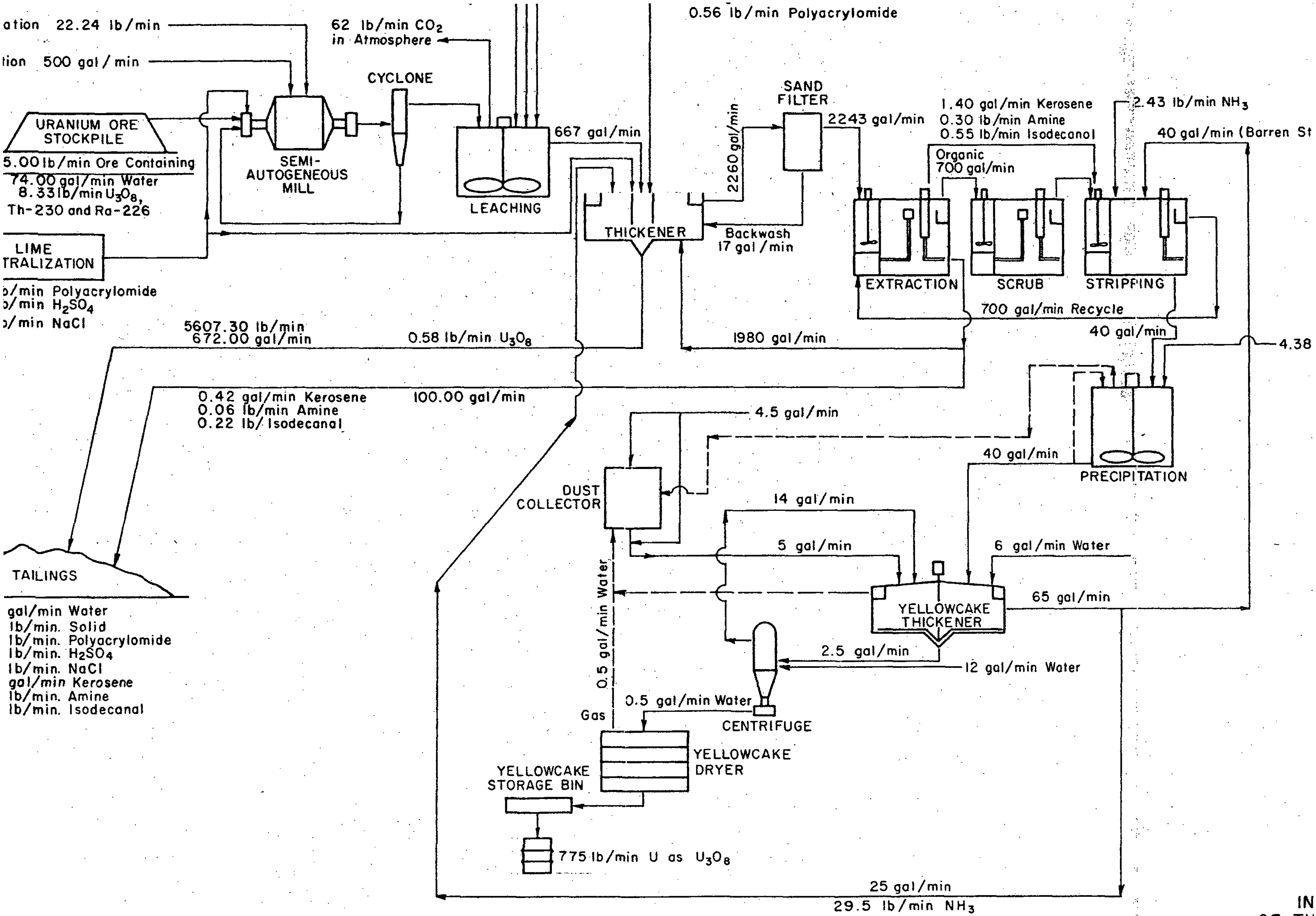
UNC

Kaiser Engineers, Drawing No. CUM-1104-G,



'aiser Engineers. Drawing No. CUM-1105-G.

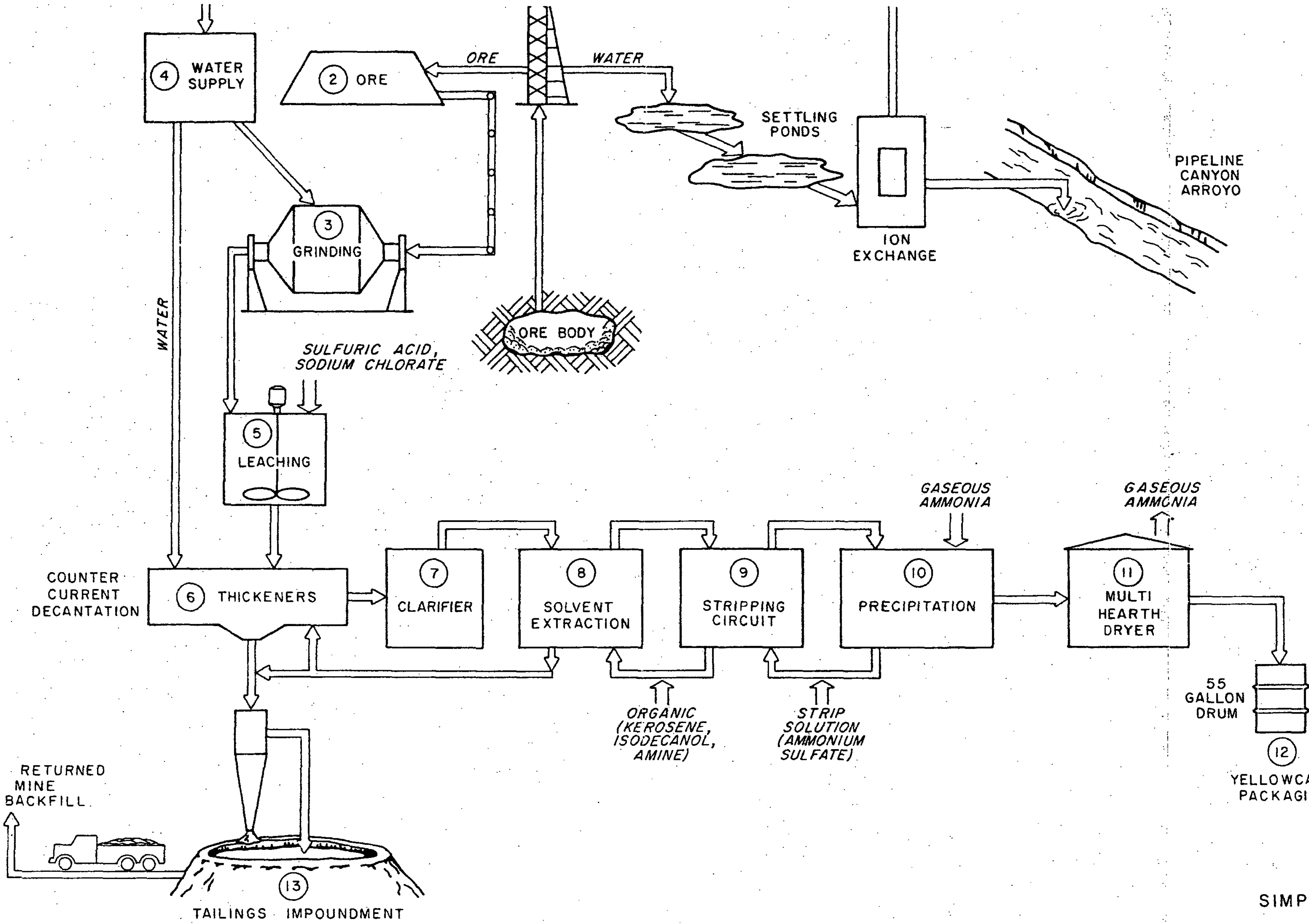
UNC



IN
OF TH

UNC File Figure

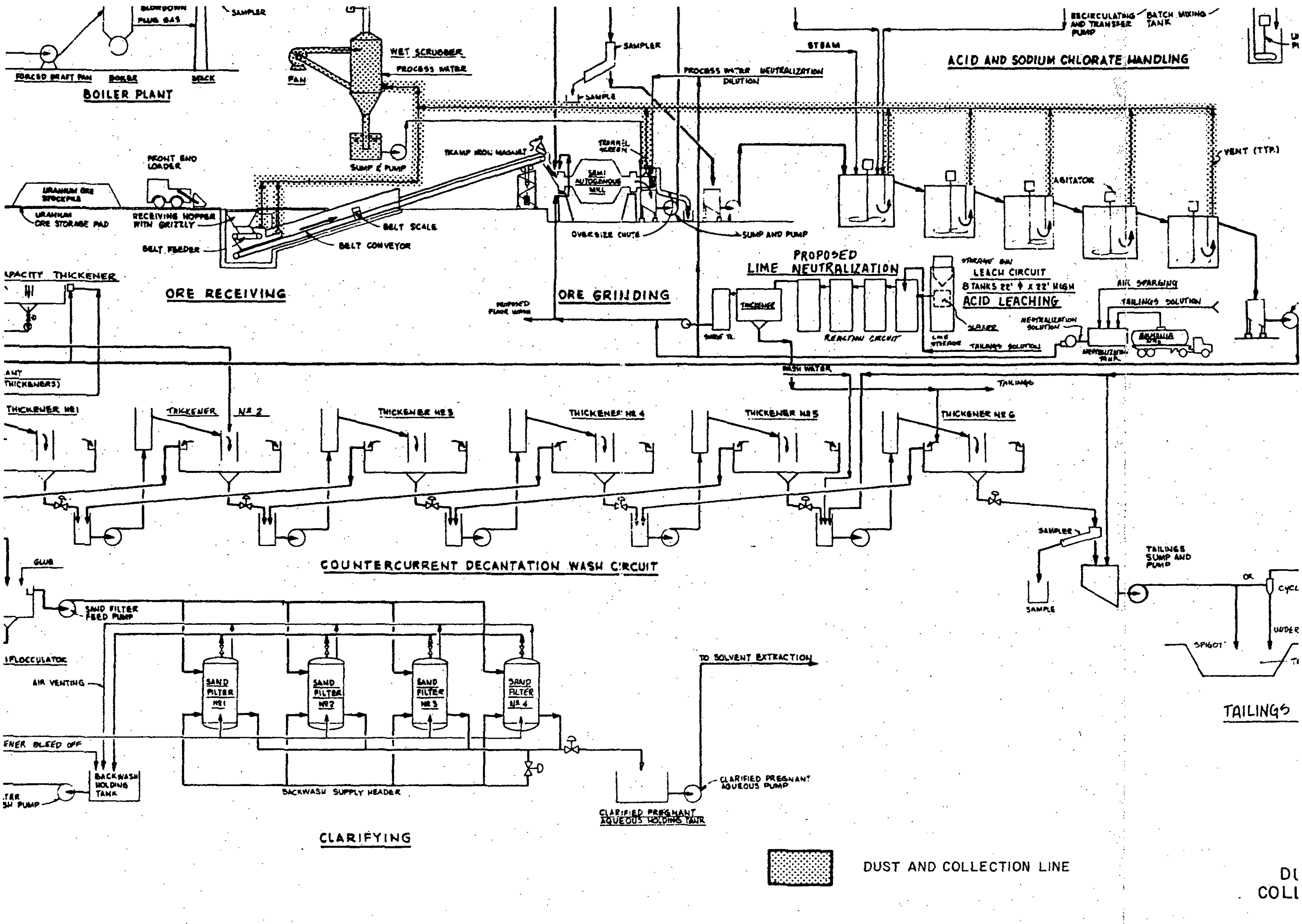
UNC M



SIMPLIFI

NOTE: NUMBERS REFERENCED TO TEXT

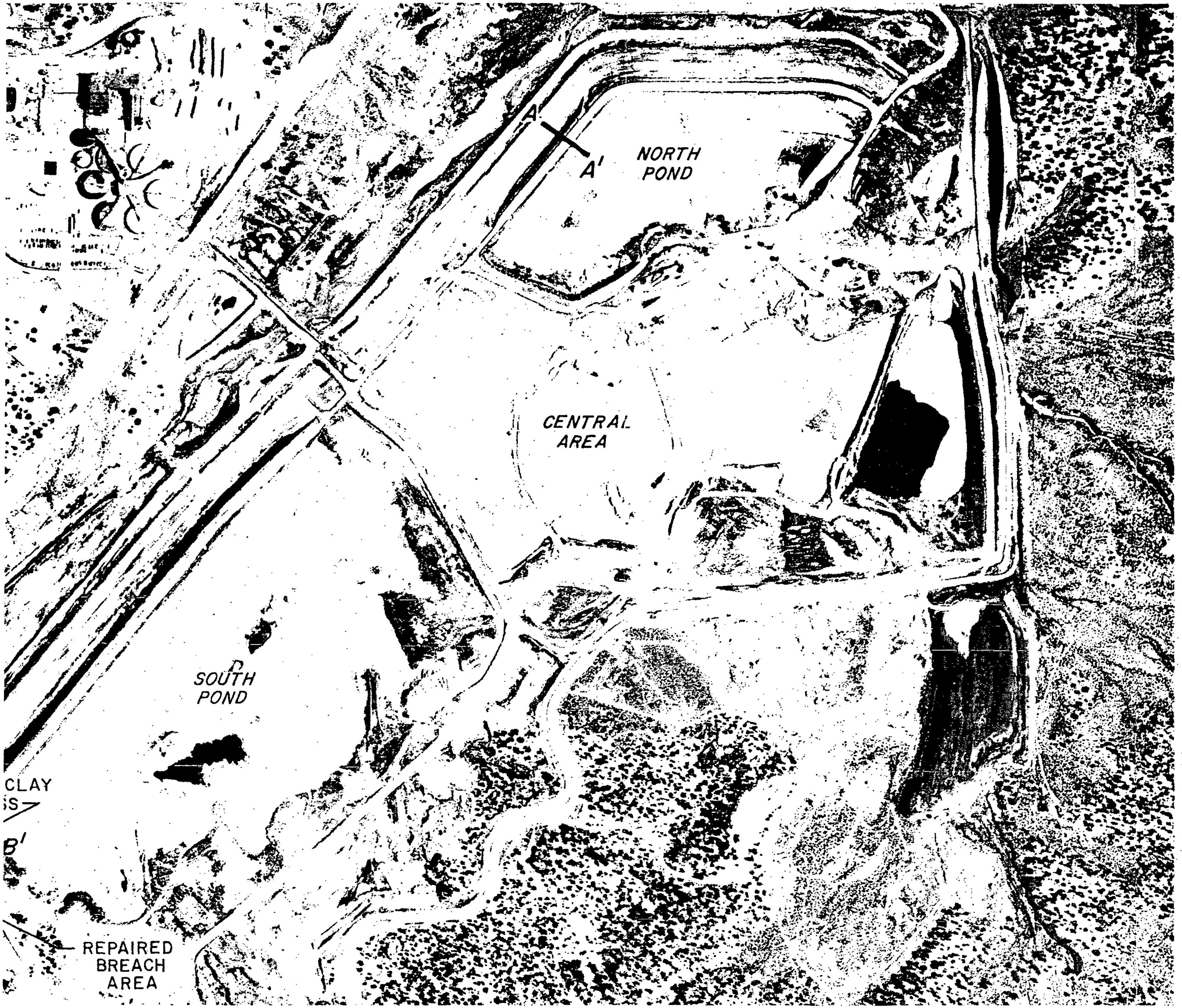
UNC M
CHURC



DI
COLL

UNC M
CHURC

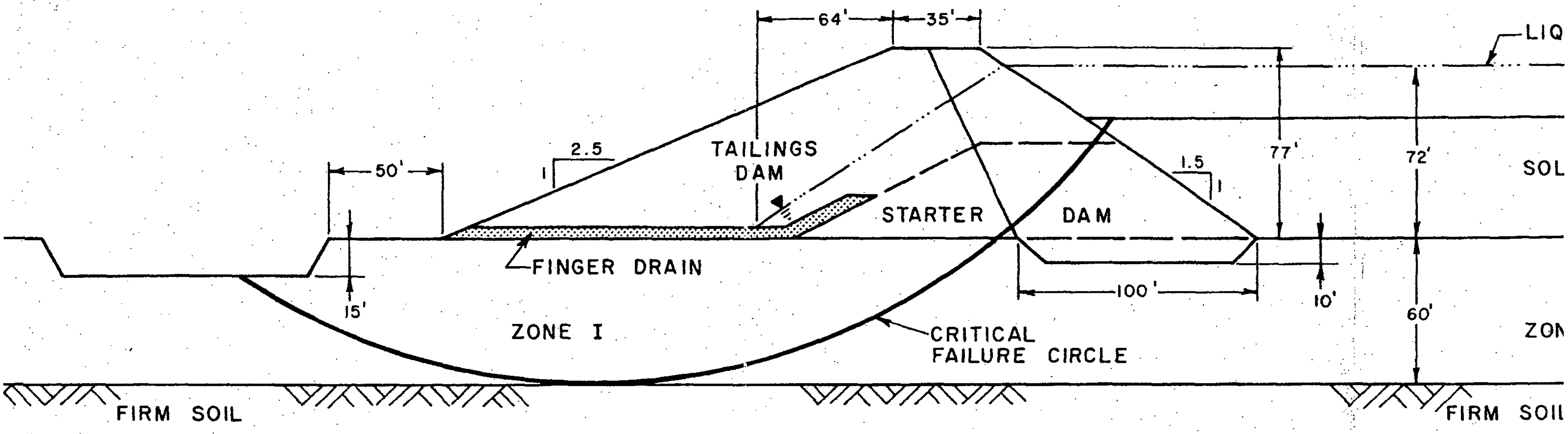
aiser Engineers, Drawing No. CUM-1104-G,



500

TAILI

UNC M
CHURC



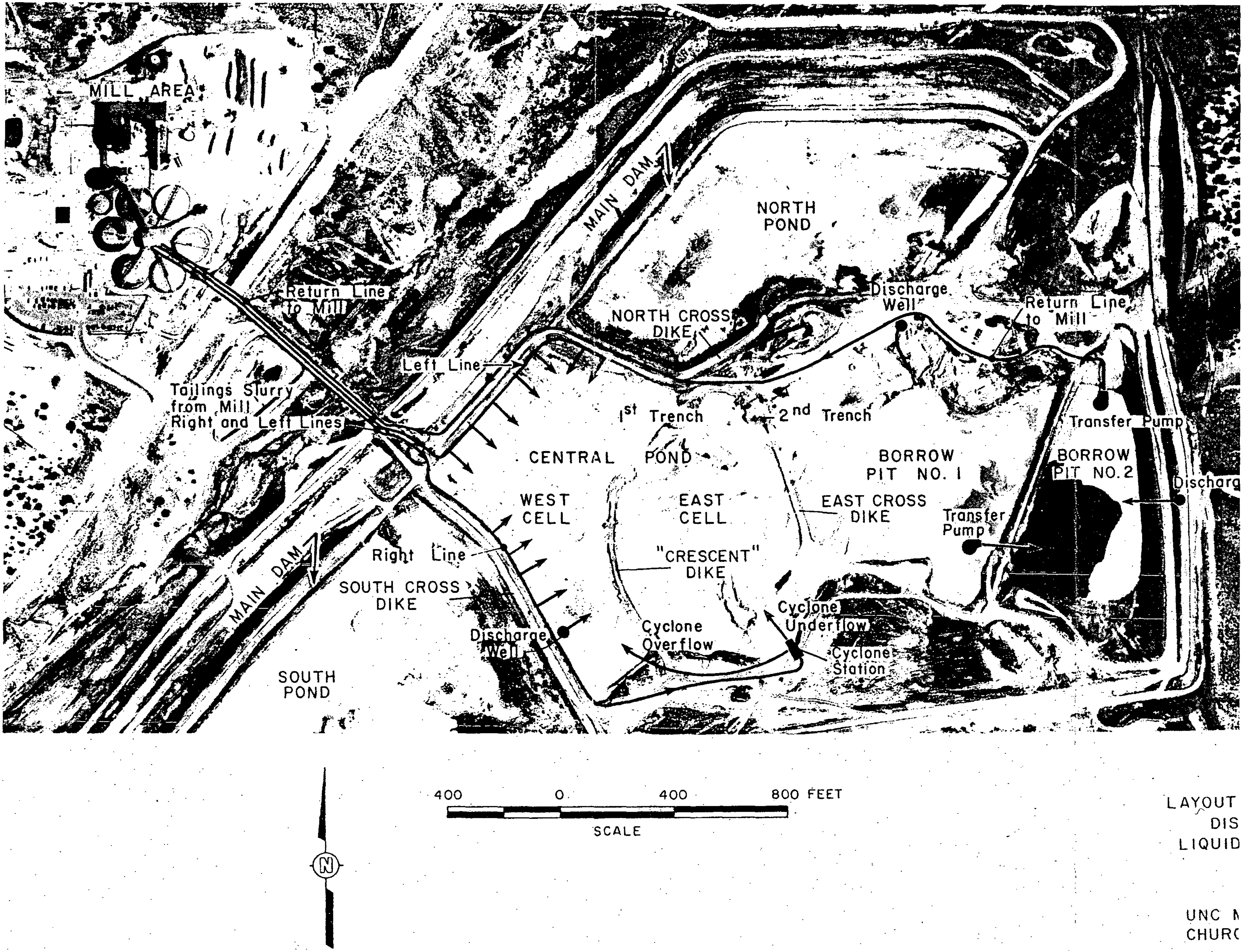
	FACTOR OF SAFETY
	1.5
ATIC	1.1

MATERIALS	c	ϕ	γ_d	γ_t
SOLIDS	0	0	–	100 pcf
STARTER DAM	450 psf	15°	103 pcf	128 pcf
TAILINGS DAM	0	34°	103 pcf	128 pcf
ZONE I	720 psf	21°	95 pcf	105 pcf

TYPICAL
ORIGINAL

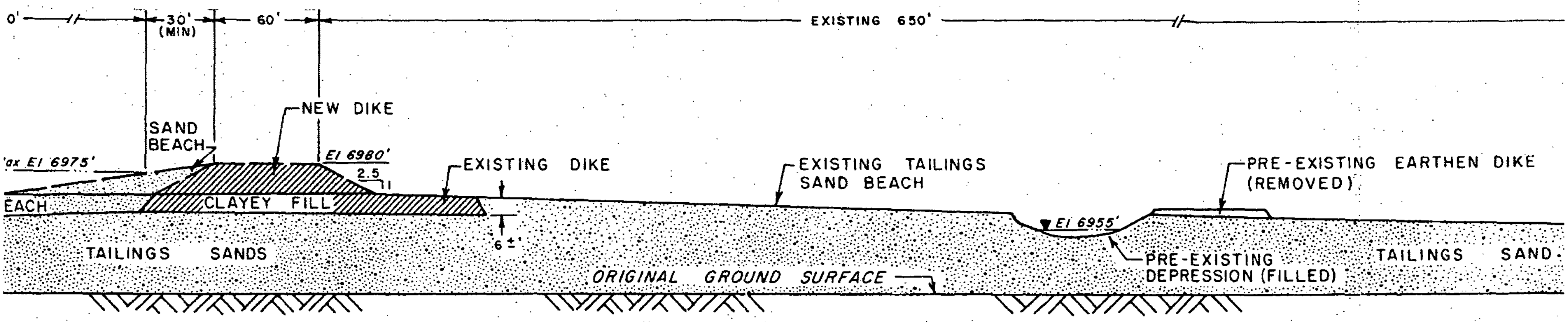
: *Kaiser Engineers, February 1976*

UNC
CHU



LAYOUT
DIS
LIQUID

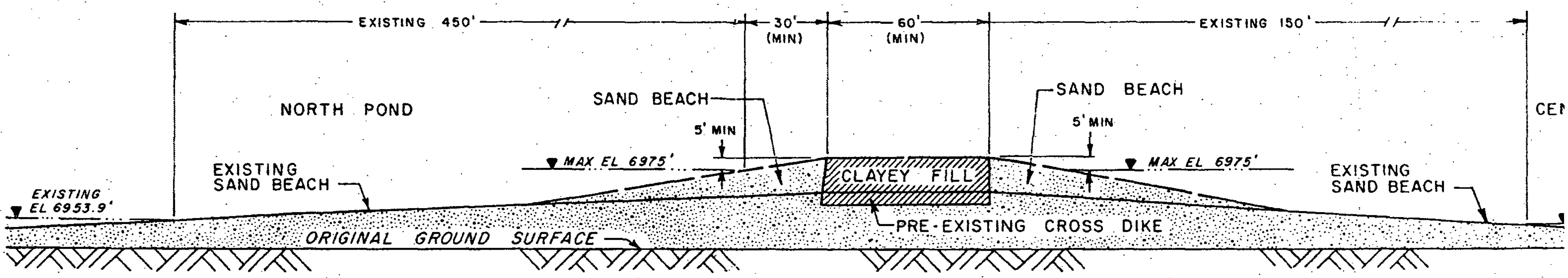
UNC M
CHURC



TYPICAL SECTION - SOUTHERN CROSS DIKE

20 0 20 40 60 80 100 FEET

SCALE



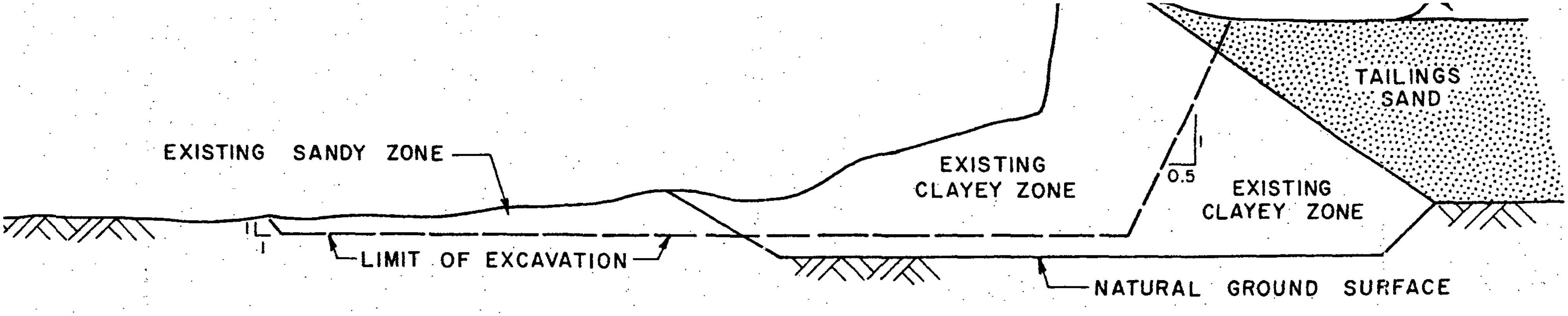
TYPICAL SECTION - NORTHERN CROSS DIKE

20 0 20 40 60 80 100 FEET

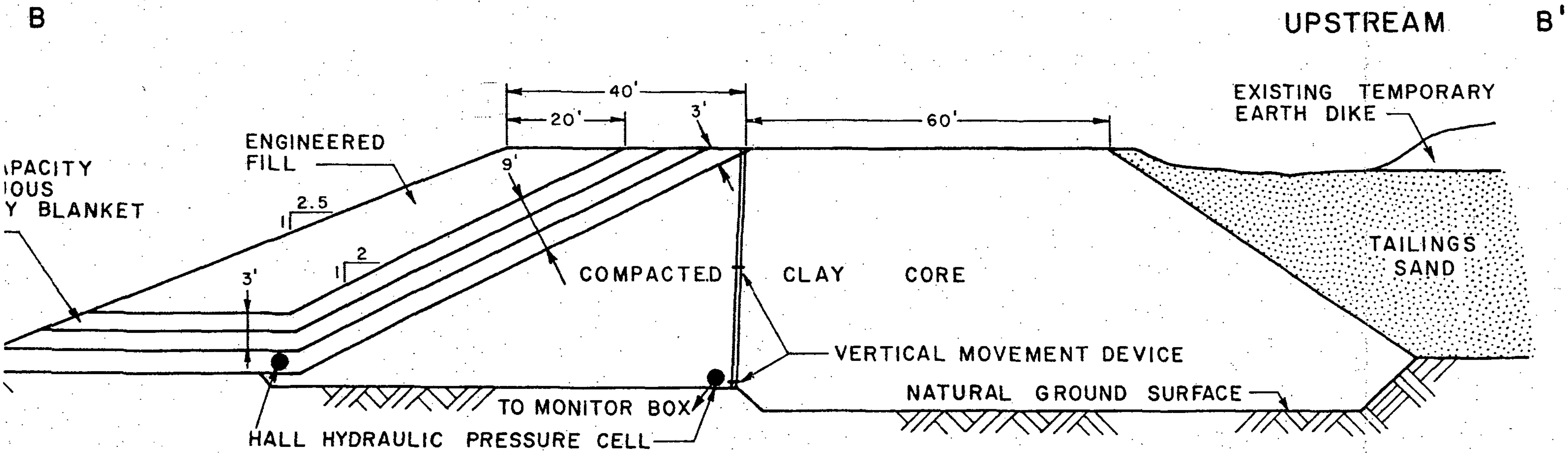
SCALE

AS-BU
NORTH

UNC



EXISTING SECTION

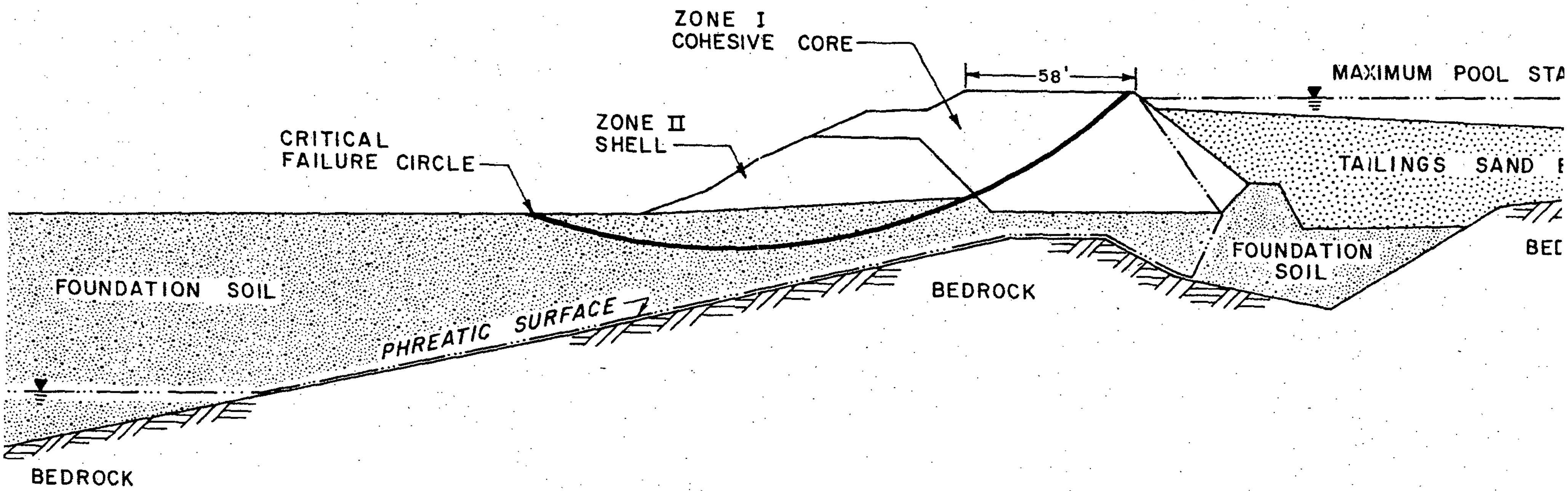


RECONSTRUCTED SECTION

RE C2-1 FOR CROSS SECTION LOCATIONS.

CROSS
AS - BU

UNC



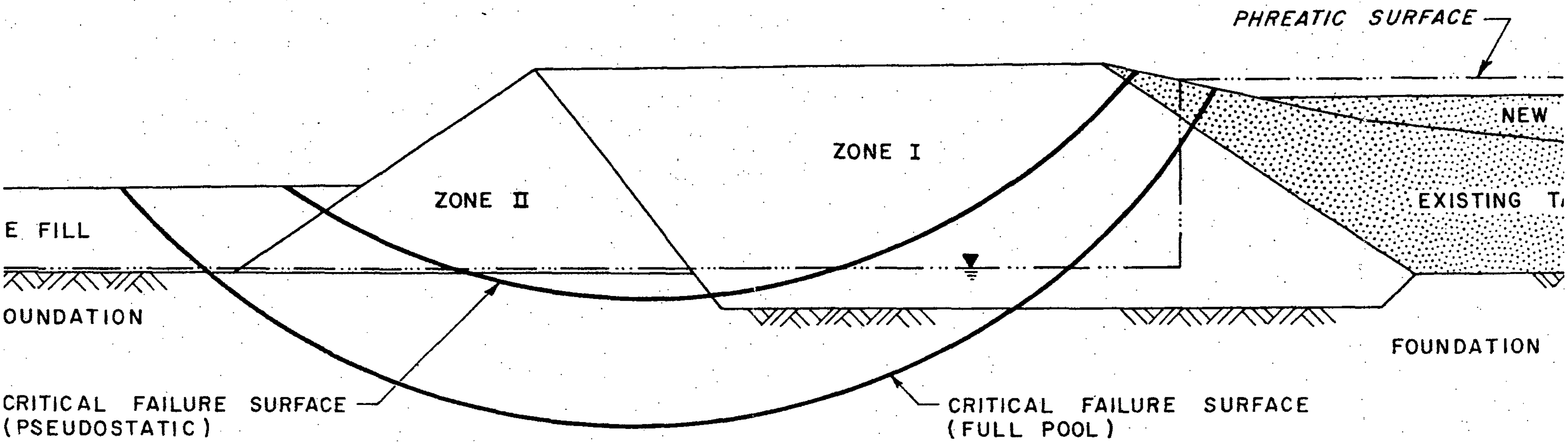
DESIGN PARAMETERS	$\phi°$	C psf
UPSTREAM ZONE I CORE	15	1600
FOUNDATION SOIL	28	250
BEDROCK	40	5000
TAILINGS SAND BEACH	0	0
ZONE II SHELL	47.5	120

FIGURE C2-1 FOR CROSS SECTION LOCATIONS.

CONDITION	FACTOR OF SAFETY	
	COMPUTED	NRC REGULATION
STEADY STATE MAXIMUM POOL JULY 1979	2.81	1.5

RECONSTR
IN SERGI
POST-BRE

UNC
CHU



FACTOR OF SAFETY		
CONDITION	COMPUTED	REQUIRED
ULL POOL	5.22	1.5
'SEUDOSTATIC (g = 0.1)	3.38	1.0

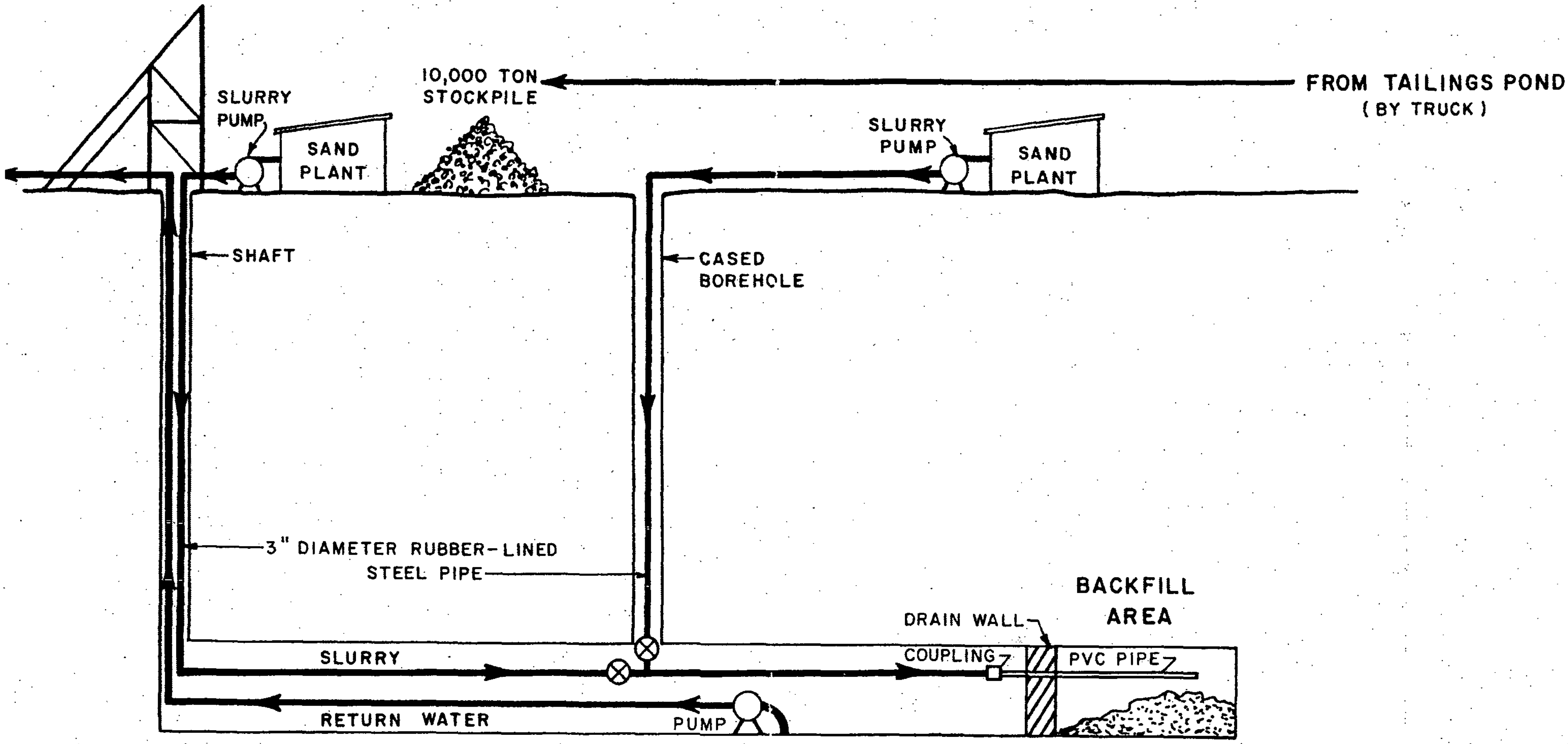
SOIL PROPERTIES			
MATERIAL	ϕ'	c'	γ_t
EXISTING TAILINGS	34°	0	120
CYCLONED TAILINGS	34°	0	120
ZONE I	37°	250	130
ZONE II	37°	0	135
TOE FILL	37°	250	130
FOUNDATION	21°	400	125

URE C2-1 FOR CROSS SECTION LOCATIONS.

'aney Geotechnical Job No. 053-001,
late 3, May 1981

CROSS S
SHO
PRO

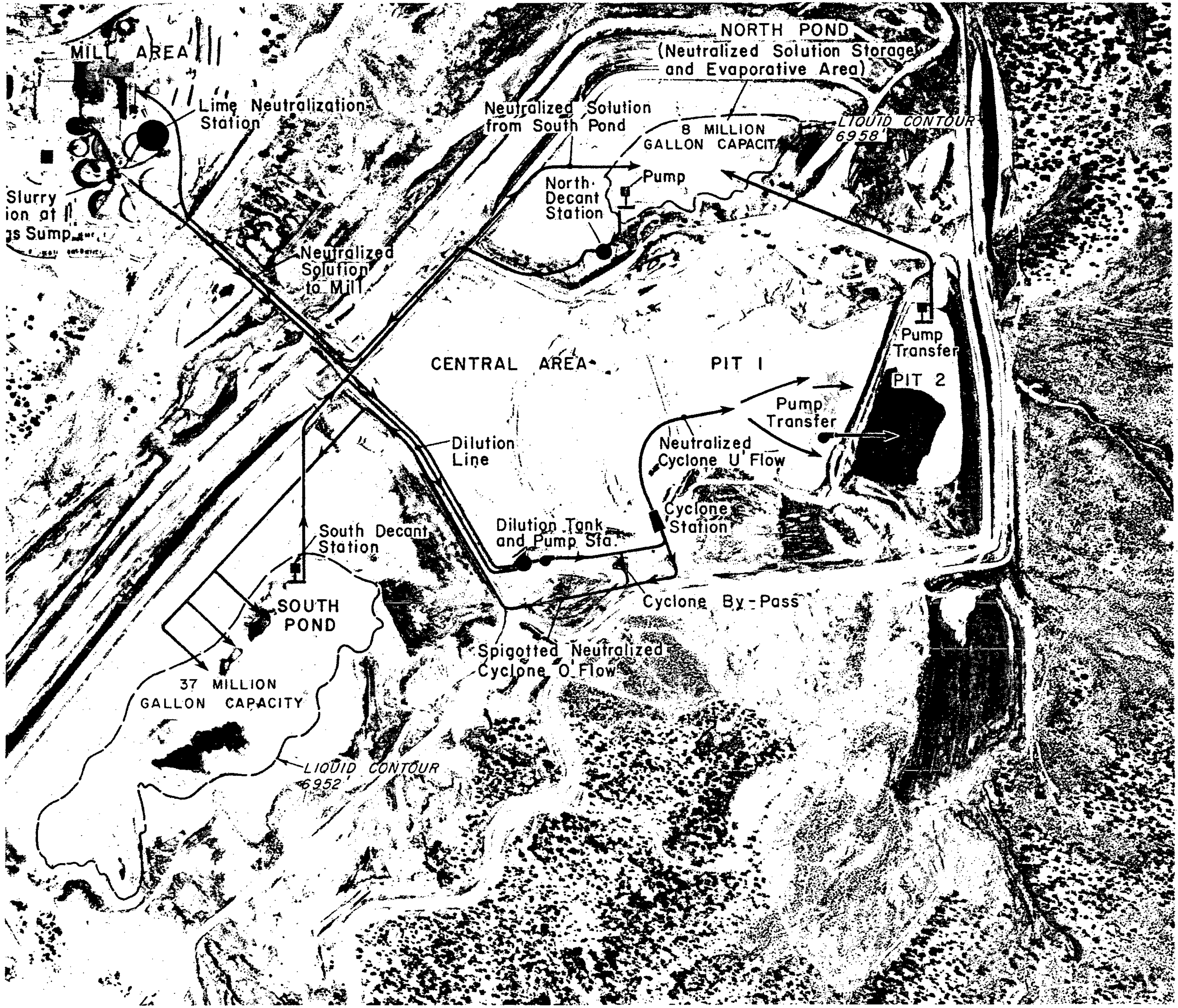
UNC
CHU



SCHEM.
SAN

ta provided by UNC, 1981

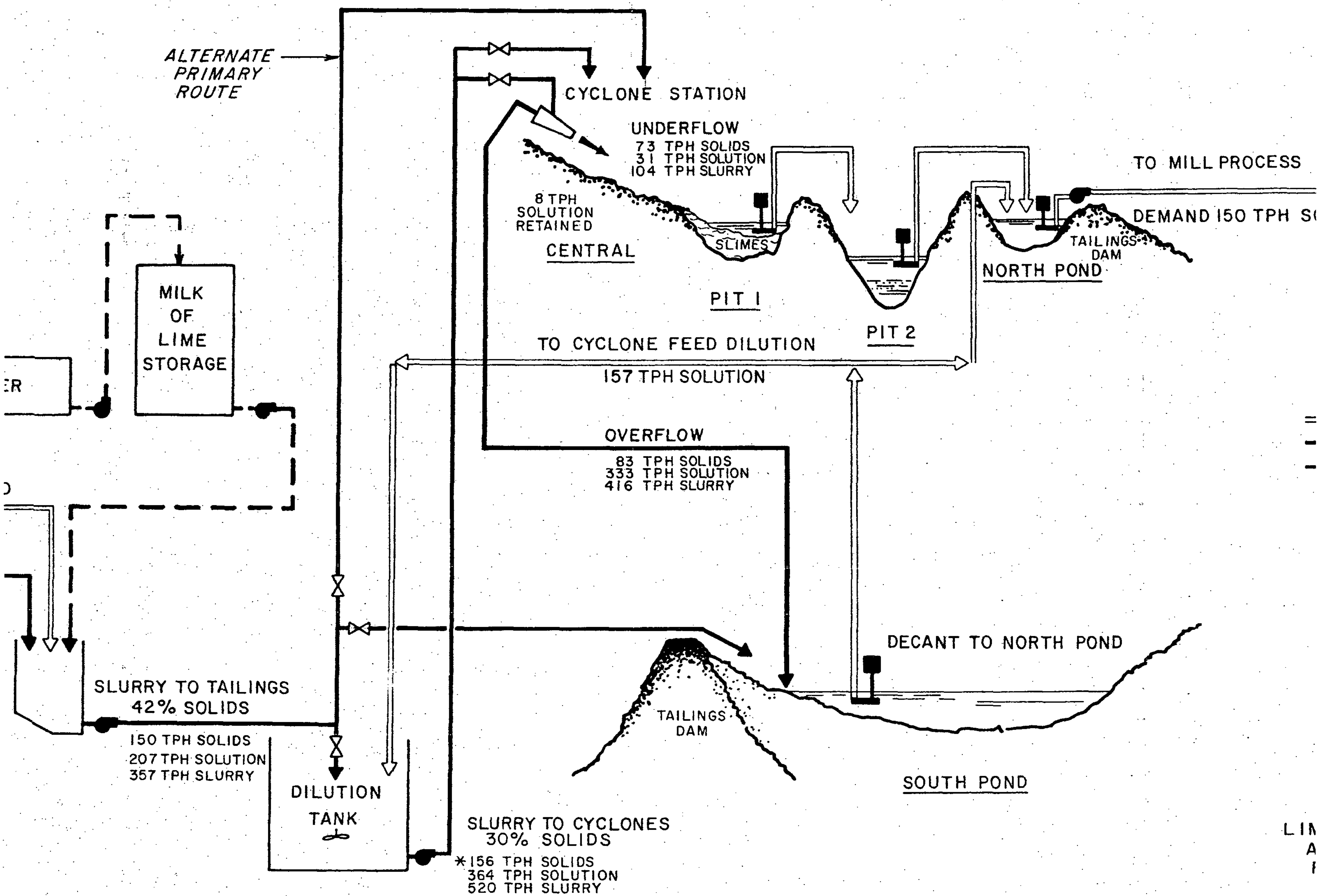
UNC
CHUR

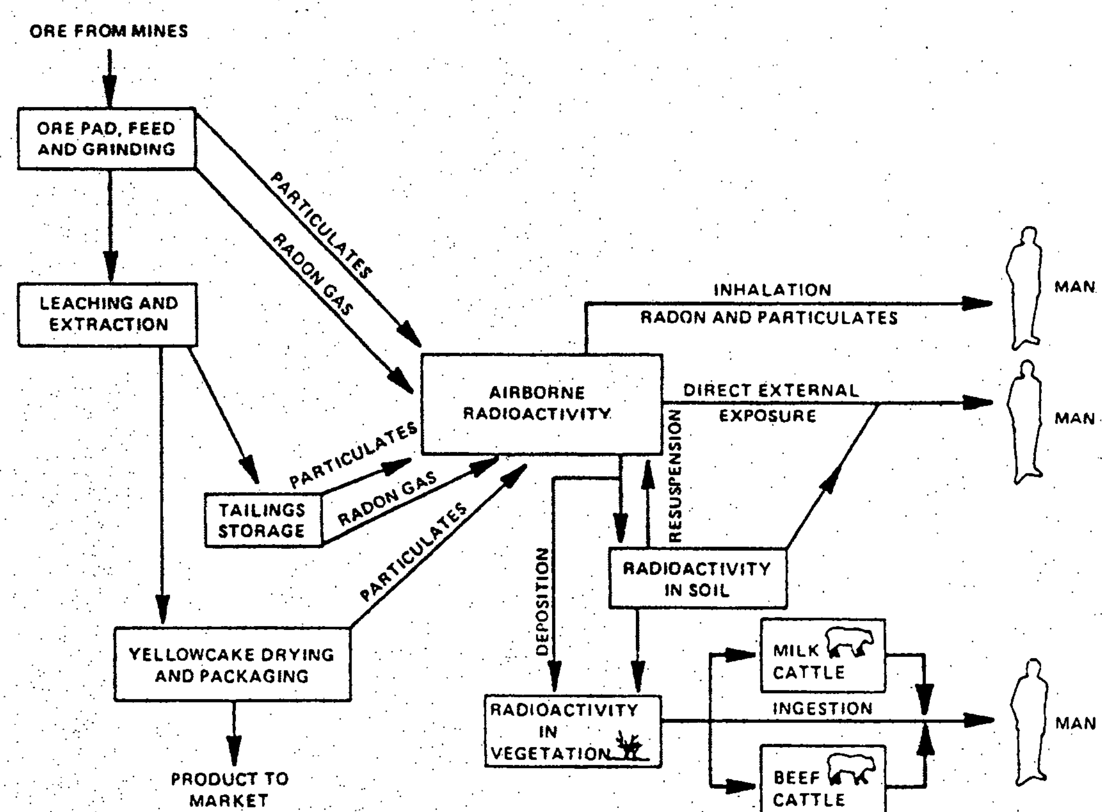


500

NEUTR

UNC M
CHURC


ALTERNATE PRIMARY ROUTE
CYCLONE STATION
UNDERFLOW
73 TPH SOLIDS
31 TPH SOLUTION
104 TPH SLURRY
TO MILL PROCESS
8 TPH SOLUTION RETAINED
SLIMES
DEMAND 150 TPH
TAILINGS DAM
CENTRAL
NORTH POND
PIT 1
PIT 2
MILK OF LIME STORAGE
TO CYCLONE FEED DILUTION
157 TPH SOLUTION
OVERFLOW
83 TPH SOLIDS
333 TPH SOLUTION
416 TPH SLURRY
DECANT TO NORTH POND
SLURRY TO TAILINGS
42% SOLIDS
TAILINGS DAM
150 TPH SOLIDS
207 TPH SOLUTION
357 TPH SLURRY
DILUTION TANK
SOUTH POND
SLURRY TO CYCLONES
30% SOLIDS
*156 TPH SOLIDS
364 TPH SOLUTION
520 TPH SLURRY



Reference: U.S. Nuclear Regulatory Commission, 1980

FIGURE C4-1

SOURCES AND PATHWAYS OF ENVIRONMENTAL RADIATION

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY EB 12/2/81 | CHECKED BY WFC 12/18/81 | APPROVED BY KGK 12/21/81 | DRAWING NUMBER NM81-433-A36

DRAWN BY	EB	12/3/81	CHECKED BY	[signature]	12/18/81	DRAWING NUMBER	NM81-435-A37
			APPROVED BY	KGK	12/21/81		

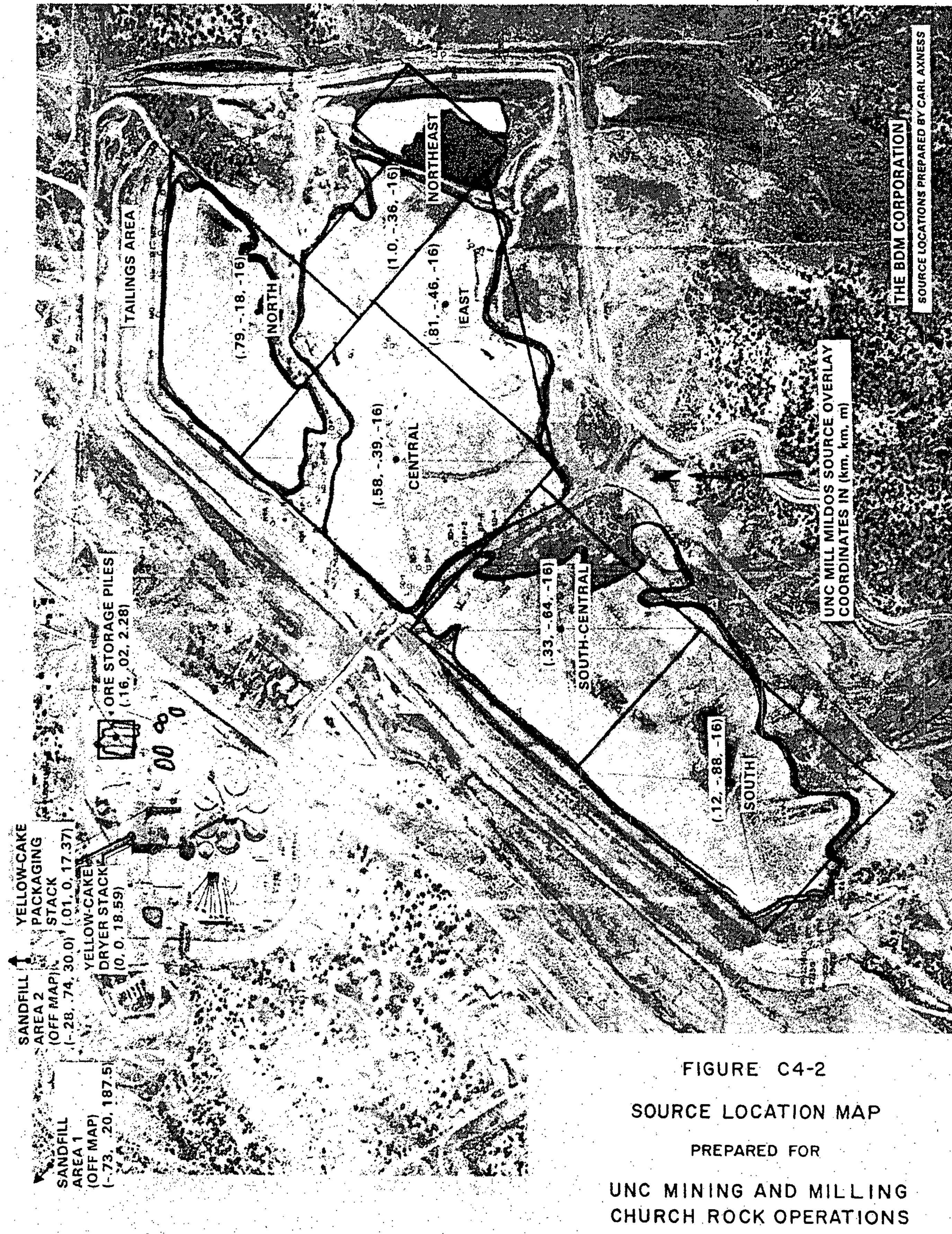


FIGURE C4-2

SOURCE LOCATION MAP

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

Reference : BDM, 1981

D'APPOLONIA

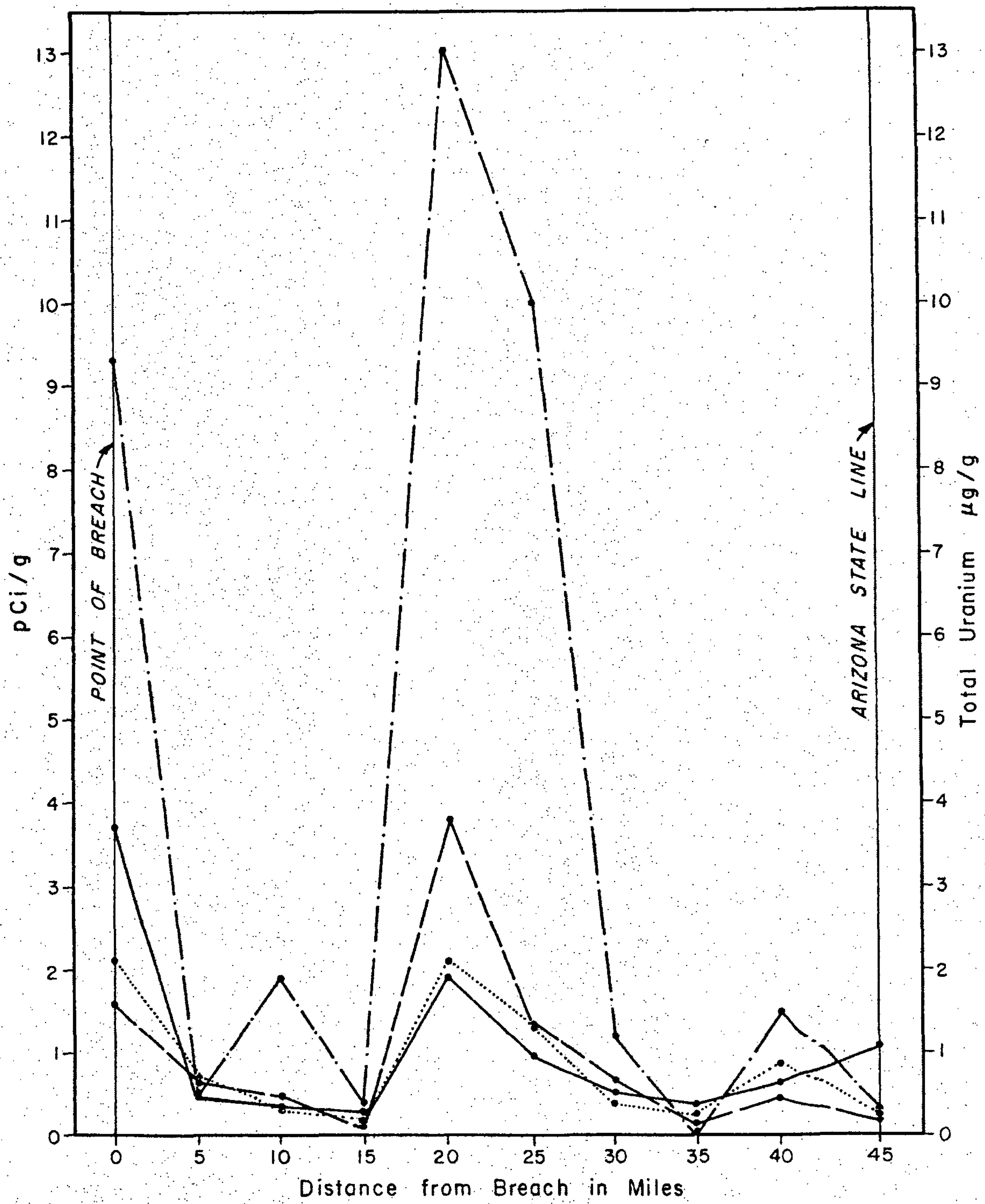


FIGURE C4-4

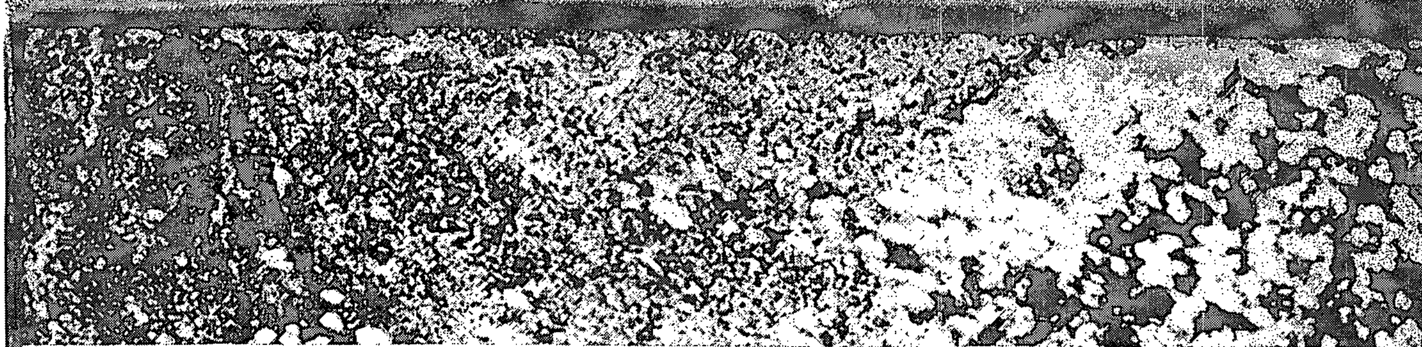
VEGETATION MONITORING
ALONG PIPELINE CANYON ARROYO
AND RIO PUERCO
AFTER DAM BREACH, 1979

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY	EF	CHECKED BY	[signature]	12/17/81	DRAWING NUMBER NM81-433-A34
	11/12/81	APPROVED BY	KGK	12/21/81	



SCALE

200 0 200 400 FEET

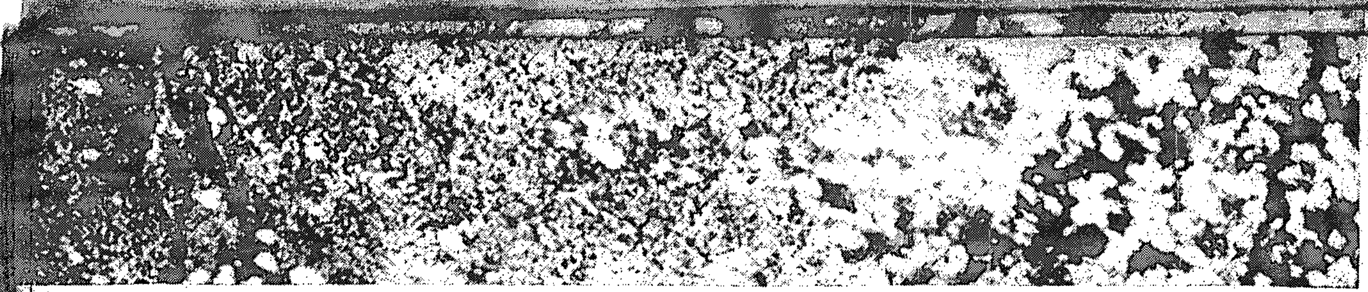
FIGURE C6-1

WELL LOCATIONS

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA



SCALE

200 0 200 400 FEET

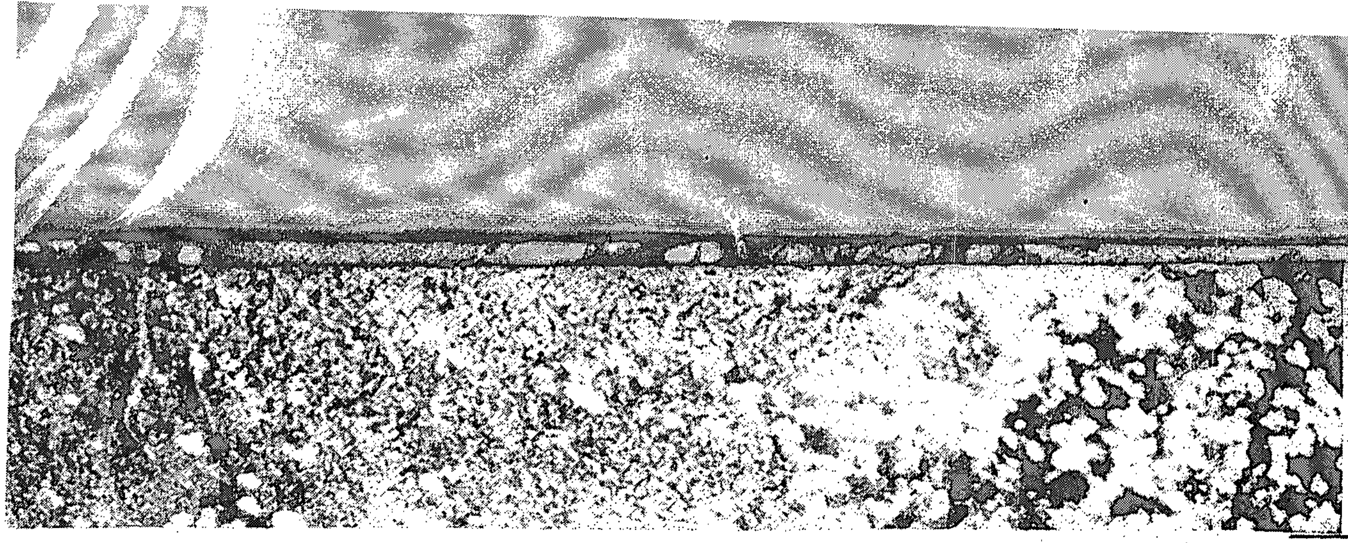
FIGURE C6-2

AVERAGE SULFATE CONCENTRATIONS IN ALLUVIUM AND DILCO/TORRIVIO WELLS

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA



SCALE

200 0 200 400 FEET

FIGURE C6-3

AVERAGE SULFATE CONCENTRATIONS IN ZONE I AND ZONE 3 WELLS

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA

SCALE

200 0 200 400 FEET

FIGURE C6-4

AVERAGE SULFATE CONCENTRATIONS IN COMPOSITE WELLS

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA

400 0 400 800 1200 FEET

SCALE

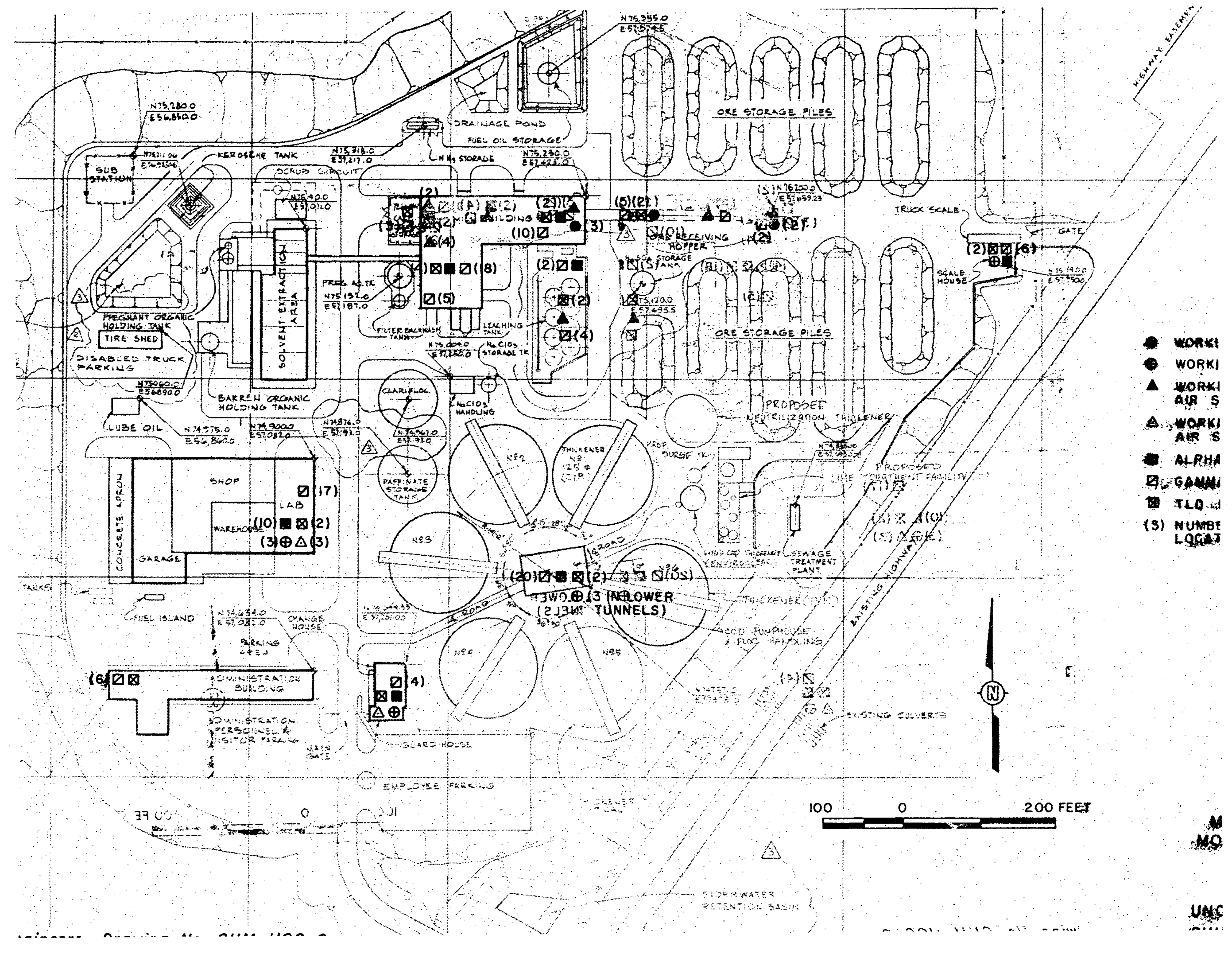
FIGURE C8-1

CURRENT ENVIRONMENTAL RADIOLOGICAL MONITORING SITES

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA



HIGHWAY EASEMENT
ORE STORAGE PILES
DRAINAGE POND
FUEL OIL STORAGE
KEROSENE TANK
SUB STATION
SCRUB CIRCUIT
NH_3 STORAGE
TRUCK SCALE
GATE
ORE RECEIVING HOPPER
SCALE HOUSE
SOLVENT EXTRACTION AREA
PREGNANT ORGANIC HOLDING TANK
TIRE SHED
DISABLED TRUCK PARKING
BARREN ORGANIC HOLDING TANK
FILTER BACKWASH TANK
LEACHING TANK
$NaClO_3$ STORAGE TK
$NaClO_3$ HANDLING
CLARIFLOC
LUBE OIL
PROPOSED NEUTRALIZATION THICKENER
PROP. SURGE TK
PROPOSED LIME TREATMENT FACILITY
RAFFINATE STORAGE TANK
SHOP
LAB
WAREHOUSE
GARAGE
CONCRETE APRON
THICKENER No. 1 125' Φ (TYP.)
No. 2
No. 3
No. 4
No. 5
SEWAGE TREATMENT PLANT
LOWER TUNNELS
FUEL ISLAND
CHANGE HOUSE
PARKING AREA
ADMINISTRATION BUILDING
ADMINISTRATION PERSONNEL & VISITOR PARKING
MAIN GATE
GUARD HOUSE
EMPLOYEE PARKING
EXISTING HIGHWAY
EXISTING CULVERTS
STORMWATER RETENTION BASIN
N75,280.0 E56,850.0
N75,318.0 E57,217.0
N75,230.0 E57,423.0
N75,157.0 E57,187.0
N75,004.0 E57,250.0
N75,120.0 E57,493.5
N74,975.0 E56,860.0
N74,900.0 E57,082.0
N74,876.0 E57,193.0
N74,634.0 E57,082.0
N75,060.0 E56,890.0
100 0 200 FEET
N
WORKI
WORKI
WORKI AIR S
WORKI AIR S
ALPHA
GAMMA
TLD
(3) NUMBE LOCAT

DRAWN BY	EF	CHECKED BY	12/1/81	DRAWING NUMBER
	10/29/81	APPROVED BY KGK	12/21/81	NM81-433-A29

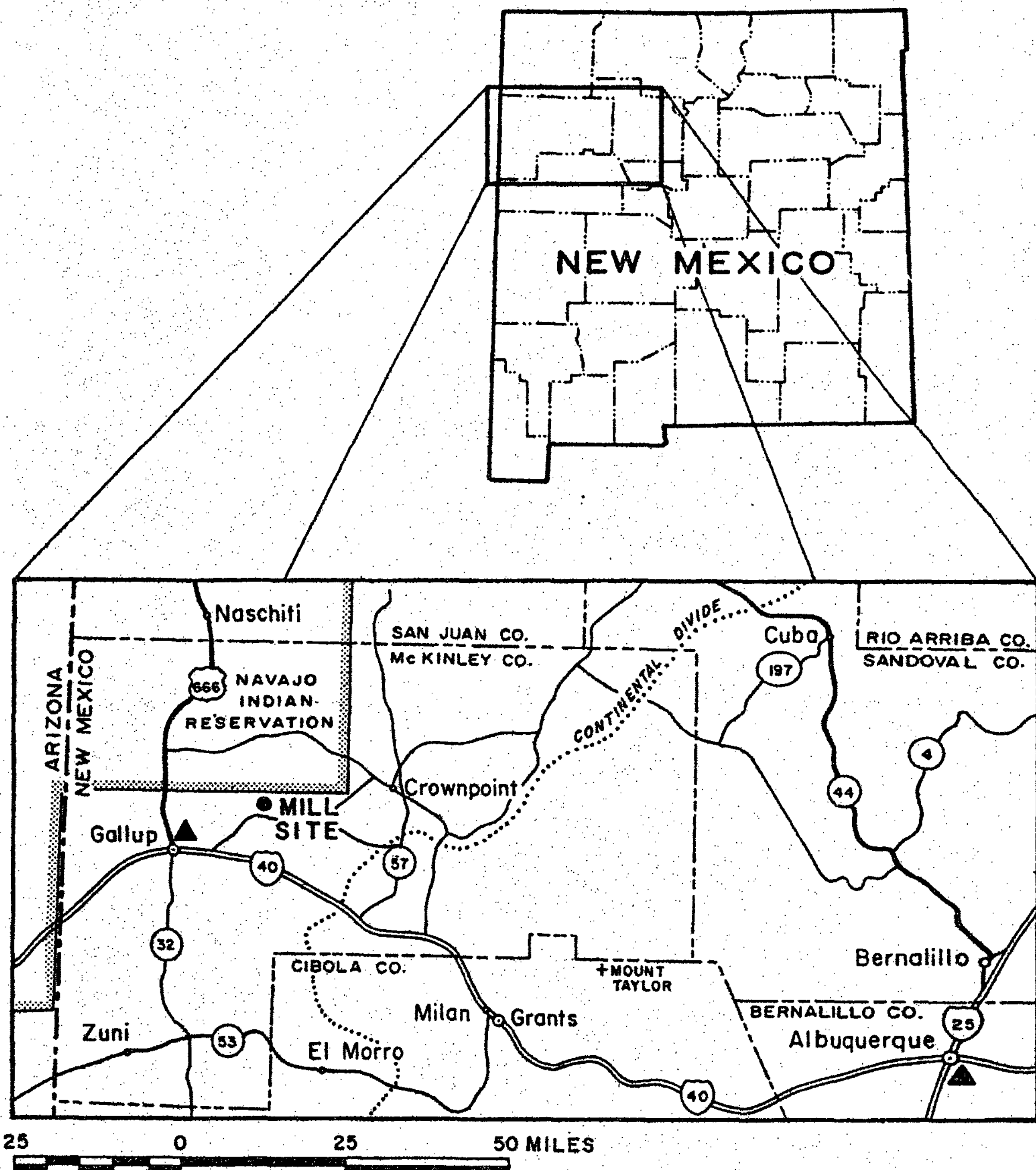


FIGURE C8-3

LOCATION OF METEOROLOGICAL MONITORING STATIONS

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA

LEGEND

- ● MILL SITE METEOROLOGICAL STATION
- ▲ NATIONAL WEATHER SERVICE METEOROLOGICAL STATION

SEE SECTION C.9.2.1 FOR SEED
MIXTURES IN VARIOUS
TREATMENT AREAS.

FIGURE C.9-1

INTERIM STABILIZATION
REVEGETATION AND SOIL STABILIZATION

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

SCALE

300 0 300 600 FEET

FIGURE C9-2

EXISTING TOPOGRAPHY AND CROSS SECTION LOCATIONS

PREPARED FOR

UNC MINING AND MILLING CHURCH ROCK OPERATIONS

D'APPOLONIA

FIGURE C9-3

POST-MILLING CROSS SECTION A-A'
SOUTH POND

PREPARED FOR

UNC MINING & MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

FIGURE C9-4

POST-MILLING CROSS SECTION B-B'
CENTRAL AREA &
BORROW PITS 1 & 2

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

FIGURE C9-5

POST-MILLING CROSS SECTION C-C'
NORTH POND &
BORROW PITS 1 & 2

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

Project No. NM81-433
Dec. 81

D'APPOLONIA

Volume III
Appendices

State of New Mexico Environmental Improvement Division
Uranium Mill License Renewal Application-Environmental Report
License No. NM-UNC-ML

UNC Mining and Milling
Church Rock Operations
Division of United Nuclear Corporation

Church Rock Mill
Gallup, New Mexico

UNC

Project No. NM81-433
Dec. 81

D'APPOLONIA

Volume III
Appendices

State of New Mexico Environmental Improvement Division Uranium Mill License Renewal Application-Environmental Report License No. NM-UNC-ML

UNC Mining and Milling
Church Rock Operations
Division of United Nuclear Corporation

Church Rock Mill
Gallup, New Mexico

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I

TABLE OF CONTENTS

VOLUME I TABLE OF CONTENTS

VOLUME I

LIST OF TABLES

VOLUME I

LIST OF TABLES
(CONT'D)

VOLUME I

LIST OF TABLES
(CONT'D)

VOLUME I

LIST OF TABLES
(CONT'D)

VOLUME II

LIST OF FIGURES

VOLUME II

LIST OF FIGURES
(CONT'D)

VOLUME II

LIST OF FIGURES
(CONT'D)

VOLUME III

LIST OF APPENDICES

APPENDIX

APPENDIX A
MILDOS COMPUTER RUNS

TABLE OF CONTENTS

MILDOS COMPUTER RUN
INCLUDING
ALL RADIONUCLIDE SOURCES

JUNC MILL RUN 7 CODE=MILDOS,REV0 (7/79) DATE= 15/12/81
T=GALLUP, 76-80 PAGE NO. 1

MBER OF SOURCES=11

NO.	KM X	KM Y	M Z	KM2 AREA	U-238	TH-230	CI/YEAR RA-226	PB-210	RN-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	.12	-.88	-16.00	.1000	5.39E-03	4.74E-02	1.91E-02	2.56E-02	7.00E+00	2001	3	0.	SOUTH TAILINGS
2	.33	-.64	-16.00	.0740	3.99E-03	3.51E-02	1.41E-02	1.89E-02	5.20E+00	2002	3	0.	SOUTH-CENTRAL
3	.58	-.39	-16.00	.1000	5.39E-03	4.74E-02	1.91E-02	2.56E-02	7.00E+00	2003	3	0.	CENTRAL TAILINGS
4	.79	-.18	-16.00	.0740	3.99E-03	3.51E-02	1.41E-02	1.89E-02	5.20E+00	2004	3	0.	NORTH TAILINGS
5	.81	-.46	-16.00	.0930	5.02E-03	4.41E-02	1.77E-02	2.38E-02	6.50E+00	2005	3	0.	EAST TAILINGS
6	1.00	-.36	-16.00	.0540	2.91E-03	2.56E-02	1.03E-02	1.38E-02	3.80E+00	2006	3	0.	NORTHEAST TAILINGS
7	.16	.02	2.28	.0030	2.09E-03	1.42E-03	5.72E-04	7.68E-04	1.36E+02	2007	3	0.	ORE PILES + DUST
8	0.00	0.00	18.59	.0000	7.30E-02	1.83E-04	6.10E-05	5.04E-06	0.	1001	1	3.14E+00	YELLOWCAKE DRYER
9	.01	0.00	17.37	.0000	3.83E-03	2.26E-05	7.03E-06	6.88E-07	0.	1002	1	2.06E+00	YELLOWCAKE PKGING
10	-.73	.20	187.50	.0070	2.83E-04	2.22E-03	8.26E-04	9.21E-04	4.90E-03	3001	3	0.	SANDFILL AREA 1
11	-.28	.74	30.00	.0070	2.83E-04	2.22E-03	8.26E-04	9.21E-04	4.90E-03	3002	3	0.	SANDFILL AREA 2

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	5.33E+01	4.68E+02	1.88E+02	2.53E+02
2	6.88E+02	4.68E+02	1.88E+02	2.53E+02
3	4.00E+01	3.14E+02	1.17E+02	1.30E+02

PARTICLE SIZES AND FRACTIONAL DISTRIBUTION

SET	1.0	1.0	5.0	35.0	PDEN
1	1.000	0.000	0.000	0.000	8.900
2	0.000	1.000	0.000	0.000	2.400
3	0.000	0.000	.300	.700	2.400

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 3 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 15.00YRS	TSTEP 3 5.00YRS	TSTEP 4 0.00YRS	TSTEP 5 0.00YRS	TSTEP 6 0.00YRS	TSTEP 7 0.00YRS	TSTEP 8 0.00YRS	TSTEP 9 0.00YRS	TSTEP10 0.00YRS
1	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
2	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
3	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
4	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
5	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
6	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
7	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
8	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
9	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
10	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
11	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 3 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 15.00YRS	TSTEP 3 5.00YRS	TSTEP 4 0.00YRS	TSTEP 5 0.00YRS	TSTEP 6 0.00YRS	TSTEP 7 0.00YRS	TSTEP 8 0.00YRS	TSTEP 9 0.00YRS	TSTEP10 0.00YRS
1	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
2	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
3	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
4	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
5	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
6	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
7	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
8	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
9	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
10	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.
11	1.000E+00	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS= .37596, .20068, .22603, .14370, .04116, .01246

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	.0678	.0565	.0678	.0226	.0678	.0973	.0452	.0226	.0747	.0452	.0792	.2262	.1357	.1018	.0452	.0565	1.2121
5.5	.0411	.0342	.0411	.0137	.0411	.0479	.0274	.0137	.0342	.0274	.0479	.1370	.0822	.0616	.0274	.0342	.7121
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	.1089	.0907	.1089	.0363	.1089	.1452	.0726	.0363	.1089	.0726	.1271	.3632	.2179	.1634	.0726	.0907	1.9242
STABILITY CLASS 2																	
1.5	.4677	.1720	.3783	.2408	.2408	.0826	.1582	.1720	.2477	.2407	.3027	.5984	.6466	.2958	.3990	.1926	4.8359
5.5	.2123	.0753	.1575	.1096	.1096	.0411	.0685	.0753	.1233	.0890	.1507	.2671	.3014	.1370	.1781	.0753	2.1711
10.0	.0822	.0548	.0753	.0753	.0753	.0274	.0411	.0342	.0959	.1027	.1986	.2466	.2260	.1233	.0822	.0822	1.6231
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	.7622	.3021	.6111	.4257	.4257	.1511	.2678	.2815	.4669	.4324	.6520	1.1121	1.1740	.5561	.6593	.3501	8.6301
STABILITY CLASS 3																	
1.5	.0989	.0973	.1300	.1329	.0594	.0226	.0170	.0226	.0707	.0848	.1482	.2233	.2132	.1103	.0537	.0424	1.5273
5.5	.2397	.2123	.3151	.3219	.1438	.0548	.0411	.0548	.1712	.2055	.3356	.5411	.4932	.2671	.1301	.1027	3.6300
10.0	.2466	.1507	.1644	.3767	.2055	.0548	.0753	.0890	.2740	.3836	.6575	.9726	.6027	.3288	.1301	.0959	4.8082
15.5	.0205	.0205	.0274	.0205	.0205	.0068	.0137	.0068	.0753	.1712	.4110	.4521	.3151	.1096	.0479	.0068	1.7257
21.5	0.0000	0.0000	.0068	.0068	0.0000	0.0000	.0068	0.0000	.0274	.0342	.1849	.2466	.0548	.0205	.0068	.0068	.6024
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	.0274	.0753	.0411	.0068	0.0000	0.0000	0.0000	.1506
ALL	.6057	.4808	.6437	.8588	.4292	.1390	.1539	.1732	.6186	.9067	1.8125	2.4768	1.6858	.8363	.3496	.2546	12.4442
STABILITY CLASS 4																	
1.5	.1143	.0831	.1143	.1181	.0914	.0533	.0381	.0838	.1715	.1631	.2240	.2286	.1410	.0762	.0381	.0419	1.7808
5.5	.2055	.1301	.2055	.2123	.1644	.0959	.0685	.1507	.3082	.2740	.3836	.4110	.2534	.1370	.0685	.0753	3.1439
10.0	.4178	.3493	.3356	.5890	.4658	.1438	.1507	.3288	1.0137	1.2877	2.0137	1.8151	.9658	.3425	.2466	.1507	10.6166
15.5	.3425	.2603	.2397	.3356	.2945	.0822	.1370	.3082	.7055	1.0959	2.9384	3.2466	1.5479	.6233	.3630	.1233	12.6439
21.5	.0205	.0205	.0068	.0479	.0685	.0068	.0274	.0753	.1027	.2808	.8630	1.2945	.4452	.1644	.0548	.0342	3.5133
28.0	.0137	.0068	0.0000	.0068	.0068	.0068	.0068	.0205	.0342	.0685	.3288	.4452	.1164	.0205	.0137	0.0000	1.0955
ALL	1.1143	.8501	.9019	1.3097	1.0914	.3888	.4285	.9673	2.3358	3.1700	6.7515	7.4410	3.4697	1.3639	.7847	.4254	32.7940
STABILITY CLASS 5																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5.5	.1027	.1918	.1849	.1575	.2123	.1575	.2329	.1918	.4247	.3014	.3425	.4041	.1918	.0822	.0685	.0137	3.2603
10.0	.3082	.2397	.2055	.2055	.1781	.0890	.0753	.1712	.7808	.7740	.9932	.7671	.3562	.2055	.1096	.0959	5.5548
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	.4109	.4315	.3904	.3630	.3904	.2465	.3082	.3630	1.2055	1.0754	1.3357	1.1712	.5480	.2877	.1781	.1096	8.8151
STABILITY CLASS 6																	
1.5	1.3542	1.3870	2.7412	2.0902	2.9577	1.7393	1.4268	1.7777	3.2127	1.7064	2.2272	2.8385	1.5830	.4687	.3385	.3906	28.2397
5.5	.3562	.3562	.7123	.5411	.7260	.4315	.3493	.4589	.7671	.4315	.5685	.7466	.3904	.1233	.0890	.1027	7.1506
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.7104	1.7432	3.4535	2.6313	3.6837	2.1708	1.7761	2.2366	3.9798	2.1379	2.7957	3.5851	1.9734	.5920	.4275	.4933	35.3903
ALL	4.7124	3.8984	6.1075	5.6248	6.1293	3.2414	3.0071	4.0579	8.7155	7.7950	13.4745	16.1494	9.0688	3.7994	2.4908	1.7237	99.9979

INDIVIDUAL RECEPTOR LOCATION DATA, 14 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE	I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	NORTH BOUNDARY	0.00	.08	6.10	.08	10	8	NEAREST COMMUNITY	5.37	-5.21	1.22	7.48	10
2	NORTHEAST BOUNDARY	1.15	.86	-3.05	1.15	10	9	NEAREST DOWNWIND COM	31.81	3.98	-18.29	32.06	10
3	SOUTHEAST BOUNDARY	1.15	-1.38	36.58	1.80	10	10	NEAREST GRAZING AREA	.31	-.61	-18.29	.69	10
4	SOUTHWEST BOUNDARY	-.46	-1.38	-6.10	1.45	10	11	GALLUP	-20.45	-14.77	0.00	25.22	10
5	NEAREST RESIDENT	.06	.52	48.77	.52	10	12	SPRINGSTEAD TR. PARK	-6.28	-7.66	-48.77	9.91	10
6	ENV MONITOR STA A	.18	.70	47.24	.72	10	13	NAVAJO GRAZING AREA	.71	.71	0.00	1.00	10
7	NEAREST DOWNWIND RES	2.57	1.99	18.29	3.25	10	14	NEXT NEAREST RESIDEN	-.04	1.30	12.19	1.30	10

MISCELLANEOUS INPUTTABLE PARAMETER VALUES

DM	TSTART	FFORI	FHAYI	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
650.00	1981.00	1.00	0.00	1.00	0.00	207.00	134.00	109.00	2.50

IPACT EQUALS 1. 1. 1. 1. 1. 1. 2. 0. 0. 3. 3.

JC EQUALS 1. 0. 1. 1. 0. 1. 1. 1. 1. 0

TIME STEP DATA....	STEP NAMES	LENGTH, YRS	IFTODO
1	AFTER 5 YEARS	5.00	1
2	AFTER 20 YEARS	15.00	1
3	AFTER 25 YEARS	5.00	1

XRHO EQUALS 1.5. 2.5. 3.5. 4.5. 7.5. 15.0. 25.0. 35.0. 45.0. 55.0. 65.0. 75.0.

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	57	0	0	0	0	0	0	0	0	0	0	28	0	0	0	39
2.0- 3.0	0	0	0	0	0	0	0	0	0	33	0	11	0	0	0	11
3.0- 4.0	0	0	28	11	0	0	17	11	0	6	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	11	11	28	17	17	11	0	0	0	0	6
5.0-10.0	54	50	40	9	137	142	138	49	22	23	264	155	155	50	54	54
10.0-20.0	94	50	50	136	136	136	39	127	361	362	37	149	149	314	100	96
20.0-30.0	74	159	157	136	241	464	211	129	38	38	10072	19044	762	1377	170	132
30.0-40.0	42	56	84	102	11082	407	723	137	137	388	762	1176	396	1576	503	143
40.0-50.0	303	17	3	20	841	948	800	116	143	356	147	464	970	191	5	2073
50.0-60.0	139	230	10	64	71	552	190	116	6	153	426	108	949	2263	1051	909
60.0-70.0	136	336	135	81	96	28	895	83	18	596	260	49	49	49	319	593
70.0-80.0	45	48	467	0	121	200	7667	596	0	7082	49	49	49	49	42	1029
1.0-80.0	944	946	974	559	12725	2888	10691	1392	742	9054	12028	21233	3479	5869	2244	5085

TOTAL 1-80 KM POPULATION IS 90853 PERSONS

INHALATION DOSE CONVERSION FACTORS, MR/YR PER PCI/M3

SIZE= 1.0UM, RHO=8.9	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	9.82E+00	1.12E+01	1.37E+02	3.58E+01	4.66E+00	0.	5.95E-01
BONE	1.66E+02	1.81E+02	4.90E+03	3.58E+02	1.45E+02	0.	2.43E+00
AVG.LUNG	1.07E+03	1.21E+03	2.37E+03	4.88E+03	5.69E+02	0.	3.13E+02
LIVER	0.	0.	2.82E+02	4.47E-02	3.69E+01	0.	5.34E+00
KIDNEY	3.78E+01	4.30E+01	1.37E+03	1.26E+00	1.21E+02	0.	1.79E+01

SIZE= 1.0UM, RHO=2.4	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	4.32E+00	4.92E+00	1.66E+02	3.09E+01	4.36E+00	0.	4.71E-01
BONE	7.92E+01	7.95E+01	5.95E+03	3.09E+02	1.35E+02	0.	1.92E+00
AVG.LUNG	1.58E+02	1.80E+02	3.22E+03	6.61E+03	7.72E+02	0.	4.20E+02
LIVER	0.	0.	3.43E+02	3.87E-02	3.45E+01	0.	4.22E+00
KIDNEY	1.66E+01	1.89E+01	1.67E+03	1.09E+00	1.13E+02	0.	1.42E+01

SIZE= 5.0UM, RHO=2.4	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	1.16E+00	1.32E+00	1.01E+02	4.00E+01	4.84E+00	0.	7.10E-01
BONE	1.96E+01	2.14E+01	3.60E+03	4.00E+02	1.50E+02	0.	2.89E+00
AVG.LUNG	1.24E+03	1.42E+03	1.38E+03	2.84E+03	3.30E+02	0.	1.88E+02
LIVER	0.	0.	2.07E+02	4.97E-02	3.83E+01	0.	6.36E+00
KIDNEY	4.47E+00	5.10E+00	1.00E+03	1.41E+00	1.25E+02	0.	2.13E+01

SIZE=35.0UM, RHO=2.4	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	7.92E-01	9.02E-01	5.77E+01	3.90E+01	4.43E+00	0.	7.28E-01
BONE	1.34E+01	1.46E+01	2.07E+03	3.90E+02	1.38E+02	0.	2.96E+00
AVG.LUNG	3.33E+02	3.80E+02	3.71E+02	7.64E+02	8.70E+01	0.	5.75E+01
LIVER	0.	0.	1.19E+02	4.85E-02	3.51E+01	0.	6.52E+00
KIDNEY	3.05E+00	3.47E+00	5.73E+02	1.38E+00	1.15E+02	0.	2.19E+01

SIZE= .3UM, RHO=1.0	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY					7.46E+00	0.	1.29E+00
BONE					2.32E+02	0.	5.24E+00
AVG.LUNG					6.27E+01	0.	2.66E+02
LIVER					5.91E+01	0.	1.15E+01
KIDNEY					1.93E+02	0.	3.87E+01

EXTERNAL WHOLE BODY DOSE CONVERSION FACTORS

	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214
GROUND, MR/YR PER PCI/M2	3.70E-06	6.12E-07	9.47E-07	2.27E-06	5.03E-08	1.10E-08	3.16E-05	1.85E-04
CLOUD, MR/YR PER PCI/M3	1.23E-04	3.59E-06	4.90E-05	1.43E-05	2.83E-06	6.38E-07	1.67E-03	1.16E-02
WORKING LEVEL CONCENTRATION FACTORS, WL PER PCI/M3			....	....	....	1.03E-06	5.07E-06	3.73E-06

INGESTION DOSE CONVERSION FACTORS, MR PER PCI INGESTED

AGE GROUP	TISSUE	U-238	U-234	TH-234	TH-230	RA-226	PB-210	BI-210	PO-210
INFANT	WH.BODY	3.33E-04	3.80E-04	2.00E-08	1.06E-04	1.07E-02	2.38E-03	3.58E-07	7.41E-04
INFANT	BONE	4.47E-03	4.88E-03	6.92E-07	3.80E-03	9.44E-02	5.28E-02	4.16E-06	3.10E-03
INFANT	LIVER	0.	0.	3.77E-08	1.90E-04	4.76E-05	1.42E-02	2.68E-05	5.93E-03
INFANT	KIDNEY	9.28E-04	1.06E-03	1.39E-07	9.12E-04	8.71E-04	4.33E-02	2.08E-04	1.26E-02
CHILD	WH.BODY	1.94E-04	2.21E-04	9.88E-09	9.91E-05	9.87E-03	2.09E-03	1.69E-07	3.67E-04
CHILD	BONE	3.27E-03	3.57E-03	3.42E-07	3.55E-03	8.76E-02	4.75E-02	1.97E-06	1.52E-03
CHILD	LIVER	0.	0.	1.51E-08	1.78E-04	1.84E-05	1.22E-02	1.02E-05	2.43E-03
CHILD	KIDNEY	5.24E-04	5.98E-04	8.01E-08	6.67E-04	4.88E-04	3.67E-02	1.15E-04	7.56E-03
TEENAGE	WH.BODY	6.49E-05	7.39E-05	3.31E-09	6.00E-05	5.00E-03	7.01E-04	5.66E-08	1.23E-04
TEENAGE	BONE	1.09E-03	1.19E-03	1.14E-07	2.16E-03	4.90E-02	1.81E-02	6.59E-07	5.09E-04
TEENAGE	LIVER	0.	0.	6.68E-09	1.23E-04	8.13E-06	5.44E-03	4.51E-06	1.07E-03
TEENAGE	KIDNEY	2.50E-04	2.85E-04	3.81E-08	5.99E-04	2.32E-04	1.72E-02	5.48E-05	3.60E-03
ADULT	WH.BODY	4.54E-05	5.17E-05	2.13E-09	5.70E-05	4.60E-03	5.44E-04	3.96E-08	8.59E-05
ADULT	BONE	7.67E-04	8.36E-04	8.01E-08	2.06E-03	4.60E-02	1.53E-02	4.61E-07	3.56E-04
ADULT	LIVER	0.	0.	4.71E-09	1.17E-04	5.74E-06	4.37E-03	3.18E-06	7.56E-04
ADULT	KIDNEY	1.75E-04	1.99E-04	2.67E-08	5.65E-04	1.63E-04	1.23E-02	3.83E-05	2.52E-03

ENVIRONMENTAL CONCENTRATION FACTORS

CONCENTRATION FACTOR	FOOD TYPE	U-238	TH-230	RA-226	PB-210
BIV, DIMENSIONLESS	ED.ABG.	2.50E-03	4.20E-03	1.40E-02	4.00E-03
BIV, DIMENSIONLESS	POTATO	2.50E-03	4.20E-03	3.00E-03	4.00E-03
BIV, DIMENSIONLESS	BELOW G.	2.50E-03	4.20E-03	1.40E-02	4.00E-03
BIV, DIMENSIONLESS	FORAGE	2.50E-03	4.20E-03	1.80E-02	2.80E-02
BIV, DIMENSIONLESS	ST. FEED	2.50E-03	4.20E-03	8.20E-02	3.60E-02
FBI, PCI/KG PER PCI/DAY	MEAT	3.40E-04	2.00E-04	5.10E-04	7.10E-04
FMI, PCI/L PER PCI/DAY	MILK	6.10E-04	5.00E-06	5.90E-04	1.20E-04
FRACTION IN ED PORTION	ED.ABG.	1.00E+00	1.00E+00	1.00E+00	1.00E+00
FRACTION IN ED PORTION	POTATO	1.00E-01	1.00E-01	1.00E-01	1.00E-01
FRACTION IN ED PORTION	BELOW G.	1.00E-01	1.00E-01	1.00E-01	1.00E-01
FRACTION IN ED PORTION	FORAGE	1.00E+00	1.00E+00	1.00E+00	1.00E+00
FRACTION IN ED PORTION	ST. FEED	1.00E+00	1.00E+00	1.00E+00	1.00E+00

TIME STEP DEPENDENT VARIABLES

NO.	TIME STEP NAME	PAJUST	GFACT U-238	GFACT TH-230	GFACT RA-226	GFACT PB-210	TFACT U-238	TFACT TH-230	TFACT RA-226	TFACT PB-210
1	AFTER 5 YEARS	1.320E+00	1.525E+08	1.525E+08	1.523E+08	1.413E+08	1.622E+00	1.622E+00	1.622E+00	1.619E+00
2	AFTER 20 YEARS	1.900E+00	4.274E+08	4.274E+08	4.261E+08	3.444E+08	1.625E+00	1.625E+00	1.625E+00	1.621E+00
3	AFTER 25 YEARS	1.930E+00	1.525E+08	1.525E+08	1.523E+08	1.413E+08	1.622E+00	1.622E+00	1.622E+00	1.619E+00

XPFACT=2.640E+02 GPFACT(4)=1.707E+09 1.707E+09 1.679E+09 6.943E+08 TPFACT(4)=1.638E+00 1.638E+00 1.638E+00 1.624E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE N DIRECTION, THETA EQUALS 0.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.042E-03	3.801E-04	1.499E-04	1.895E-04	1.907E+01	1.871E+01	9.960E+00	4.520E+00	3.738E-06	8.663E-05
2.5	3.328E-03	1.958E-04	7.773E-05	9.956E-05	8.936E+00	8.878E+00	6.383E+00	4.156E+00	6.422E-06	5.701E-05
3.5	1.844E-03	1.237E-04	4.924E-05	6.352E-05	5.527E+00	5.514E+00	4.534E+00	3.526E+00	8.488E-06	4.182E-05
4.5	1.103E-03	8.588E-05	3.422E-05	4.437E-05	3.901E+00	3.898E+00	3.435E+00	2.939E+00	9.985E-06	3.239E-05
7.5	3.382E-04	3.888E-05	1.553E-05	2.032E-05	1.981E+00	1.982E+00	1.885E+00	1.787E+00	1.238E-05	1.827E-05
15.0	5.908E-05	1.245E-05	4.984E-06	6.583E-06	8.397E-01	8.402E-01	8.303E-01	8.157E-01	1.385E-05	8.118E-06
25.0	1.860E-05	5.273E-06	2.112E-06	2.798E-06	4.592E-01	4.595E-01	4.595E-01	4.574E-01	1.411E-05	4.509E-06
35.0	9.326E-06	2.970E-06	1.190E-06	1.578E-06	3.089E-01	3.091E-01	3.101E-01	3.103E-01	1.404E-05	3.048E-06
45.0	5.637E-06	1.984E-06	7.950E-07	1.055E-06	2.291E-01	2.293E-01	2.303E-01	2.308E-01	1.389E-05	2.265E-06
55.0	3.729E-06	1.408E-06	5.644E-07	7.495E-07	1.797E-01	1.798E-01	1.807E-01	1.813E-01	1.371E-05	1.778E-06
65.0	2.591E-06	1.014E-06	4.065E-07	5.398E-07	1.462E-01	1.462E-01	1.470E-01	1.475E-01	1.352E-05	1.446E-06
75.0	1.834E-06	7.281E-07	2.918E-07	3.875E-07	1.219E-01	1.220E-01	1.226E-01	1.231E-01	1.331E-05	1.206E-06

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	5.882E+03	1.905E+03	7.534E+02	7.534E+02	7.534E+02	7.682E+02	7.682E+02	7.682E+02	1.585E+00
2.5	3.222E+03	9.224E+02	3.679E+02	3.679E+02	3.679E+02	3.749E+02	3.749E+02	3.749E+02	2.723E+00
3.5	1.789E+03	5.662E+02	2.261E+02	2.261E+02	2.261E+02	2.305E+02	2.305E+02	2.305E+02	3.599E+00
4.5	1.075E+03	3.838E+02	1.534E+02	1.534E+02	1.534E+02	1.565E+02	1.565E+02	1.565E+02	4.234E+00
7.5	3.335E+02	1.636E+02	6.538E+01	6.538E+01	6.538E+01	6.695E+01	6.695E+01	6.695E+01	5.247E+00
15.0	5.973E+01	4.621E+01	1.848E+01	1.848E+01	1.848E+01	1.915E+01	1.915E+01	1.915E+01	5.870E+00
25.0	1.899E+01	1.726E+01	6.907E+00	6.907E+00	6.907E+00	7.271E+00	7.271E+00	7.271E+00	5.983E+00
35.0	9.502E+00	8.810E+00	3.527E+00	3.527E+00	3.527E+00	3.771E+00	3.771E+00	3.771E+00	5.954E+00
45.0	5.733E+00	5.423E+00	2.171E+00	2.171E+00	2.171E+00	2.353E+00	2.353E+00	2.353E+00	5.891E+00
55.0	3.785E+00	3.614E+00	1.447E+00	1.447E+00	1.447E+00	1.589E+00	1.589E+00	1.589E+00	5.814E+00
65.0	2.612E+00	2.479E+00	9.926E-01	9.926E-01	9.926E-01	1.108E+00	1.108E+00	1.108E+00	5.730E+00
75.0	1.850E+00	1.715E+00	6.869E-01	6.869E-01	6.869E-01	7.835E-01	7.835E-01	7.835E-01	5.643E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	6.260E-05	2.027E-05	8.026E-06	1.039E-05
2.5	3.428E-05	9.817E-06	3.919E-06	5.175E-06
3.5	1.904E-05	6.026E-06	2.409E-06	3.206E-06
4.5	1.144E-05	4.085E-06	1.634E-06	2.190E-06
7.5	3.549E-06	1.741E-06	6.966E-07	9.597E-07
15.0	6.357E-07	4.917E-07	1.969E-07	3.030E-07
25.0	2.021E-07	1.837E-07	7.358E-08	1.401E-07
35.0	1.011E-07	9.376E-08	3.757E-08	9.209E-08
45.0	6.102E-08	5.771E-08	2.313E-08	7.245E-08
55.0	4.028E-08	3.846E-08	1.542E-08	6.165E-08
65.0	2.780E-08	2.638E-08	1.057E-08	5.462E-08
75.0	1.969E-08	1.826E-08	7.318E-09	4.967E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE ENE DIRECTION, THETA EQUALS 67.5 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	7.411E-03	5.744E-03	2.307E-03	3.082E-03	2.704E+01	2.566E+01	1.168E+01	4.622E+00	3.115E-06	1.029E-04
2.5	3.875E-03	3.098E-03	1.244E-03	1.662E-03	1.094E+01	1.069E+01	6.970E+00	4.222E+00	5.702E-06	6.209E-05
3.5	2.151E-03	1.706E-03	6.849E-04	9.142E-04	6.275E+00	6.203E+00	4.745E+00	3.527E+00	7.661E-06	4.361E-05
4.5	1.315E-03	1.098E-03	4.406E-04	5.880E-04	4.254E+00	4.229E+00	3.514E+00	2.912E+00	9.086E-06	3.304E-05
7.5	4.453E-04	4.445E-04	1.784E-04	2.379E-04	2.072E+00	2.070E+00	1.895E+00	1.761E+00	1.150E-05	1.831E-05
15.0	9.943E-05	1.289E-04	5.173E-05	6.898E-05	8.423E-01	8.428E-01	8.180E-01	7.921E-01	1.288E-05	7.970E-06
25.0	3.743E-05	5.237E-05	2.101E-05	2.802E-05	4.502E-01	4.505E-01	4.468E-01	4.408E-01	1.305E-05	4.374E-06
35.0	2.044E-05	2.989E-05	1.159E-05	1.546E-05	2.990E-01	2.992E-01	2.990E-01	2.975E-01	1.292E-05	2.934E-06
45.0	1.321E-05	1.908E-05	7.655E-06	1.021E-05	2.205E-01	2.206E-01	2.211E-01	2.209E-01	1.275E-05	2.172E-06
55.0	9.226E-06	1.357E-05	5.443E-06	7.259E-06	1.723E-01	1.724E-01	1.731E-01	1.733E-01	1.256E-05	1.701E-06
65.0	6.646E-06	9.808E-06	3.935E-06	5.247E-06	1.396E-01	1.397E-01	1.404E-01	1.407E-01	1.237E-05	1.380E-06
75.0	4.858E-06	7.071E-06	2.837E-06	3.783E-06	1.160E-01	1.161E-01	1.166E-01	1.170E-01	1.217E-05	1.147E-06

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.013E+04	3.049E+04	1.224E+04	1.224E+04	1.224E+04	1.226E+04	1.226E+04	1.226E+04	1.321E+00
2.5	5.229E+03	1.589E+04	6.375E+03	6.375E+03	6.375E+03	6.384E+03	6.384E+03	6.384E+03	2.418E+00
3.5	2.863E+03	8.495E+03	3.408E+03	3.408E+03	3.408E+03	3.413E+03	3.413E+03	3.413E+03	3.248E+00
4.5	1.760E+03	5.331E+03	2.138E+03	2.138E+03	2.138E+03	2.142E+03	2.142E+03	2.142E+03	3.852E+00
7.5	6.155E+02	2.031E+03	8.144E+02	8.144E+02	8.144E+02	8.160E+02	8.160E+02	8.160E+02	4.875E+00
15.0	1.429E+02	5.255E+02	2.106E+02	2.106E+02	2.106E+02	2.112E+02	2.112E+02	2.112E+02	5.462E+00
25.0	5.252E+01	1.909E+02	7.650E+01	7.650E+01	7.650E+01	7.686E+01	7.686E+01	7.686E+01	5.531E+00
35.0	2.768E+01	9.634E+01	3.860E+01	3.860E+01	3.860E+01	3.883E+01	3.883E+01	3.883E+01	5.476E+00
45.0	1.743E+01	5.890E+01	2.360E+01	2.360E+01	2.360E+01	2.377E+01	2.377E+01	2.377E+01	5.404E+00
55.0	1.193E+01	3.941E+01	1.579E+01	1.579E+01	1.579E+01	1.593E+01	1.593E+01	1.593E+01	5.327E+00
65.0	8.447E+00	2.720E+01	1.090E+01	1.090E+01	1.090E+01	1.101E+01	1.101E+01	1.101E+01	5.246E+00
75.0	6.070E+00	1.895E+01	7.591E+00	7.591E+00	7.591E+00	7.683E+00	7.683E+00	7.683E+00	5.162E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	1.078E-04	3.245E-04	1.304E-04	1.746E-04
2.5	5.564E-05	1.691E-04	6.792E-05	9.088E-05
3.5	3.047E-05	9.041E-05	3.631E-05	4.857E-05
4.5	1.874E-05	5.674E-05	2.278E-05	3.047E-05
7.5	6.550E-06	2.162E-05	8.676E-06	1.162E-05
15.0	1.521E-06	5.592E-06	2.243E-06	3.030E-06
25.0	5.590E-07	2.032E-06	8.150E-07	1.126E-06
35.0	2.945E-07	1.025E-06	4.112E-07	5.869E-07
45.0	1.855E-07	6.268E-07	2.514E-07	3.733E-07
55.0	1.270E-07	4.194E-07	1.682E-07	2.619E-07
65.0	8.989E-08	2.895E-07	1.161E-07	1.919E-07
75.0	6.460E-08	2.016E-07	8.087E-08	1.443E-07

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE E DIRECTION, THETA EQUALS 90.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	5.454E-03	1.401E-02	5.632E-03	7.542E-03	2.154E+01	2.015E+01	8.096E+00	2.938E+00	1.854E-06	7.276E-05
2.5	2.348E-03	3.215E-03	1.292E-03	1.728E-03	7.304E+00	7.142E+00	4.567E+00	2.689E+00	3.485E-06	4.054E-05
3.5	1.254E-03	1.384E-03	5.558E-04	7.431E-04	4.000E+00	3.959E+00	3.021E+00	2.218E+00	4.665E-06	2.767E-05
4.5	7.526E-04	7.663E-04	3.078E-04	4.113E-04	2.641E+00	2.628E+00	2.192E+00	1.807E+00	5.499E-06	2.056E-05
7.5	2.492E-04	2.405E-04	9.657E-05	1.289E-04	1.229E+00	1.228E+00	1.133E+00	1.055E+00	6.799E-06	1.094E-05
15.0	5.487E-05	5.363E-05	2.152E-05	2.871E-05	4.824E-01	4.827E-01	4.706E-01	4.572E-01	7.434E-06	4.588E-06
25.0	2.015E-05	1.903E-05	7.632E-06	1.017E-05	2.546E-01	2.548E-01	2.533E-01	2.505E-01	7.448E-06	2.481E-06
35.0	1.151E-05	9.929E-06	3.983E-06	5.307E-06	1.688E-01	1.689E-01	1.690E-01	1.684E-01	7.360E-06	1.659E-06
45.0	7.475E-06	6.443E-06	2.584E-06	3.443E-06	1.245E-01	1.246E-01	1.249E-01	1.249E-01	7.267E-06	1.228E-06
55.0	5.237E-06	4.542E-06	1.822E-06	2.427E-06	9.732E-02	9.738E-02	9.778E-02	9.796E-02	7.164E-06	9.614E-07
65.0	3.798E-06	3.269E-06	1.311E-06	1.747E-06	7.889E-02	7.893E-02	7.931E-02	7.953E-02	7.056E-06	7.800E-07
75.0	2.808E-06	2.350E-06	9.426E-07	1.256E-06	6.556E-02	6.560E-02	6.593E-02	6.615E-02	6.943E-06	6.486E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.238E+04	7.605E+04	3.054E+04	3.054E+04	3.054E+04	3.056E+04	3.056E+04	3.056E+04	7.860E-01
2.5	3.789E+03	1.661E+04	6.669E+03	6.669E+03	6.669E+03	6.675E+03	6.675E+03	6.675E+03	1.478E+00
3.5	1.836E+03	6.912E+03	2.775E+03	2.775E+03	2.775E+03	2.778E+03	2.778E+03	2.778E+03	1.978E+00
4.5	1.060E+03	3.722E+03	1.494E+03	1.494E+03	1.494E+03	1.496E+03	1.496E+03	1.496E+03	2.331E+00
7.5	3.370E+02	1.091E+03	4.378E+02	4.378E+02	4.378E+02	4.388E+02	4.388E+02	4.388E+02	2.883E+00
15.0	7.128E+01	2.141E+02	8.582E+01	8.582E+01	8.582E+01	8.620E+01	8.620E+01	8.620E+01	3.152E+00
25.0	2.556E+01	6.701E+01	2.685E+01	2.685E+01	2.685E+01	2.705E+01	2.705E+01	2.705E+01	3.158E+00
35.0	1.354E+01	3.165E+01	1.268E+01	1.268E+01	1.268E+01	1.281E+01	1.281E+01	1.281E+01	3.121E+00
45.0	8.590E+00	1.887E+01	7.561E+00	7.561E+00	7.561E+00	7.659E+00	7.659E+00	7.659E+00	3.081E+00
55.0	5.921E+00	1.245E+01	4.987E+00	4.987E+00	4.987E+00	5.064E+00	5.064E+00	5.064E+00	3.038E+00
65.0	4.234E+00	8.515E+00	3.411E+00	3.411E+00	3.411E+00	3.474E+00	3.474E+00	3.474E+00	2.992E+00
75.0	3.088E+00	5.886E+00	2.358E+00	2.358E+00	2.358E+00	2.410E+00	2.410E+00	2.410E+00	2.944E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	1.317E-04	8.094E-04	3.254E-04	4.359E-04
2.5	4.032E-05	1.768E-04	7.105E-05	9.516E-05
3.5	1.954E-05	7.356E-05	2.956E-05	3.958E-05
4.5	1.129E-05	3.961E-05	1.591E-05	2.131E-05
7.5	3.586E-06	1.162E-05	4.664E-06	6.254E-06
15.0	7.586E-07	2.279E-06	9.143E-07	1.242E-06
25.0	2.721E-07	7.131E-07	2.860E-07	4.037E-07
35.0	1.441E-07	3.368E-07	1.351E-07	2.021E-07
45.0	9.142E-08	2.009E-07	8.055E-08	1.291E-07
55.0	6.301E-08	1.325E-07	5.313E-08	9.229E-08
65.0	4.506E-08	9.063E-08	3.634E-08	6.960E-08
75.0	3.287E-08	6.265E-08	2.517E-08	5.431E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE S DIRECTION, THETA EQUALS 180.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	2.837E-03	4.375E-04	1.753E-04	2.316E-04	1.359E+01	1.319E+01	6.170E+00	2.547E+00	1.880E-06	5.437E-05
2.5	1.501E-03	1.465E-04	5.860E-05	7.679E-05	5.001E+00	4.961E+00	3.419E+00	2.127E+00	3.024E-06	3.038E-05
3.5	8.281E-04	7.546E-05	3.016E-05	3.945E-05	2.833E+00	2.825E+00	2.274E+00	1.724E+00	3.887E-06	2.087E-05
4.5	4.969E-04	4.710E-05	1.882E-05	2.464E-05	1.924E+00	1.922E+00	1.673E+00	1.410E+00	4.533E-06	1.572E-05
7.5	1.577E-04	1.829E-05	7.312E-06	9.600E-06	9.257E-01	9.261E-01	8.781E-01	8.290E-01	5.538E-06	8.498E-06
15.0	3.079E-05	5.130E-06	2.053E-06	2.708E-06	3.735E-01	3.737E-01	3.692E-01	3.624E-01	6.048E-06	3.608E-06
25.0	1.181E-05	2.030E-06	8.128E-07	1.074E-06	2.021E-01	2.022E-01	2.022E-01	2.013E-01	6.142E-06	1.984E-06
35.0	5.757E-06	1.104E-06	4.418E-07	5.836E-07	1.353E-01	1.354E-01	1.358E-01	1.359E-01	6.099E-06	1.335E-06
45.0	3.613E-06	7.203E-07	2.884E-07	3.811E-07	1.001E-01	1.002E-01	1.006E-01	1.009E-01	6.029E-06	9.896E-07
55.0	2.462E-06	5.056E-07	2.025E-07	2.676E-07	7.840E-02	7.845E-02	7.884E-02	7.910E-02	5.945E-06	7.756E-07
65.0	1.754E-06	3.597E-07	1.440E-07	1.904E-07	6.366E-02	6.370E-02	6.403E-02	6.426E-02	5.854E-06	6.299E-07
75.0	1.285E-06	2.548E-07	1.020E-07	1.348E-07	5.302E-02	5.306E-02	5.334E-02	5.354E-02	5.760E-06	5.248E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	2.883E+03	2.244E+03	9.003E+02	9.003E+02	9.003E+02	9.108E+02	9.108E+02	9.108E+02	7.969E-01
2.5	1.478E+03	7.042E+02	2.824E+02	2.824E+02	2.824E+02	2.863E+02	2.863E+02	2.863E+02	1.282E+00
3.5	8.115E+02	3.482E+02	1.396E+02	1.396E+02	1.396E+02	1.418E+02	1.418E+02	1.418E+02	1.648E+00
4.5	4.870E+02	2.106E+02	8.438E+01	8.438E+01	8.438E+01	8.590E+01	8.590E+01	8.590E+01	1.922E+00
7.5	1.553E+02	7.585E+01	3.038E+01	3.038E+01	3.038E+01	3.111E+01	3.111E+01	3.111E+01	2.348E+00
15.0	3.059E+01	1.845E+01	7.386E+00	7.386E+00	7.386E+00	7.682E+00	7.682E+00	7.682E+00	2.564E+00
25.0	1.069E+01	6.320E+00	2.530E+00	2.530E+00	2.530E+00	2.690E+00	2.690E+00	2.690E+00	2.604E+00
35.0	5.652E+00	3.062E+00	1.225E+00	1.225E+00	1.225E+00	1.333E+00	1.333E+00	1.333E+00	2.586E+00
45.0	3.534E+00	1.817E+00	7.272E-01	7.272E-01	7.272E-01	8.065E-01	8.065E-01	8.065E-01	2.556E+00
55.0	2.400E+00	1.184E+00	4.738E-01	4.738E-01	4.738E-01	5.360E-01	5.360E-01	5.360E-01	2.521E+00
65.0	1.703E+00	7.936E-01	3.176E-01	3.176E-01	3.176E-01	3.681E-01	3.681E-01	3.681E-01	2.482E+00
75.0	1.243E+00	5.351E-01	2.141E-01	2.141E-01	2.141E-01	2.562E-01	2.562E-01	2.562E-01	2.442E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	3.069E-05	2.388E-05	9.591E-06	1.282E-05
2.5	1.573E-05	7.495E-06	3.008E-06	4.019E-06
3.5	8.637E-06	3.706E-06	1.487E-06	1.992E-06
4.5	5.183E-06	2.241E-06	8.989E-07	1.210E-06
7.5	1.653E-06	8.073E-07	3.236E-07	4.469E-07
15.0	3.256E-07	1.963E-07	7.869E-08	1.227E-07
25.0	1.138E-07	6.726E-08	2.695E-08	5.424E-08
35.0	6.016E-08	3.258E-08	1.305E-08	3.564E-08
45.0	3.761E-08	1.934E-08	7.747E-09	2.837E-08
55.0	2.555E-09	1.260E-08	5.048E-09	2.454E-08
65.0	1.813E-08	8.446E-09	3.384E-09	2.206E-08
75.0	1.323E-08	5.695E-09	2.281E-09	2.031E-08

TIME STEP NUMBER 1, AFTER 5 YEARS　　DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE W DIRECTION, THETA EQUALS 270.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	4.937E-03	1.203E-04	4.731E-05	5.758E-05	1.569E+01	1.554E+01	9.078E+00	4.500E+00	4.199E-06	7.881E-05
2.5	2.779E-03	6.907E-05	2.718E-05	3.318E-05	7.552E+00	7.531E+00	5.706E+00	3.891E+00	6.560E-06	5.120E-05
3.5	1.534E-03	4.503E-05	1.778E-05	2.203E-05	4.771E+00	4.768E+00	4.064E+00	3.251E+00	8.375E-06	3.764E-05
4.5	9.090E-04	3.193E-05	1.264E-05	1.586E-05	3.403E+00	3.403E+00	3.082E+00	2.690E+00	9.658E-06	2.917E-05
7.5	2.668E-04	1.492E-05	5.933E-06	7.619E-06	1.753E+00	1.754E+00	1.696E+00	1.626E+00	1.168E-05	1.647E-05
15.0	4.061E-05	4.836E-06	1.932E-06	2.533E-06	7.463E-01	7.467E-01	7.431E-01	7.353E-01	1.282E-05	7.279E-06
25.0	1.132E-05	2.030E-06	8.121E-07	1.071E-06	4.064E-01	4.067E-01	4.078E-01	4.075E-01	1.292E-05	4.006E-06
35.0	5.377E-06	1.131E-06	4.528E-07	5.983E-07	2.728E-01	2.730E-01	2.742E-01	2.748E-01	1.279E-05	2.696E-06
45.0	3.146E-06	7.513E-07	3.008E-07	3.981E-07	2.020E-01	2.022E-01	2.032E-01	2.038E-01	1.262E-05	1.999E-06
55.0	2.039E-06	5.294E-07	2.120E-07	2.808E-07	1.583E-01	1.584E-01	1.592E-01	1.598E-01	1.243E-05	1.567E-06
65.0	1.398E-06	3.770E-07	1.510E-07	2.000E-07	1.287E-01	1.287E-01	1.294E-01	1.299E-01	1.223E-05	1.273E-06
75.0	9.926E-07	2.663E-07	1.066E-07	1.413E-07	1.073E-01	1.074E-01	1.079E-01	1.084E-01	1.204E-05	1.062E-06

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	4.697E+03	5.462E+02	2.179E+02	2.179E+02	2.179E+02	2.302E+02	2.302E+02	2.302E+02	1.780E+00
2.5	2.642E+03	3.025E+02	1.207E+02	1.207E+02	1.207E+02	1.266E+02	1.266E+02	1.266E+02	2.781E+00
3.5	1.461E+03	1.938E+02	7.735E+01	7.735E+01	7.735E+01	8.112E+01	8.112E+01	8.112E+01	3.551E+00
4.5	8.674E+02	1.354E+02	5.405E+01	5.405E+01	5.405E+01	5.675E+01	5.675E+01	5.675E+01	4.095E+00
7.5	2.564E+02	6.028E+01	2.408E+01	2.408E+01	2.408E+01	2.547E+01	2.547E+01	2.547E+01	4.953E+00
15.0	3.973E+01	1.725E+01	6.897E+00	6.897E+00	6.897E+00	7.488E+00	7.488E+00	7.488E+00	5.437E+00
25.0	1.118E+01	6.273E+00	2.509E+00	2.509E+00	2.509E+00	2.831E+00	2.831E+00	2.831E+00	5.477E+00
35.0	5.304E+00	3.105E+00	1.242E+00	1.242E+00	1.242E+00	1.459E+00	1.459E+00	1.459E+00	5.422E+00
45.0	3.099E+00	1.868E+00	7.476E-01	7.476E-01	7.476E-01	9.077E-01	9.077E-01	9.077E-01	5.348E+00
55.0	2.004E+00	1.218E+00	4.876E-01	4.876E-01	4.876E-01	6.130E-01	6.130E-01	6.130E-01	5.269E+00
65.0	1.370E+00	8.156E-01	3.264E-01	3.264E-01	3.264E-01	4.284E-01	4.284E-01	4.284E-01	5.187E+00
75.0	9.692E-01	5.476E-01	2.192E-01	2.192E-01	2.192E-01	3.042E-01	3.042E-01	3.042E-01	5.105E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	4.999E-05	5.813E-06	2.321E-06	3.050E-06
2.5	2.812E-05	3.219E-06	1.285E-06	1.702E-06
3.5	1.554E-05	2.062E-06	8.240E-07	1.106E-06
4.5	9.231E-06	1.441E-06	5.758E-07	7.862E-07
7.5	2.729E-06	6.415E-07	2.565E-07	3.735E-07
15.0	4.228E-07	1.836E-07	7.347E-08	1.358E-07
25.0	1.190E-07	6.676E-08	2.673E-08	7.422E-08
35.0	5.644E-08	3.305E-08	1.324E-08	5.593E-08
45.0	3.298E-08	1.988E-08	7.965E-09	4.842E-08
55.0	2.133E-08	1.297E-08	5.194E-09	4.418E-08
65.0	1.458E-08	8.690E-09	3.477E-09	4.132E-08
75.0	1.031E-08	5.828E-09	2.335E-09	3.922E-08

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL.   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	9.284E-03	0.	0.	0.	5.964E-04	2.452E-04	7.732E-05	2.584E-05	1.318E-04	4.630E-05	3.612E-05	9.790E-06
NNE	0.	0.	0.	0.	6.468E-04	1.866E-04	2.526E-04	5.177E-05	1.083E-05	1.082E-04	1.199E-04	1.318E-05
NE	0.	0.	3.104E-03	0.	1.348E-03	5.317E-04	7.284E-04	2.265E-04	5.542E-06	1.351E-05	1.358E-04	3.520E-04
ENE	0.	0.	2.256E-03	0.	4.694E-04	2.034E-03	8.438E-04	3.586E-04	4.750E-05	1.105E-04	1.037E-04	0.
E	0.	0.	0.	0.	3.900E-03	8.908E-04	5.885E-04	1.478E-02	7.517E-04	4.614E-05	4.658E-05	4.425E-05
ESE	0.	0.	0.	2.947E-04	1.229E-03	2.828E-04	3.767E-04	1.850E-04	2.894E-04	1.223E-04	4.625E-06	2.487E-05
SE	0.	0.	3.081E-04	1.188E-04	5.334E-04	4.028E-05	8.951E-05	1.752E-04	1.315E-04	2.283E-05	8.072E-05	5.263E-04
SSE	0.	0.	1.323E-04	1.946E-04	1.110E-04	6.661E-05	2.663E-05	1.633E-05	9.517E-06	7.125E-06	3.972E-06	2.284E-05
S	0.	0.	0.	2.562E-04	1.138E-04	4.395E-04	1.849E-05	3.901E-05	2.849E-05	9.097E-07	2.166E-06	0.
SSW	0.	1.275E-03	1.274E-04	2.206E-04	9.995E-05	3.464E-04	1.417E-05	8.504E-05	5.527E-05	1.838E-05	5.801E-05	5.766E-04
SW	0.	0.	0.	2.379E-04	1.769E-03	4.640E-05	4.627E-03	2.103E-04	2.981E-05	6.986E-05	3.634E-05	6.041E-06
WSW	2.781E-03	6.036E-04	0.	0.	9.701E-04	2.009E-04	9.942E-03	3.633E-04	1.027E-04	1.866E-05	6.917E-06	5.828E-06
W	0.	0.	0.	0.	1.115E-03	2.154E-04	4.177E-04	1.306E-04	2.347E-04	1.839E-04	7.957E-06	6.876E-06
WNW	0.	0.	0.	0.	1.938E-04	2.213E-04	3.504E-04	2.422E-04	2.188E-05	2.123E-04	3.958E-06	3.522E-06
NW	0.	0.	0.	0.	2.032E-04	7.736E-05	5.001E-05	8.813E-05	6.343E-07	1.055E-04	2.657E-05	2.998E-06
NNW	3.277E-03	5.116E-04	0.	9.901E-05	3.078E-04	1.255E-04	6.756E-05	4.281E-05	4.408E-04	1.488E-04	7.771E-05	1.108E-04

TOTAL DOSE COMMITMENT IS 8.611E-02 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.945E-01	0.	0.	0.	1.310E-02	6.019E-03	2.018E-03	6.955E-04	3.636E-03	1.302E-03	1.031E-03	2.828E-04
NNE	0.	0.	0.	0.	1.677E-02	5.139E-03	7.131E-03	1.478E-03	3.123E-04	3.145E-03	3.504E-03	3.867E-04
NE	0.	0.	8.319E-02	0.	3.818E-02	1.560E-02	2.165E-02	6.769E-03	1.664E-04	4.068E-04	4.100E-03	1.064E-02
ENE	0.	0.	6.380E-02	0.	1.360E-02	6.031E-02	2.525E-02	1.077E-02	1.432E-03	3.339E-03	3.138E-03	0.
E	0.	0.	0.	0.	1.127E-01	2.593E-02	1.714E-02	4.304E-01	2.197E-02	1.353E-03	1.369E-03	1.302E-03
ESE	0.	0.	0.	8.408E-03	3.485E-02	8.023E-03	1.066E-02	5.231E-03	8.215E-03	3.486E-03	1.321E-04	7.108E-04
SE	0.	0.	8.217E-03	3.158E-03	1.423E-02	1.089E-03	2.422E-03	4.751E-03	3.590E-03	6.281E-04	2.232E-03	1.460E-02
SSE	0.	0.	3.278E-03	4.770E-03	2.723E-03	1.677E-03	6.789E-04	4.209E-04	2.490E-04	1.892E-04	1.068E-04	6.212E-04
S	0.	0.	0.	5.430E-03	2.503E-03	1.041E-02	4.564E-04	9.870E-04	7.386E-04	2.410E-05	5.842E-05	0.
SSW	0.	2.524E-02	2.516E-03	4.413E-03	2.095E-03	8.001E-03	3.484E-04	2.170E-03	1.456E-03	4.967E-04	1.601E-03	1.619E-02
SW	0.	0.	0.	4.495E-03	3.438E-02	9.861E-04	1.076E-01	5.204E-03	7.744E-04	1.883E-03	1.008E-03	1.713E-04
WSW	5.380E-02	1.172E-02	0.	0.	2.037E-02	4.690E-03	2.484E-01	9.426E-03	2.746E-03	5.110E-04	1.930E-08	1.651E-04
W	0.	0.	0.	0.	2.219E-02	4.906E-03	1.049E-02	3.455E-03	6.443E-03	5.182E-03	2.286E-04	2.005E-04
WNW	0.	0.	0.	0.	3.704E-03	4.748E-03	8.426E-03	6.246E-03	5.930E-04	5.954E-03	1.138E-04	1.030E-04
NW	0.	0.	0.	0.	4.167E-03	1.788E-03	1.260E-03	2.331E-03	1.740E-05	2.973E-03	7.635E-04	8.745E-05
NNW	6.524E-02	1.015E-02	0.	2.049E-03	6.824E-03	3.139E-03	1.806E-03	1.182E-03	1.248E-02	4.285E-03	2.267E-03	3.266E-03

TOTAL DOSE COMMITMENT IS 2.177E+00 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS AVG.LUNG

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	8.202E-01	0.	0.	0.	4.557E-02	1.507E-02	4.034E-03	1.207E-03	5.538E-03	1.761E-03	1.244E-03	3.048E-04
NNE	0.	0.	0.	0.	3.410E-02	8.213E-03	1.025E-02	2.012E-03	4.033E-04	3.872E-03	4.125E-03	4.349E-04
NE	0.	0.	1.440E-01	0.	5.142E-02	1.770E-02	2.328E-02	7.142E-03	1.722E-04	4.138E-04	4.104E-03	1.047E-02
ENE	0.	0.	8.389E-02	0.	1.603E-02	6.378E-02	2.600E-02	1.103E-02	1.450E-03	3.338E-03	3.099E-03	0.
E	0.	0.	0.	0.	1.350E-01	3.094E-02	2.095E-02	5.325E-01	2.680E-02	1.618E-03	1.605E-03	1.499E-03
ESE	0.	0.	0.	1.066E-02	4.694E-02	1.115E-02	1.536E-02	7.627E-03	1.182E-02	4.917E-03	1.832E-04	9.724E-04
SE	0.	0.	1.458E-02	5.713E-03	2.574E-02	1.907E-03	4.277E-03	8.355E-03	6.126E-03	1.034E-03	3.561E-03	2.265E-02
SSE	0.	0.	7.787E-03	1.181E-02	6.786E-03	3.866E-03	1.499E-03	8.869E-04	4.908E-04	3.466E-04	1.820E-04	9.823E-04
S	0.	0.	0.	2.069E-02	8.673E-03	2.925E-02	1.120E-03	2.196E-03	1.476E-03	4.328E-05	9.455E-05	0.
SSW	0.	1.135E-01	1.140E-02	1.941E-02	8.239E-03	2.424E-02	8.600E-04	4.615E-03	2.674E-03	7.939E-04	2.240E-03	1.988E-02
SW	0.	0.	0.	2.250E-02	1.618E-01	3.728E-03	3.105E-01	1.190E-02	1.423E-03	2.832E-03	1.260E-03	1.806E-04
WSW	2.549E-01	5.510E-02	0.	0.	7.975E-02	1.375E-02	5.785E-01	1.873E-02	4.700E-03	7.632E-04	2.532E-04	1.909E-04
W	0.	0.	0.	0.	9.887E-02	1.540E-02	2.368E-02	6.202E-03	9.457E-03	6.374E-03	2.395E-04	1.806E-04
WNW	0.	0.	0.	0.	1.807E-02	1.743E-02	2.165E-02	1.204E-02	8.820E-04	7.061E-03	1.104E-04	8.364E-05
NW	0.	0.	0.	0.	1.726E-02	5.371E-03	2.813E-03	4.198E-03	2.575E-05	3.688E-03	8.067E-04	7.952E-05
NNW	2.888E-01	4.541E-02	0.	8.291E-03	2.313E-02	7.361E-03	3.260E-03	1.815E-03	1.655E-02	5.000E-03	2.346E-03	3.000E-03

TOTAL DOSE COMMITMENT IS 4.886E+00 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BRONCHI

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.793E-01	0.	0.	0.	6.685E-02	4.933E-02	2.124E-02	8.108E-03	4.339E-02	1.561E-02	1.242E-02	3.429E-03
NNE	0.	0.	0.	0.	3.930E-02	1.561E-02	2.648E-02	6.197E-03	1.388E-03	1.468E-02	1.740E-02	2.069E-03
NE	0.	0.	8.393E-02	0.	4.002E-02	2.062E-02	3.475E-02	1.239E-02	3.268E-04	8.520E-04	9.321E-03	2.678E-02
ENE	0.	0.	4.314E-02	0.	1.165E-02	7.160E-02	3.827E-02	1.906E-02	2.756E-03	6.893E-03	7.069E-03	0.
E	0.	0.	0.	0.	1.052E-01	4.100E-02	3.836E-02	1.169E+00	6.543E-02	4.319E-03	4.733E-03	4.958E-03
ESE	0.	0.	0.	6.263E-03	3.605E-02	1.331E-02	2.395E-02	1.394E-02	2.396E-02	1.091E-02	4.485E-04	2.660E-03
SE	0.	0.	9.575E-03	4.065E-03	2.368E-02	2.669E-03	7.763E-03	1.778E-02	1.456E-02	2.712E-03	1.037E-02	7.389E-02
SSE	0.	0.	8.832E-03	1.392E-02	1.010E-02	9.287E-03	4.974E-03	3.502E-03	2.182E-03	1.704E-03	9.881E-04	5.906E-03
S	0.	0.	0.	2.044E-02	1.273E-02	8.427E-02	4.799E-03	1.158E-02	8.947E-03	2.940E-04	7.162E-04	0.
SSW	0.	1.178E-01	1.200E-02	2.263E-02	1.412E-02	8.610E-02	4.832E-03	3.284E-02	2.222E-02	7.460E-03	2.358E-02	2.333E-01
SW	0.	0.	0.	2.268E-02	2.747E-01	1.621E-02	2.407E+00	1.223E-01	1.747E-02	3.968E-02	1.968E-02	3.093E-03
WSW	2.347E-01	4.336E-02	0.	0.	1.281E-01	5.144E-02	3.548E+00	1.464E-01	4.267E-02	7.767E-03	2.859E-03	2.381E-03
W	0.	0.	0.	0.	1.699E-01	6.950E-02	1.936E-01	6.752E-02	1.225E-01	9.390E-02	3.941E-03	3.286E-03
WNW	0.	0.	0.	0.	3.244E-02	8.686E-02	2.066E-01	1.584E-01	1.420E-02	1.318E-01	2.319E-03	1.934E-03
NW	0.	0.	0.	0.	2.919E-02	2.317E-02	2.133E-02	4.226E-02	3.106E-04	5.113E-02	1.260E-02	1.383E-03
NNW	2.645E-01	3.463E-02	0.	8.125E-03	3.673E-02	2.793E-02	2.080E-02	1.505E-02	1.612E-01	5.533E-02	2.931E-02	4.236E-02

TOTAL DOSE COMMITMENT IS 1.333E+01 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS GROUND EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	9.019E-03	0.	0.	0.	7.156E-04	3.467E-04	1.033E-04	3.058E-05	1.386E-04	4.340E-05	3.002E-05	7.153E-06
NNE	0.	0.	0.	0.	1.359E-03	3.883E-04	4.768E-04	8.835E-05	1.691E-05	1.564E-04	1.614E-04	1.655E-05
NE	0.	0.	8.260E-03	0.	3.663E-03	1.346E-03	1.649E-03	4.643E-04	1.041E-05	2.363E-05	2.238E-04	5.505E-04
ENE	0.	0.	6.954E-03	0.	1.358E-03	5.307E-03	1.932E-03	7.331E-04	8.809E-05	1.891E-04	1.657E-04	0.
E	0.	0.	0.	0.	1.112E-02	2.172E-03	1.211E-03	2.645E-02	1.203E-03	6.734E-05	6.267E-05	5.505E-05
ESE	0.	0.	0.	8.761E-04	3.251E-03	6.212E-04	6.870E-04	2.920E-04	4.074E-04	1.568E-04	5.460E-06	2.712E-05
SE	0.	0.	7.983E-04	2.923E-04	1.196E-03	7.714E-05	1.430E-04	2.417E-04	1.617E-04	2.556E-05	8.274E-05	4.932E-04
SSE	0.	0.	2.748E-04	3.747E-04	1.923E-04	1.007E-04	3.351E-05	1.758E-05	9.026E-06	6.062E-06	3.044E-06	1.573E-05
S	0.	0.	0.	2.920E-04	1.355E-04	5.416E-04	2.007E-05	3.632E-05	2.325E-05	6.582E-07	1.384E-06	0.
SSW	0.	1.114E-03	1.045E-04	1.865E-04	9.504E-05	3.748E-04	1.412E-05	7.336E-05	4.173E-05	1.222E-05	3.383E-05	2.928E-04
SW	0.	0.	0.	1.428E-04	1.133E-03	3.407E-05	3.252E-03	1.300E-04	1.622E-05	3.362E-05	1.549E-05	2.291E-06
WSW	2.230E-03	4.715E-04	0.	0.	9.403E-04	2.289E-04	1.056E-02	3.342E-04	8.234E-05	1.311E-05	4.246E-06	3.111E-06
W	0.	0.	0.	0.	8.430E-04	2.230E-04	4.269E-04	1.156E-04	1.791E-04	1.210E-04	4.495E-06	3.320E-06
WNW	0.	0.	0.	0.	1.187E-04	1.842E-04	3.001E-04	1.824E-04	1.432E-05	1.200E-04	1.922E-06	1.466E-06
NW	0.	0.	0.	0.	1.842E-04	8.936E-05	5.682E-05	8.843E-05	5.586E-07	8.124E-05	1.775E-05	1.724E-06
NNW	3.174E-03	4.587E-04	0.	1.024E-04	3.865E-04	1.891E-04	9.522E-05	5.229E-05	4.688E-04	1.381E-04	6.248E-05	7.624E-05

TOTAL DOSE COMMITMENT IS 1.308E-01 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS CLOUD EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.251E-03	0.	0.	0.	1.064E-03	8.415E-04	3.709E-04	1.427E-04	7.657E-04	2.759E-04	2.196E-04	6.063E-05
NNE	0.	0.	0.	0.	6.004E-04	2.600E-04	4.571E-04	1.084E-04	2.442E-05	2.590E-04	3.074E-04	3.657E-05
NE	0.	0.	8.647E-04	0.	5.937E-04	3.378E-04	5.944E-04	2.157E-04	5.732E-06	1.500E-05	1.645E-04	4.730E-04
ENE	0.	0.	4.434E-04	0.	1.753E-04	1.185E-03	6.576E-04	3.325E-04	4.838E-05	1.214E-04	1.247E-04	0.
E	0.	0.	0.	0.	1.597E-03	6.834E-04	6.619E-04	2.044E-02	1.151E-03	7.614E-05	8.358E-05	8.762E-05
ESE	0.	0.	0.	7.405E-05	5.316E-04	2.184E-04	4.104E-04	2.430E-04	4.208E-04	1.922E-04	7.916E-06	4.700E-05
SE	0.	0.	9.621E-05	4.948E-05	3.560E-04	4.430E-05	1.339E-04	3.109E-04	2.562E-04	4.783E-05	1.831E-04	1.306E-03
SSE	0.	0.	9.356E-05	1.778E-04	1.579E-04	1.576E-04	8.666E-05	6.156E-05	3.848E-05	3.009E-05	1.746E-05	1.044E-04
S	0.	0.	0.	2.687E-04	2.012E-04	1.436E-03	8.380E-05	2.038E-04	1.579E-04	5.195E-06	1.266E-05	0.
SSW	0.	1.002E-03	1.374E-04	3.038E-04	2.254E-04	1.473E-03	8.454E-05	5.786E-04	3.923E-04	1.318E-04	4.169E-04	4.126E-03
SW	0.	0.	0.	3.141E-04	4.462E-03	2.800E-04	4.227E-02	2.158E-03	3.088E-04	7.015E-04	3.480E-04	5.470E-05
WSW	1.295E-03	4.027E-04	0.	0.	2.065E-03	8.837E-04	6.216E-02	2.580E-03	7.535E-04	1.373E-04	5.056E-05	4.211E-05
W	0.	0.	0.	0.	2.775E-03	1.201E-03	3.400E-03	1.191E-03	2.164E-03	1.660E-03	6.968E-05	5.811E-05
WNW	0.	0.	0.	0.	5.317E-04	1.505E-03	3.633E-03	2.797E-03	2.511E-04	2.330E-03	4.101E-05	3.419E-05
NW	0.	0.	0.	0.	4.750E-04	4.001E-04	3.747E-04	7.457E-04	5.489E-06	9.039E-04	2.229E-04	2.446E-05
NNW	1.374E-03	3.154E-04	0.	1.122E-04	5.933E-04	4.804E-04	3.648E-04	2.653E-04	2.848E-03	9.780E-04	5.182E-04	7.491E-04

TOTAL DOSE COMMITMENT IS 2.139E-01 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS VEG.ING.   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	5.339E-04	4.435E-04	3.760E-04	3.229E-04	1.111E-03	1.235E-03	7.966E-04	6.054E-04	5.153E-04	4.573E-04	4.120E-04	3.748E-04
NNE	9.370E-04	8.457E-04	7.283E-04	6.366E-04	2.272E-03	2.596E-03	1.682E-03	1.251E-03	1.029E-03	8.741E-04	7.460E-04	6.356E-04
NE	2.185E-03	2.501E-03	2.302E-03	2.069E-03	7.652E-03	8.996E-03	5.864E-03	4.334E-03	3.520E-03	2.948E-03	2.467E-03	2.047E-03
ENE	7.590E-03	6.589E-03	4.931E-03	3.977E-03	1.261E-02	1.304E-02	7.930E-03	5.635E-03	4.466E-03	3.689E-03	3.048E-03	2.491E-03
E	1.877E-02	6.857E-03	4.000E-03	2.772E-03	6.783E-03	5.336E-03	2.810E-03	1.881E-03	1.465E-03	1.203E-03	9.948E-04	8.182E-04
ESE	9.408E-03	2.297E-03	1.178E-03	7.987E-04	1.914E-03	1.528E-03	8.292E-04	5.666E-04	4.410E-04	3.613E-04	2.983E-04	2.451E-04
SE	2.659E-03	6.219E-04	3.666E-04	2.668E-04	7.249E-04	6.624E-04	3.809E-04	2.662E-04	2.104E-04	1.747E-04	1.457E-04	1.212E-04
SSE	9.804E-04	3.405E-04	1.949E-04	1.343E-04	3.281E-04	2.658E-04	1.478E-04	1.055E-04	8.583E-05	7.414E-05	6.541E-05	5.853E-05
S	5.863E-04	3.192E-04	2.233E-04	1.736E-04	5.166E-04	5.036E-04	3.037E-04	2.241E-04	1.884E-04	1.676E-04	1.521E-04	1.398E-04
SSW	4.140E-04	1.900E-04	1.374E-04	1.110E-04	3.462E-04	3.472E-04	2.157E-04	1.642E-04	1.424E-04	1.305E-04	1.223E-04	1.165E-04
SW	3.902E-04	2.521E-04	1.744E-04	1.330E-04	3.615E-04	3.095E-04	1.959E-04	1.652E-04	1.586E-04	1.601E-04	1.646E-04	1.707E-04
WSW	2.702E-04	2.434E-04	1.943E-04	1.602E-04	5.093E-04	5.151E-04	3.216E-04	2.465E-04	2.150E-04	1.975E-04	1.856E-04	1.770E-04
W	1.942E-04	1.803E-04	1.549E-04	1.334E-04	4.571E-04	5.013E-04	3.287E-04	2.615E-04	2.361E-04	2.237E-04	2.163E-04	2.120E-04
WNW	1.441E-04	1.071E-04	8.354E-05	6.676E-05	1.997E-04	1.966E-04	1.311E-04	1.101E-04	1.051E-04	1.046E-04	1.058E-04	1.081E-04
NW	1.543E-04	1.295E-04	1.061E-04	8.841E-05	2.863E-04	2.992E-04	1.944E-04	1.536E-04	1.368E-04	1.276E-04	1.211E-04	1.166E-04
NNW	2.746E-04	2.359E-04	2.006E-04	1.728E-04	5.994E-04	6.586E-04	4.119E-04	3.056E-04	2.576E-04	2.270E-04	2.031E-04	1.836E-04

TOTAL DOSE COMMITMENT IS 2.492E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS VEG.ING. EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.994E-03	5.846E-03	4.941E-03	4.228E-03	1.446E-02	1.615E-02	1.072E-02	8.480E-03	7.528E-03	6.981E-03	6.591E-03	6.298E-03
NNE	1.195E-02	1.080E-02	9.296E-03	8.117E-03	2.891E-02	3.309E-02	2.161E-02	1.627E-02	1.356E-02	1.171E-02	1.018E-02	8.884E-03
NE	2.778E-02	3.173E-02	2.918E-02	2.620E-02	9.682E-02	1.139E-01	7.446E-02	5.529E-02	4.515E-02	3.808E-02	3.213E-02	2.696E-02
ENE	9.598E-02	8.332E-02	6.235E-02	5.029E-02	1.594E-01	1.649E-01	1.006E-01	7.187E-02	5.730E-02	4.766E-02	3.974E-02	3.288E-02
E	2.367E-01	8.658E-02	5.052E-02	3.503E-02	8.577E-02	6.763E-02	3.583E-02	2.421E-02	1.905E-02	1.583E-02	1.331E-02	1.117E-02
ESE	1.186E-01	2.901E-02	1.488E-02	1.010E-02	2.422E-02	1.939E-02	1.060E-02	7.314E-03	5.757E-03	4.779E-03	4.012E-03	3.366E-03
SE	3.356E-02	7.876E-03	4.650E-03	3.386E-03	9.209E-03	8.452E-03	4.911E-03	3.481E-03	2.797E-03	2.367E-03	2.021E-03	1.732E-03
SSE	1.240E-02	4.327E-03	2.484E-03	1.715E-03	4.203E-03	3.441E-03	1.964E-03	1.452E-03	1.225E-03	1.100E-03	1.012E-03	9.472E-04
S	7.520E-03	4.140E-03	2.906E-03	2.260E-03	6.724E-03	6.626E-03	4.145E-03	3.213E-03	2.841E-03	2.656E-03	2.535E-03	2.455E-03
SSW	5.341E-03	2.508E-03	1.821E-03	1.469E-03	4.568E-03	4.638E-03	3.021E-03	2.445E-03	2.248E-03	2.176E-03	2.150E-03	2.150E-03
SW	5.142E-03	3.387E-03	2.363E-03	1.804E-03	4.919E-03	4.366E-03	3.025E-03	2.787E-03	2.863E-03	3.039E-03	3.249E-03	3.476E-03
WSW	3.586E-03	3.234E-03	2.580E-03	2.121E-03	6.712E-03	6.867E-03	4.494E-03	3.659E-03	3.380E-03	3.279E-03	3.244E-03	3.248E-03
W	2.680E-03	2.493E-03	2.124E-03	1.816E-03	6.138E-03	6.799E-03	4.724E-03	4.039E-03	3.889E-03	3.902E-03	3.975E-03	4.082E-03
WNW	1.949E-03	1.477E-03	1.153E-03	9.192E-04	2.736E-03	2.758E-03	1.993E-03	1.824E-03	1.861E-03	1.954E-03	2.067E-03	2.190E-03
NW	2.058E-03	1.739E-03	1.421E-03	1.180E-03	3.794E-03	4.011E-03	2.738E-03	2.302E-03	2.172E-03	2.137E-03	2.136E-03	2.156E-03
NNW	3.601E-03	3.108E-03	2.633E-03	2.260E-03	7.789E-03	8.603E-03	5.552E-03	4.308E-03	3.806E-03	3.521E-03	3.320E-03	3.170E-03

TOTAL DOSE COMMITMENT IS 3.220E+00 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION, SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.289E-05	3.544E-05	3.023E-05	2.613E-05	9.137E-05	1.037E-04	6.801E-05	5.261E-05	4.563E-05	4.130E-05	3.801E-05	3.537E-05
NNE	7.816E-05	7.065E-05	6.098E-05	5.343E-05	1.915E-04	2.200E-04	1.431E-04	1.069E-04	8.835E-05	7.555E-05	6.497E-05	5.587E-05
NE	1.840E-04	2.113E-04	1.949E-04	1.753E-04	6.497E-04	7.653E-04	4.995E-04	3.698E-04	3.009E-04	2.527E-04	2.121E-04	1.767E-04
ENE	6.450E-04	5.600E-04	4.190E-04	3.380E-04	1.072E-03	1.110E-03	6.758E-04	4.810E-04	3.820E-04	3.162E-04	2.621E-04	2.152E-04
E	1.601E-03	5.841E-04	3.404E-04	2.358E-04	5.768E-04	4.538E-04	2.392E-04	1.605E-04	1.254E-04	1.034E-04	8.600E-05	7.125E-05
ESE	8.027E-04	1.957E-04	1.002E-04	6.789E-05	1.625E-04	1.296E-04	7.039E-05	4.818E-05	3.762E-05	3.095E-05	2.570E-05	2.127E-05
SE	2.266E-04	5.275E-05	3.103E-05	2.256E-05	6.127E-05	5.600E-05	3.223E-05	2.259E-05	1.795E-05	1.500E-05	1.262E-05	1.062E-05
SSE	8.333E-05	2.874E-05	1.638E-05	1.127E-05	2.749E-05	2.234E-05	1.250E-05	9.026E-06	7.447E-06	6.539E-06	5.877E-06	5.366E-06
S	4.884E-05	2.617E-05	1.823E-05	1.418E-05	4.248E-05	4.201E-05	2.573E-05	1.936E-05	1.664E-05	1.516E-05	1.409E-05	1.329E-05
SSW	3.420E-05	1.518E-05	1.093E-05	8.864E-06	2.805E-05	2.887E-05	1.840E-05	1.440E-05	1.284E-05	1.210E-05	1.165E-05	1.138E-05
SW	3.123E-05	1.960E-05	1.341E-05	1.023E-05	2.820E-05	2.531E-05	1.698E-05	1.507E-05	1.508E-05	1.571E-05	1.655E-05	1.750E-05
WSW	2.139E-05	1.925E-05	1.541E-05	1.278E-05	4.131E-05	4.296E-05	2.754E-05	2.170E-05	1.945E-05	1.835E-05	1.768E-05	1.729E-05
W	1.442E-05	1.338E-05	1.167E-05	1.022E-05	3.628E-05	4.176E-05	2.847E-05	2.347E-05	2.189E-05	2.135E-05	2.120E-05	2.129E-05
WNW	1.106E-05	7.974E-06	6.233E-06	5.020E-06	1.548E-05	1.623E-05	1.148E-05	1.012E-05	1.003E-05	1.029E-05	1.068E-05	1.113E-05
NW	1.212E-05	1.007E-05	8.299E-06	6.973E-06	2.309E-05	2.499E-05	1.676E-05	1.365E-05	1.251E-05	1.198E-05	1.167E-05	1.150E-05
NNW	2.207E-05	1.888E-05	1.615E-05	1.402E-05	4.942E-05	5.548E-05	3.533E-05	2.673E-05	2.300E-05	2.071E-05	1.898E-05	1.759E-05

TOTAL DOSE COMMITMENT IS 2.123E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	5.719E-04	4.750E-04	4.048E-04	3.495E-04	1.221E-03	1.405E-03	9.577E-04	7.782E-04	7.089E-04	6.740E-04	6.520E-04	6.378E-04
NNE	1.027E-03	9.307E-04	8.035E-04	7.037E-04	2.523E-03	2.909E-03	1.912E-03	1.450E-03	1.219E-03	1.063E-03	9.357E-04	8.274E-04
NE	2.420E-03	2.777E-03	2.559E-03	2.302E-03	8.529E-03	1.006E-02	6.594E-03	4.911E-03	4.023E-03	3.407E-03	2.890E-03	2.440E-03
ENE	8.467E-03	7.350E-03	5.499E-03	4.436E-03	1.407E-02	1.458E-02	8.917E-03	6.385E-03	5.108E-03	4.267E-03	3.577E-03	2.980E-03
E	2.099E-02	7.661E-03	4.466E-03	3.095E-03	7.572E-03	5.974E-03	3.171E-03	2.152E-03	1.703E-03	1.425E-03	1.209E-03	1.026E-03
ESE	1.052E-02	2.566E-03	1.314E-03	8.911E-04	2.134E-03	1.708E-03	9.346E-04	6.471E-04	5.123E-04	4.283E-04	3.628E-04	3.079E-04
SE	2.972E-03	6.929E-04	4.079E-04	2.967E-04	8.064E-04	7.407E-04	4.315E-04	3.077E-04	2.494E-04	2.133E-04	1.846E-04	1.607E-04
SSE	1.094E-03	3.782E-04	2.160E-04	1.487E-04	3.638E-04	2.995E-04	1.731E-04	1.303E-04	1.124E-04	1.032E-04	9.718E-05	9.305E-05
S	6.456E-04	3.480E-04	2.430E-04	1.891E-04	5.678E-04	5.720E-04	3.671E-04	2.931E-04	2.670E-04	2.568E-04	2.519E-04	2.500E-04
SSW	4.535E-04	2.038E-04	1.471E-04	1.194E-04	3.785E-04	3.994E-04	2.706E-04	2.278E-04	2.168E-04	2.163E-04	2.194E-04	2.245E-04
SW	4.189E-04	2.659E-04	1.830E-04	1.399E-04	3.892E-04	3.704E-04	2.785E-04	2.724E-04	2.914E-04	3.180E-04	3.468E-04	3.765E-04
WSW	2.880E-04	2.595E-04	2.078E-04	1.722E-04	5.571E-04	5.937E-04	4.045E-04	3.423E-04	3.271E-04	3.266E-04	3.314E-04	3.392E-04
W	1.988E-04	1.847E-04	1.605E-04	1.400E-04	4.960E-04	5.881E-04	4.323E-04	3.872E-04	3.867E-04	3.993E-04	4.165E-04	4.360E-04
WNW	1.504E-04	1.099E-04	8.608E-05	6.934E-05	2.148E-04	2.368E-04	1.854E-04	1.795E-04	1.902E-04	2.052E-04	2.215E-04	2.383E-04
NW	1.635E-04	1.366E-04	1.124E-04	9.436E-05	3.126E-04	3.477E-04	2.488E-04	2.179E-04	2.128E-04	2.153E-04	2.205E-04	2.272E-04
NNW	2.948E-04	2.531E-04	2.163E-04	1.874E-04	6.600E-04	7.521E-04	4.994E-04	3.989E-04	3.623E-04	3.442E-04	3.329E-04	3.258E-04

TOTAL DOSE COMMITMENT IS 2.857E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MILK ING   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.178E-05	3.482E-05	2.936E-05	2.506E-05	8.497E-05	9.191E-05	5.721E-05	4.155E-05	3.358E-05	2.810E-05	2.362E-05	1.980E-05
NNE	7.109E-05	6.400E-05	5.498E-05	4.795E-05	1.704E-04	1.933E-04	1.241E-04	9.128E-05	7.404E-05	6.191E-05	5.177E-05	4.297E-05
NE	1.641E-04	1.872E-04	1.721E-04	1.545E-04	5.703E-04	6.687E-04	4.344E-04	3.198E-04	2.583E-04	2.150E-04	1.785E-04	1.465E-04
ENE	5.652E-04	4.907E-04	3.672E-04	2.961E-04	9.384E-04	9.684E-04	5.874E-04	4.157E-04	3.277E-04	2.689E-04	2.202E-04	1.779E-04
E	1.393E-03	5.095E-04	2.978E-04	2.062E-04	5.047E-04	3.966E-04	2.080E-04	1.383E-04	1.067E-04	8.652E-05	7.049E-05	5.680E-05
ESE	6.979E-04	1.707E-04	8.763E-05	5.946E-05	1.426E-04	1.137E-04	6.151E-05	4.175E-05	3.219E-05	2.606E-05	2.118E-05	1.703E-05
SE	1.975E-04	4.639E-05	2.740E-05	1.995E-05	5.422E-05	4.944E-05	2.825E-05	1.953E-05	1.521E-05	1.240E-05	1.010E-05	8.137E-06
SSE	7.299E-05	2.551E-05	1.465E-05	1.011E-05	2.470E-05	1.985E-05	1.081E-05	7.472E-06	5.838E-06	4.812E-06	4.015E-06	3.362E-06
S	4.443E-05	2.452E-05	1.721E-05	1.337E-05	3.950E-05	3.765E-05	2.186E-05	1.530E-05	1.209E-05	1.002E-05	8.367E-06	6.991E-06
SSW	3.160E-05	1.491E-05	1.082E-05	8.707E-06	2.676E-05	2.587E-05	1.518E-05	1.073E-05	8.558E-06	7.169E-06	6.086E-06	5.195E-06
SW	3.057E-05	2.021E-05	1.409E-05	1.073E-05	2.871E-05	2.290E-05	1.272E-05	9.248E-06	7.714E-06	6.845E-06	6.254E-06	5.833E-06
WSW	2.136E-05	1.925E-05	1.533E-05	1.257E-05	3.932E-05	3.826E-05	2.255E-05	1.605E-05	1.290E-05	1.086E-05	9.267E-06	7.959E-06
W	1.611E-05	1.497E-05	1.270E-05	1.080E-05	3.585E-05	3.698E-05	2.234E-05	1.610E-05	1.310E-05	1.115E-05	9.627E-06	8.376E-06
WNW	1.168E-05	8.867E-06	6.899E-06	5.476E-06	1.592E-05	1.441E-05	8.480E-06	6.190E-06	5.167E-06	4.528E-06	4.047E-06	3.667E-06
NW	1.229E-05	1.038E-05	8.461E-06	7.001E-06	2.220E-05	2.212E-05	1.344E-05	9.801E-06	8.010E-06	6.817E-06	5.864E-06	5.074E-06
NNW	2.146E-05	1.849E-05	1.563E-05	1.339E-05	4.572E-05	4.882E-05	2.936E-05	2.070E-05	1.646E-05	1.356E-05	1.119E-05	9.173E-06

TOTAL DOSE COMMITMENT IS 1.831E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.718E-04	3.973E-04	3.322E-04	2.808E-04	9.323E-04	9.894E-04	6.195E-04	4.578E-04	3.777E-04	3.240E-04	2.810E-04	2.448E-04
NNE	7.545E-04	6.791E-04	5.814E-04	5.053E-04	1.783E-03	2.013E-03	1.295E-03	9.572E-04	7.808E-04	6.574E-04	5.545E-04	4.656E-04
NE	1.718E-03	1.948E-03	1.785E-03	1.599E-03	5.885E-03	6.886E-03	4.478E-03	3.303E-03	2.674E-03	2.232E-03	1.860E-03	1.534E-03
ENE	5.823E-03	5.054E-03	3.784E-03	3.051E-03	9.657E-03	9.957E-03	6.048E-03	4.290E-03	3.391E-03	2.791E-03	2.295E-03	1.864E-03
E	1.425E-02	5.727E-03	3.056E-03	2.120E-03	5.195E-03	4.089E-03	2.153E-03	1.439E-03	1.116E-03	9.106E-04	7.475E-04	6.083E-04
ESE	7.135E-03	1.752E-03	9.014E-04	6.124E-04	1.472E-03	1.178E-03	6.407E-04	4.375E-04	3.394E-04	2.766E-04	2.267E-04	1.843E-04
SE	2.023E-03	4.797E-04	2.845E-04	2.074E-04	5.647E-04	5.167E-04	2.976E-04	2.076E-04	1.631E-04	1.342E-04	1.106E-04	9.060E-05
SSE	7.518E-04	2.662E-04	1.540E-04	1.067E-04	2.619E-04	2.116E-04	1.170E-04	8.245E-05	6.572E-05	5.535E-05	4.739E-05	4.095E-05
S	4.743E-04	2.691E-04	1.903E-04	1.477E-04	4.335E-04	4.106E-04	2.421E-04	1.739E-04	1.412E-04	1.208E-04	1.048E-04	9.176E-05
SSW	3.426E-04	1.704E-04	1.245E-04	9.974E-05	3.015E-04	2.869E-04	1.709E-04	1.247E-04	1.030E-04	8.971E-05	7.976E-05	7.186E-05
SW	3.482E-04	2.398E-04	1.698E-04	1.293E-04	3.432E-04	2.711E-04	1.559E-04	1.199E-04	1.059E-04	9.935E-05	9.596E-05	9.443E-05
WSW	2.471E-04	2.232E-04	1.771E-04	1.442E-04	4.421E-04	4.221E-04	2.522E-04	1.851E-04	1.540E-04	1.348E-04	1.203E-04	1.089E-04
W	2.018E-04	1.879E-04	1.568E-04	1.310E-04	4.178E-04	4.149E-04	2.538E-04	1.898E-04	1.613E-04	1.441E-04	1.315E-04	1.218E-04
WNW	1.407E-04	1.108E-04	8.615E-05	6.792E-05	1.924E-04	1.683E-04	1.010E-04	7.760E-05	6.839E-05	6.351E-05	6.041E-05	5.840E-05
NW	1.437E-04	1.231E-04	9.962E-05	8.162E-05	2.523E-04	2.449E-04	1.504E-04	1.129E-04	9.545E-05	8.450E-05	7.616E-05	6.955E-05
NNW	2.424E-04	2.106E-04	1.765E-04	1.496E-04	4.996E-04	5.230E-04	3.167E-04	2.277E-04	1.854E-04	1.573E-04	1.348E-04	1.160E-04

TOTAL DOSE COMMITMENT IS 1.917E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION, SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

SUMMARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	8.611E-02	2.177E+00	4.886E+00	1.271E-01	6.715E-01	1.333E+01
GROUND	1.308E-01	1.308E-01	1.308E-01	1.308E-01	1.308E-01	1.308E-01
CLOUD	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01
VEG.ING.	2.492E-01	3.220E+00	2.492E-01	3.610E-01	1.134E+00	2.492E-01
MEAT ING	2.123E-02	2.857E-01	2.123E-02	3.995E-02	1.211E-01	2.123E-02
MILK ING	1.831E-02	1.917E-01	1.831E-02	6.780E-03	2.340E-02	1.831E-02
RNPLUS50	0.	0.	0.	0.	0.	0.
TOTALS	7.197E-01	6.220E+00	5.519E+00	8.796E-01	2.295E+00	1.397E+01

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.	0.	0.	0.	0.	0.
GROUND	0.	0.	0.	0.	0.	0.
CLOUD	0.	0.	0.	0.	0.	0.
VEG.ING.	0.	0.	0.	0.	0.	0.
MEAT ING	0.	0.	0.	0.	0.	0.
MILK ING	0.	0.	0.	0.	0.	0.
RNPLUS50	1.848E+00	2.479E+01	4.056E-01	1.848E+00	1.848E+00	1.172E+01
TOTALS	1.848E+00	2.479E+01	4.056E-01	1.848E+00	1.848E+00	1.172E+01

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	8.611E-02	2.177E+00	4.886E+00	1.271E-01	6.715E-01	1.333E+01
GROUND	1.308E-01	1.308E-01	1.308E-01	1.308E-01	1.308E-01	1.308E-01
CLOUD	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01
VEG.ING.	2.492E-01	3.220E+00	2.492E-01	3.610E-01	1.134E+00	2.492E-01
MEAT ING	2.123E-02	2.857E-01	2.123E-02	3.995E-02	1.211E-01	2.123E-02
MILK ING	1.831E-02	1.917E-01	1.831E-02	6.780E-03	2.340E-02	1.831E-02
RNPLUS50	1.848E+00	2.479E+01	4.056E-01	1.848E+00	1.848E+00	1.172E+01
TOTALS	2.567E+00	3.101E+01	5.925E+00	2.727E+00	4.142E+00	2.568E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
1	NORTH BOUNDARY	1	1.940E-02	5.286E-05	1.746E-05	1.474E-06	1.822E+04	4.967E+01	1.639E+01	1.639E+01
1	NORTH BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
1	NORTH BOUNDARY	3	8.260E-05	4.083E-04	1.641E-04	2.196E-04	7.761E+01	3.837E+02	1.540E+02	1.540E+02
1	NORTH BOUNDARY	4	1.392E-04	6.213E-04	2.495E-04	3.338E-04	1.153E+03	5.149E+03	2.066E+03	2.066E+03
	CONCENTRATION TOTALS		1.962E-02	1.082E-03	4.311E-04	5.549E-04	1.946E+04	5.582E+03	2.236E+03	2.236E+03
2	NORTHEAST BOUNDARY	1	4.212E-03	1.144E-05	3.778E-06	3.187E-07	3.958E+03	1.075E+01	3.547E+00	3.547E+00
2	NORTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
2	NORTHEAST BOUNDARY	3	7.532E-04	6.405E-03	2.575E-03	3.450E-03	7.077E+02	6.019E+03	2.417E+03	2.417E+03
2	NORTHEAST BOUNDARY	4	1.233E-03	1.049E-02	4.215E-03	5.647E-03	1.022E+04	8.690E+04	3.490E+04	3.490E+04
	CONCENTRATION TOTALS		6.198E-03	1.690E-02	6.794E-03	9.098E-03	1.488E+04	9.293E+04	3.732E+04	3.732E+04
3	SOUTHEAST BOUNDARY	1	3.707E-04	9.924E-07	3.284E-07	2.758E-08	3.484E+02	9.325E-01	3.082E-01	3.082E-01
3	SOUTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
3	SOUTHEAST BOUNDARY	3	3.664E-05	3.151E-04	1.266E-04	1.696E-04	3.443E+01	2.961E+02	1.189E+02	1.189E+02
3	SOUTHEAST BOUNDARY	4	5.206E-05	4.486E-04	1.803E-04	2.415E-04	4.314E+02	3.718E+03	1.493E+03	1.493E+03
	CONCENTRATION TOTALS		4.594E-04	7.646E-04	3.073E-04	4.112E-04	8.142E+02	4.015E+03	1.612E+03	1.612E+03
4	SOUTHWEST BOUNDARY	1	1.754E-03	4.771E-06	1.576E-06	1.330E-07	1.648E+03	4.483E+00	1.479E+00	1.479E+00
4	SOUTHWEST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
4	SOUTHWEST BOUNDARY	3	1.728E-05	1.455E-04	5.846E-05	7.829E-05	1.624E+01	1.367E+02	5.488E+01	5.488E+01
4	SOUTHWEST BOUNDARY	4	2.306E-05	1.933E-04	7.767E-05	1.040E-04	1.911E+02	1.602E+03	6.430E+02	6.430E+02
	CONCENTRATION TOTALS		1.795E-03	3.436E-04	1.377E-04	1.824E-04	1.856E+03	1.743E+03	6.994E+02	6.994E+02
5	NEAREST RESIDENT	1	2.313E-02	6.193E-05	2.049E-05	1.722E-06	2.173E+04	5.819E+01	1.923E+01	1.923E+01
5	NEAREST RESIDENT	2	0.	0.	0.	0.	0.	0.	0.	0.
5	NEAREST RESIDENT	3	4.994E-05	3.098E-04	1.238E-04	1.640E-04	4.692E+01	2.911E+02	1.162E+02	1.162E+02
5	NEAREST RESIDENT	4	7.418E-05	4.439E-04	1.772E-04	2.342E-04	6.147E+02	3.679E+03	1.467E+03	1.467E+03
	CONCENTRATION TOTALS		2.325E-02	8.156E-04	3.216E-04	3.999E-04	2.239E+04	4.028E+03	1.603E+03	1.603E+03
6	ENV MONITOR STA A	1	1.013E-02	2.715E-05	8.981E-06	7.546E-07	9.521E+03	2.551E+01	8.430E+00	8.430E+00
6	ENV MONITOR STA A	2	0.	0.	0.	0.	0.	0.	0.	0.
6	ENV MONITOR STA A	3	5.863E-05	3.835E-04	1.518E-04	1.967E-04	5.509E+01	3.603E+02	1.424E+02	1.424E+02
6	ENV MONITOR STA A	4	8.669E-05	5.568E-04	2.197E-04	2.830E-04	7.185E+02	4.614E+03	1.819E+03	1.819E+03
	CONCENTRATION TOTALS		1.028E-02	9.674E-04	3.804E-04	4.804E-04	1.029E+04	5.000E+03	1.970E+03	1.970E+03
7	NEAREST DOWNWIND RES	1	1.180E-03	3.116E-06	1.033E-06	8.641E-08	1.109E+03	2.928E+00	9.693E-01	9.693E-01
7	NEAREST DOWNWIND RES	2	0.	0.	0.	0.	0.	0.	0.	0.
7	NEAREST DOWNWIND RES	3	6.436E-05	5.099E-04	2.047E-04	2.735E-04	6.048E+01	4.791E+02	1.921E+02	1.921E+02
7	NEAREST DOWNWIND RES	4	7.879E-05	6.234E-04	2.501E-04	3.336E-04	6.530E+02	5.167E+03	2.070E+03	2.070E+03
	CONCENTRATION TOTALS		1.324E-03	1.136E-03	4.558E-04	6.072E-04	1.823E+03	5.649E+03	2.264E+03	2.264E+03
8	NEAREST COMMUNITY	1	5.515E-05	1.469E-07	4.863E-08	4.080E-09	5.182E+01	1.380E-01	4.565E-02	4.565E-02
8	NEAREST COMMUNITY	2	0.	0.	0.	0.	0.	0.	0.	0.
8	NEAREST COMMUNITY	3	1.790E-06	1.486E-05	5.968E-06	7.985E-06	1.682E+00	1.396E+01	5.602E+00	5.602E+00
8	NEAREST COMMUNITY	4	1.578E-06	1.312E-05	5.265E-06	7.029E-06	1.308E+01	1.087E+02	4.359E+01	4.359E+01
	CONCENTRATION TOTALS		5.851E-05	2.812E-05	1.128E-05	1.502E-05	6.658E+01	1.228E+02	4.923E+01	4.923E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
9	NEAREST DOWNWIND COM	1	1.692E-05	4.520E-08	1.496E-08	1.256E-09	1.590E+01	4.247E-02	1.404E-02	1.404E-02
9	NEAREST DOWNWIND COM	2	0.	0.	0.	0.	0.	0.	0.	0.
9	NEAREST DOWNWIND COM	3	1.696E-06	1.394E-05	5.597E-06	7.482E-06	1.594E+00	1.310E+01	5.254E+00	5.254E+00
9	NEAREST DOWNWIND COM	4	8.734E-07	7.052E-06	2.828E-06	3.771E-06	7.238E+00	5.845E+01	2.342E+01	2.342E+01
	CONCENTRATION TOTALS		1.949E-05	2.104E-05	8.441E-06	1.125E-05	2.474E+01	7.159E+01	2.868E+01	2.868E+01
10	NEAREST GRAZING AREA	1	9.864E-04	2.644E-06	8.747E-07	7.350E-08	9.269E+02	2.484E+00	8.210E-01	8.210E-01
10	NEAREST GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
10	NEAREST GRAZING AREA	3	8.056E-04	7.058E-03	2.837E-03	3.801E-03	7.570E+02	6.631E+03	2.663E+03	2.663E+03
10	NEAREST GRAZING AREA	4	1.627E-03	1.424E-02	5.726E-03	7.672E-03	1.348E+04	1.180E+05	4.741E+04	4.741E+04
	CONCENTRATION TOTALS		3.419E-03	2.130E-02	8.564E-03	1.147E-02	1.517E+04	1.247E+05	5.007E+04	5.007E+04
11	GALLUP	1	1.175E-05	3.132E-08	1.037E-08	8.700E-10	1.104E+01	2.943E-02	9.732E-03	9.732E-03
11	GALLUP	2	0.	0.	0.	0.	0.	0.	0.	0.
11	GALLUP	3	1.335E-07	1.097E-06	4.404E-07	5.886E-07	1.254E-01	1.031E+00	4.134E-01	4.134E-01
11	GALLUP	4	5.335E-08	4.380E-07	1.756E-07	2.339E-07	4.421E-01	3.630E+00	1.454E+00	1.454E+00
	CONCENTRATION TOTALS		1.193E-05	1.566E-06	6.264E-07	8.234E-07	1.161E+01	4.690E+00	1.877E+00	1.877E+00
12	SPRINGSTEAD TR. PARK	1	1.432E-04	3.853E-07	1.274E-07	1.072E-08	1.346E+02	3.620E-01	1.196E-01	1.196E-01
12	SPRINGSTEAD TR. PARK	2	0.	0.	0.	0.	0.	0.	0.	0.
12	SPRINGSTEAD TR. PARK	3	3.986E-07	3.256E-06	1.308E-06	1.748E-06	3.745E-01	3.059E+00	1.227E+00	1.227E+00
12	SPRINGSTEAD TR. PARK	4	3.913E-07	3.160E-06	1.267E-06	1.690E-06	3.243E+00	2.619E+01	1.049E+01	1.049E+01
	CONCENTRATION TOTALS		1.440E-04	6.802E-06	2.702E-06	3.449E-06	1.382E+02	2.961E+01	1.184E+01	1.184E+01
13	NAVAJO GRAZING AREA	1	7.156E-03	1.944E-05	6.422E-06	5.417E-07	6.724E+03	1.827E+01	6.028E+00	6.028E+00
13	NAVAJO GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
13	NAVAJO GRAZING AREA	3	1.235E-04	7.559E-04	3.034E-04	4.051E-04	1.160E+02	7.103E+02	2.848E+02	2.848E+02
13	NAVAJO GRAZING AREA	4	1.838E-04	1.095E-03	4.390E-04	5.849E-04	1.523E+03	9.076E+03	3.635E+03	3.635E+03
	CONCENTRATION TOTALS		7.464E-03	1.871E-03	7.488E-04	9.906E-04	8.364E+03	9.804E+03	3.925E+03	3.925E+03
14	NEXT NEAREST RESIDEN	1	1.071E-02	2.857E-05	9.458E-06	7.937E-07	1.007E+04	2.685E+01	8.878E+00	8.878E+00
14	NEXT NEAREST RESIDEN	2	0.	0.	0.	0.	0.	0.	0.	0.
14	NEXT NEAREST RESIDEN	3	2.459E-05	1.848E-04	7.304E-05	9.841E-05	2.311E+01	1.737E+02	6.856E+01	6.856E+01
14	NEXT NEAREST RESIDEN	4	3.705E-05	2.782E-04	1.089E-04	1.378E-04	3.071E+02	2.306E+03	9.014E+02	9.014E+02
	CONCENTRATION TOTALS		1.078E-02	4.916E-04	1.914E-04	2.330E-04	1.040E+04	2.506E+03	9.789E+02	9.789E+02

REGION=UNC MILL RUN 7 CODE=MILDOS.REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 27

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR RADON AND RADON DAUGHTER CONCENTRATIONS

NO.	AIRBORNE CONCENTRATIONS, PCI/M3 RN-222	PO-218	PB-214	BI-214	PB-210	BI-210	PO-210	WL	GROUND CONCENTRATIONS, PCI/M2 PO-218	PB-214	BI-214	PB-210
1	7.288E+02	4.141E+02	2.536E+01	1.763E+00	3.310E-07	1.347E-10	1.773E-15	5.617E-04	3.280E+02	3.280E+02	3.280E+02	1.403E-01
2	3.833E+01	3.478E+01	1.096E+01	3.088E+00	1.392E-06	7.808E-10	1.300E-14	1.029E-04	2.755E+01	2.755E+01	2.755E+01	5.904E-01
3	3.999E+00	3.853E+00	1.831E+00	7.746E-01	6.077E-07	5.774E-10	1.596E-14	1.614E-05	3.052E+00	3.052E+00	3.052E+00	2.576E-01
4	1.332E+01	1.301E+01	6.302E+00	2.659E+00	2.018E-06	1.819E-09	4.711E-14	5.527E-05	1.031E+01	1.031E+01	1.031E+01	8.555E-01
5	1.081E+02	9.629E+01	1.941E+01	3.398E+00	9.732E-07	4.308E-10	6.826E-15	2.102E-04	7.626E+01	7.626E+01	7.626E+01	4.126E-01
6	7.934E+01	7.358E+01	1.983E+01	4.498E+00	1.597E-06	7.833E-10	1.299E-14	1.931E-04	5.828E+01	5.828E+01	5.828E+01	6.771E-01
7	6.080E+00	5.995E+00	4.422E+00	3.164E+00	6.221E-06	1.314E-08	7.608E-13	4.040E-05	4.748E+00	4.748E+00	4.748E+00	2.638E+00
8	2.804E-01	2.804E-01	2.570E-01	2.378E-01	1.522E-06	9.192E-09	1.438E-12	2.479E-06	2.221E-01	2.221E-01	2.221E-01	6.452E-01
9	2.251E-01	2.252E-01	2.247E-01	2.231E-01	8.562E-06	2.829E-07	2.348E-10	2.204E-06	1.784E-01	1.784E-01	1.784E-01	3.630E+00
10	3.460E+01	2.361E+01	3.514E+00	5.463E-01	1.323E-07	4.235E-11	3.603E-16	4.817E-05	1.870E+01	1.870E+01	1.870E+01	5.611E-02
11	3.555E-01	3.558E-01	3.565E-01	3.560E-01	1.105E-05	2.873E-07	1.863E-10	3.502E-06	2.818E-01	2.818E-01	2.818E-01	4.684E+00
12	5.783E-01	5.787E-01	5.631E-01	5.450E-01	5.442E-06	4.863E-08	1.102E-11	5.484E-06	4.583E-01	4.583E-01	4.583E-01	2.307E+00
13	4.108E+01	3.785E+01	1.264E+01	3.593E+00	1.601E-06	9.028E-10	1.571E-14	1.165E-04	2.998E+01	2.998E+01	2.998E+01	6.786E-01
14	2.289E+01	2.235E+01	1.076E+01	4.359E+00	3.076E-06	2.643E-09	6.798E-14	9.381E-05	1.770E+01	1.770E+01	1.770E+01	1.304E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	0.
INFANT	GROUND	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02
INFANT	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	9.58E-01	1.03E+01	9.58E-01	2.96E-01	1.81E+00	9.58E-01
INFANT	TOTALS	1.54E+00	2.04E+01	4.74E+01	5.61E-01	4.36E+00	1.03E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	0.
CHILD	GROUND	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02
CHILD	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
CHILD	VEG.ING.	7.01E-01	9.07E+00	7.01E-01	8.10E-01	2.90E+00	7.01E-01
CHILD	MEAT ING	1.04E-01	1.36E+00	1.04E-01	1.68E-01	5.54E-01	1.04E-01
CHILD	MILK ING	7.62E-01	8.66E+00	7.62E-01	2.14E-01	1.20E+00	7.62E-01
CHILD	TOTALS	2.15E+00	2.92E+01	4.80E+01	1.46E+00	7.21E+00	1.63E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	0.
TEENAGER	GROUND	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02
TEENAGER	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
TEENAGER	VEG.ING.	5.10E-01	6.74E+00	5.10E-01	6.04E-01	2.29E+00	5.10E-01
TEENAGER	MEAT ING	7.37E-02	9.85E-01	7.37E-02	1.22E-01	4.25E-01	7.37E-02
TEENAGER	MILK ING	4.09E-01	4.71E+00	4.09E-01	1.13E-01	6.74E-01	4.09E-01
TEENAGER	TOTALS	1.57E+00	2.25E+01	4.74E+01	1.10E+00	5.95E+00	1.06E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	0.
ADULT	GROUND	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02	6.81E-02
ADULT	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
ADULT	VEG.ING.	6.07E-01	8.08E+00	6.07E-01	6.61E-01	2.28E+00	6.07E-01
ADULT	MEAT ING	1.11E-01	1.50E+00	1.11E-01	1.68E-01	5.31E-01	1.11E-01
ADULT	MILK ING	1.89E-01	2.16E+00	1.89E-01	4.69E-02	2.52E-01	1.89E-01
ADULT	TOTALS	1.49E+00	2.18E+01	4.73E+01	1.14E+00	5.62E+00	9.75E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	4.55E+02
INFANT	GROUND	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01
INFANT	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	9.58E-01	1.03E+01	9.58E-01	2.96E-01	1.81E+00	9.58E-01
INFANT	TOTALS	2.05E+00	2.09E+01	4.79E+01	1.07E+00	4.87E+00	4.57E+02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	4.55E+02
CHILD	GROUND	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01
CHILD	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
CHILD	VEG.ING.	7.01E-01	9.07E+00	7.01E-01	8.10E-01	2.90E+00	7.01E-01
CHILD	MEAT ING	1.04E-01	1.36E+00	1.04E-01	1.68E-01	5.54E-01	1.04E-01
CHILD	MILK ING	7.62E-01	8.66E+00	7.62E-01	2.14E-01	1.20E+00	7.62E-01
CHILD	TOTALS	2.66E+00	2.97E+01	4.85E+01	1.97E+00	7.72E+00	4.58E+02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	4.55E+02
TEENAGER	GROUND	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01
TEENAGER	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
TEENAGER	VEG.ING.	5.10E-01	6.74E+00	5.10E-01	6.04E-01	2.29E+00	5.10E-01
TEENAGER	MEAT ING	7.37E-02	9.85E-01	7.37E-02	1.22E-01	4.25E-01	7.37E-02
TEENAGER	MILK ING	4.09E-01	4.71E+00	4.09E-01	1.13E-01	6.74E-01	4.09E-01
TEENAGER	TOTALS	2.09E+00	2.30E+01	4.79E+01	1.62E+00	6.46E+00	4.57E+02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.12E-01	1.00E+01	4.64E+01	1.97E-01	2.48E+00	4.55E+02
ADULT	GROUND	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01	5.27E-01
ADULT	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
ADULT	VEG.ING.	6.07E-01	8.08E+00	6.07E-01	6.61E-01	2.28E+00	6.07E-01
ADULT	MEAT ING	1.11E-01	1.50E+00	1.11E-01	1.68E-01	5.31E-01	1.11E-01
ADULT	MILK ING	1.89E-01	2.16E+00	1.89E-01	4.69E-02	2.52E-01	1.89E-01
ADULT	TOTALS	2.00E+00	2.23E+01	4.79E+01	1.65E+00	6.13E+00	4.57E+02

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	0.
INFANT	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
INFANT	CLOUD	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.06E+01	1.02E+02	1.06E+01	4.98E+00	1.52E+01	1.06E+01
INFANT	TOTALS	1.25E+01	1.52E+02	4.92E+01	8.14E+00	2.95E+01	1.08E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	0.
CHILD	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
CHILD	CLOUD	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06
CHILD	VEG.ING.	9.38E+00	1.13E+02	9.38E+00	1.36E+01	4.24E+01	9.38E+00
CHILD	MEAT ING	1.51E+00	1.89E+01	1.51E+00	2.83E+00	8.69E+00	1.51E+00
CHILD	MILK ING	9.59E+00	9.30E+01	9.59E+00	3.60E+00	1.17E+01	9.59E+00
CHILD	TOTALS	2.23E+01	2.76E+02	5.91E+01	2.32E+01	7.71E+01	2.07E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	0.
TEENAGER	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
TEENAGER	CLOUD	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06
TEENAGER	VEG.ING.	7.23E+00	9.15E+01	7.23E+00	1.02E+01	3.35E+01	7.23E+00
TEENAGER	MEAT ING	1.11E+00	1.44E+01	1.11E+00	2.05E+00	6.66E+00	1.11E+00
TEENAGER	MILK ING	5.59E+00	5.83E+01	5.59E+00	1.90E+00	6.52E+00	5.59E+00
TEENAGER	TOTALS	1.58E+01	2.15E+02	5.25E+01	1.73E+01	6.10E+01	1.41E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	0.
ADULT	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
ADULT	CLOUD	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06	1.06E-06
ADULT	VEG.ING.	8.90E+00	1.15E+02	8.90E+00	1.11E+01	3.35E+01	8.90E+00
ADULT	MEAT ING	1.71E+00	2.26E+01	1.71E+00	2.83E+00	8.33E+00	1.71E+00
ADULT	MILK ING	2.69E+00	2.85E+01	2.69E+00	7.89E-01	2.46E+00	2.69E+00
ADULT	TOTALS	1.51E+01	2.16E+02	5.19E+01	1.79E+01	5.86E+01	1.35E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	2.40E+01
INFANT	GROUND	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00
INFANT	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.06E+01	1.02E+02	1.06E+01	4.98E+00	1.52E+01	1.06E+01
INFANT	TOTALS	1.92E+01	1.59E+02	5.59E+01	1.49E+01	3.62E+01	4.15E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	2.40E+01
CHILD	GROUND	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00
CHILD	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
CHILD	VEG.ING.	9.38E+00	1.13E+02	9.38E+00	1.36E+01	4.24E+01	9.38E+00
CHILD	MEAT ING	1.51E+00	1.89E+01	1.51E+00	2.83E+00	8.69E+00	1.51E+00
CHILD	MILK ING	9.59E+00	9.30E+01	9.59E+00	3.60E+00	1.17E+01	9.59E+00
CHILD	TOTALS	2.91E+01	2.83E+02	6.58E+01	2.99E+01	8.38E+01	5.13E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	2.40E+01
TEENAGER	GROUND	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00
TEENAGER	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
TEENAGER	VEG.ING.	7.23E+00	9.15E+01	7.23E+00	1.02E+01	3.35E+01	7.23E+00
TEENAGER	MEAT ING	1.11E+00	1.44E+01	1.11E+00	2.05E+00	6.66E+00	1.11E+00
TEENAGER	MILK ING	5.59E+00	5.83E+01	5.59E+00	1.90E+00	6.52E+00	5.59E+00
TEENAGER	TOTALS	2.25E+01	2.21E+02	5.92E+01	2.40E+01	6.77E+01	4.48E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.66E+00	5.03E+01	3.84E+01	2.97E+00	1.41E+01	2.40E+01
ADULT	GROUND	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00	6.87E+00
ADULT	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
ADULT	VEG.ING.	8.90E+00	1.15E+02	8.90E+00	1.11E+01	3.35E+01	8.90E+00
ADULT	MEAT ING	1.71E+00	2.26E+01	1.71E+00	2.83E+00	8.33E+00	1.71E+00
ADULT	MILK ING	2.69E+00	2.85E+01	2.69E+00	7.89E-01	2.46E+00	2.69E+00
ADULT	TOTALS	2.19E+01	2.23E+02	5.86E+01	2.46E+01	6.53E+01	4.42E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS TS... 5.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.62E-01	0.
INFANT	GROUND	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03
INFANT	CLOUD	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.61E-01	4.43E+00	4.61E-01	2.15E-01	6.67E-01	4.61E-01
INFANT	TOTALS	5.50E-01	6.82E+00	2.68E+00	3.60E-01	1.34E+00	4.70E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.62E-01	0.
CHILD	GROUND	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03
CHILD	CLOUD	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08
CHILD	VEG.ING.	4.06E-01	4.92E+00	4.06E-01	5.88E-01	1.84E+00	4.06E-01
CHILD	MEAT ING	6.52E-02	8.20E-01	6.52E-02	1.22E-01	3.76E-01	6.52E-02
CHILD	MILK ING	4.16E-01	4.04E+00	4.16E-01	1.56E-01	5.11E-01	4.16E-01
CHILD	TOTALS	9.76E-01	1.22E+01	3.10E+00	1.01E+00	3.39E+00	8.96E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.62E-01	0.
TEENAGER	GROUND	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03
TEENAGER	CLOUD	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08
TEENAGER	VEG.ING.	3.13E-01	3.96E+00	3.13E-01	4.38E-01	1.45E+00	3.13E-01
TEENAGER	MEAT ING	4.78E-02	6.24E-01	4.78E-02	8.86E-02	2.88E-01	4.78E-02
TEENAGER	MILK ING	2.42E-01	2.53E+00	2.42E-01	8.19E-02	2.84E-01	2.42E-01
TEENAGER	TOTALS	6.92E-01	9.51E+00	2.82E+00	7.54E-01	2.69E+00	6.12E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.62E-01	0.
ADULT	GROUND	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03	8.79E-03
ADULT	CLOUD	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08	6.62E-08
ADULT	VEG.ING.	3.85E-01	4.96E+00	3.85E-01	4.80E-01	1.45E+00	3.85E-01
ADULT	MEAT ING	7.38E-02	9.79E-01	7.38E-02	1.22E-01	3.60E-01	7.38E-02
ADULT	MILK ING	1.17E-01	1.24E+00	1.17E-01	3.41E-02	1.07E-01	1.17E-01
ADULT	TOTALS	6.64E-01	9.56E+00	2.79E+00	7.81E-01	2.59E+00	5.84E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.63E-01	2.50E+00
INFANT	GROUND	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01
INFANT	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.61E-01	4.43E+00	4.61E-01	2.15E-01	6.67E-01	4.61E-01
INFANT	TOTALS	8.49E-01	7.12E+00	2.97E+00	6.59E-01	1.64E+00	3.27E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.63E-01	2.50E+00
CHILD	GROUND	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01
CHILD	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
CHILD	VEG.ING.	4.06E-01	4.92E+00	4.06E-01	5.88E-01	1.84E+00	4.06E-01
CHILD	MEAT ING	6.52E-02	8.20E-01	6.52E-02	1.22E-01	3.76E-01	6.52E-02
CHILD	MILK ING	4.16E-01	4.00E+00	4.16E-01	1.56E-01	5.11E-01	4.16E-01
CHILD	TOTALS	1.28E+00	1.25E+01	3.40E+00	1.31E+00	3.69E+00	3.69E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.63E-01	2.50E+00
TEENAGER	GROUND	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01
TEENAGER	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
TEENAGER	VEG.ING.	3.13E-01	3.96E+00	3.13E-01	4.38E-01	1.45E+00	3.13E-01
TEENAGER	MEAT ING	4.78E-02	6.24E-01	4.78E-02	8.86E-02	2.88E-01	4.78E-02
TEENAGER	MILK ING	2.42E-01	2.53E+00	2.42E-01	8.19E-02	2.84E-01	2.42E-01
TEENAGER	TOTALS	9.91E-01	9.80E+00	3.12E+00	1.05E+00	2.99E+00	3.41E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.01E-02	2.38E+00	2.21E+00	1.37E-01	6.63E-01	2.50E+00
ADULT	GROUND	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01	2.97E-01
ADULT	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
ADULT	VEG.ING.	3.85E-01	4.96E+00	3.85E-01	4.80E-01	1.45E+00	3.85E-01
ADULT	MEAT ING	7.38E-02	9.79E-01	7.38E-02	1.22E-01	3.60E-01	7.38E-02
ADULT	MILK ING	1.17E-01	1.24E+00	1.17E-01	3.41E-02	1.07E-01	1.17E-01
ADULT	TOTALS	9.63E-01	9.86E+00	3.09E+00	1.08E+00	2.89E+00	3.38E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.23E-02	4.31E-01	0.
INFANT	GROUND	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03
INFANT	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.26E-01	2.26E+00	2.26E-01	9.31E-02	3.61E-01	2.26E-01
INFANT	TOTALS	3.04E-01	3.91E+00	4.87E+00	1.64E-01	8.01E-01	2.35E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.23E-02	4.31E-01	0.
CHILD	GROUND	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03
CHILD	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
CHILD	VEG.ING.	1.88E-01	2.32E+00	1.88E-01	2.54E-01	8.25E-01	1.88E-01
CHILD	MEAT ING	2.94E-02	3.74E-01	2.94E-02	5.29E-02	1.66E-01	2.94E-02
CHILD	MILK ING	1.96E-01	2.00E+00	1.96E-01	6.73E-02	2.62E-01	1.96E-01
CHILD	TOTALS	4.91E-01	6.34E+00	5.06E+00	4.45E-01	1.69E+00	4.21E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.23E-02	4.31E-01	0.
TEENAGER	GROUND	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03
TEENAGER	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
TEENAGER	VEG.ING.	1.42E-01	1.82E+00	1.42E-01	1.90E-01	6.52E-01	1.42E-01
TEENAGER	MEAT ING	2.14E-02	2.80E-01	2.14E-02	3.84E-02	1.27E-01	2.14E-02
TEENAGER	MILK ING	1.11E-01	1.20E+00	1.11E-01	3.55E-02	1.46E-01	1.11E-01
TEENAGER	TOTALS	3.53E-01	4.94E+00	4.92E+00	3.34E-01	1.36E+00	2.83E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.23E-02	4.31E-01	0.
ADULT	GROUND	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03	8.40E-03
ADULT	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
ADULT	VEG.ING.	1.73E-01	2.25E+00	1.73E-01	2.08E-01	6.51E-01	1.73E-01
ADULT	MEAT ING	3.28E-02	4.37E-01	3.28E-02	5.29E-02	1.59E-01	3.28E-02
ADULT	MILK ING	5.28E-02	5.73E-01	5.28E-02	1.47E-02	5.49E-02	5.28E-02
ADULT	TOTALS	3.37E-01	4.91E+00	4.90E+00	3.46E-01	1.30E+00	2.67E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.24E-02	4.31E-01	8.33E+00
INFANT	GROUND	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01
INFANT	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.26E-01	2.26E+00	2.26E-01	9.31E-02	3.62E-01	2.26E-01
INFANT	TOTALS	4.65E-01	4.07E+00	5.03E+00	3.25E-01	9.62E-01	8.72E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.24E-02	4.31E-01	8.33E+00
CHILD	GROUND	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01
CHILD	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
CHILD	VEG.ING.	1.88E-01	2.32E+00	1.88E-01	2.55E-01	8.26E-01	1.88E-01
CHILD	MEAT ING	2.94E-02	3.74E-01	2.94E-02	5.30E-02	1.66E-01	2.94E-02
CHILD	MILK ING	1.96E-01	2.00E+00	1.96E-01	6.74E-02	2.62E-01	1.96E-01
CHILD	TOTALS	6.52E-01	6.51E+00	5.22E+00	6.07E-01	1.85E+00	8.91E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.24E-02	4.31E-01	8.33E+00
TEENAGER	GROUND	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01
TEENAGER	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
TEENAGER	VEG.ING.	1.42E-01	1.82E+00	1.42E-01	1.90E-01	6.53E-01	1.42E-01
TEENAGER	MEAT ING	2.14E-02	2.80E-01	2.14E-02	3.84E-02	1.27E-01	2.14E-02
TEENAGER	MILK ING	1.11E-01	1.20E+00	1.11E-01	3.55E-02	1.46E-01	1.11E-01
TEENAGER	TOTALS	5.14E-01	5.11E+00	5.08E+00	4.96E-01	1.53E+00	8.77E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	6.99E-02	1.64E+00	4.63E+00	6.24E-02	4.31E-01	8.33E+00
ADULT	GROUND	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01
ADULT	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
ADULT	VEG.ING.	1.73E-01	2.25E+00	1.73E-01	2.08E-01	6.52E-01	1.73E-01
ADULT	MEAT ING	3.28E-02	4.37E-01	3.28E-02	5.29E-02	1.59E-01	3.28E-02
ADULT	MILK ING	5.28E-02	5.73E-01	5.28E-02	1.48E-02	5.49E-02	5.28E-02
ADULT	TOTALS	4.98E-01	5.07E+00	5.06E+00	5.07E-01	1.47E+00	8.76E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	0.
INFANT	GROUND	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02
INFANT	CLOUD	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.33E-01	9.31E+00	8.33E-01	2.09E-01	1.69E+00	8.33E-01
INFANT	TOTALS	1.47E+00	1.99E+01	5.53E+01	4.35E-01	4.34E+00	9.07E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	0.
CHILD	GROUND	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02
CHILD	CLOUD	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06
CHILD	VEG.ING.	5.64E-01	7.52E+00	5.64E-01	5.71E-01	2.22E+00	5.64E-01
CHILD	MEAT ING	8.05E-02	1.07E+00	8.05E-02	1.19E-01	4.09E-01	8.05E-02
CHILD	MILK ING	6.31E-01	7.61E+00	6.31E-01	1.51E-01	1.09E+00	6.31E-01
CHILD	TOTALS	1.92E+00	2.68E+01	5.57E+01	1.07E+00	6.37E+00	1.35E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	0.
TEENAGER	GROUND	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02
TEENAGER	CLOUD	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06
TEENAGER	VEG.ING.	4.00E-01	5.39E+00	4.00E-01	4.26E-01	1.76E+00	4.00E-01
TEENAGER	MEAT ING	5.61E-02	7.59E-01	5.61E-02	8.61E-02	3.14E-01	5.61E-02
TEENAGER	MILK ING	3.27E-01	3.93E+00	3.27E-01	7.95E-02	6.09E-01	3.27E-01
TEENAGER	TOTALS	1.42E+00	2.07E+01	5.52E+01	8.18E-01	5.33E+00	8.57E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	0.
ADULT	GROUND	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02	7.46E-02
ADULT	CLOUD	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06
ADULT	VEG.ING.	4.68E-01	6.33E+00	4.68E-01	4.66E-01	1.75E+00	4.68E-01
ADULT	MEAT ING	8.38E-02	1.10E+00	8.38E-02	1.19E-01	3.91E-01	8.38E-02
ADULT	MILK ING	1.48E-01	1.75E+00	1.48E-01	3.31E-02	2.27E-01	1.48E-01
ADULT	TOTALS	1.34E+00	1.99E+01	5.51E+01	8.44E-01	5.01E+00	7.74E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	6.76E+01
INFANT	GROUND	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01
INFANT	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.33E-01	9.31E+00	8.33E-01	2.09E-01	1.69E+00	8.33E-01
INFANT	TOTALS	1.83E+00	2.03E+01	5.56E+01	7.95E-01	4.70E+00	6.89E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	6.76E+01
CHILD	GROUND	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01
CHILD	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
CHILD	VEG.ING.	5.64E-01	7.52E+00	5.64E-01	5.71E-01	2.22E+00	5.64E-01
CHILD	MEAT ING	8.05E-02	1.07E+00	8.05E-02	1.19E-01	4.09E-01	8.05E-02
CHILD	MILK ING	6.31E-01	7.61E+00	6.31E-01	1.51E-01	1.09E+00	6.31E-01
CHILD	TOTALS	2.28E+00	2.72E+01	5.61E+01	1.43E+00	6.73E+00	6.93E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	6.76E+01
TEENAGER	GROUND	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01
TEENAGER	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
TEENAGER	VEG.ING.	4.00E-01	5.39E+00	4.00E-01	4.26E-01	1.76E+00	4.00E-01
TEENAGER	MEAT ING	5.61E-02	7.59E-01	5.61E-02	8.61E-02	3.14E-01	5.61E-02
TEENAGER	MILK ING	3.27E-01	3.93E+00	3.27E-01	7.95E-02	6.10E-01	3.27E-01
TEENAGER	TOTALS	1.78E+00	2.11E+01	5.56E+01	1.18E+00	5.69E+00	6.88E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.67E-01	1.06E+01	5.44E+01	1.52E-01	2.58E+00	6.76E+01
ADULT	GROUND	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01
ADULT	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
ADULT	VEG.ING.	4.68E-01	6.33E+00	4.68E-01	4.67E-01	1.75E+00	4.68E-01
ADULT	MEAT ING	8.38E-02	1.14E+00	8.38E-02	1.19E-01	3.91E-01	8.38E-02
ADULT	MILK ING	1.48E-01	1.75E+00	1.48E-01	3.31E-02	2.27E-01	1.48E-01
ADULT	TOTALS	1.70E+00	2.02E+01	5.55E+01	1.20E+00	5.37E+00	6.87E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	0.
INFANT	GROUND	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02
INFANT	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.23E-01	7.50E+00	7.23E-01	2.52E-01	1.24E+00	7.23E-01
INFANT	TOTALS	1.07E+00	1.39E+01	2.57E+01	4.65E-01	2.90E+00	7.62E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	0.
CHILD	GROUND	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02
CHILD	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
CHILD	VEG.ING.	5.62E-01	7.07E+00	5.62E-01	6.90E-01	2.35E+00	5.62E-01
CHILD	MEAT ING	8.56E-02	1.10E+00	8.56E-02	1.43E-01	4.60E-01	8.56E-02
CHILD	MILK ING	6.01E-01	6.47E+00	6.01E-01	1.82E-01	8.55E-01	6.01E-01
CHILD	TOTALS	1.59E+00	2.11E+01	2.62E+01	1.23E+00	5.33E+00	1.29E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	0.
TEENAGER	GROUND	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02
TEENAGER	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
TEENAGER	VEG.ING.	4.18E-01	5.42E+00	4.18E-01	5.15E-01	1.86E+00	4.18E-01
TEENAGER	MEAT ING	6.17E-02	8.12E-01	6.17E-02	1.04E-01	3.52E-01	6.17E-02
TEENAGER	MILK ING	3.33E-01	3.69E+00	3.33E-01	9.60E-02	4.78E-01	3.33E-01
TEENAGER	TOTALS	1.16E+00	1.64E+01	2.58E+01	9.28E-01	4.35E+00	8.52E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	0.
ADULT	GROUND	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02	3.92E-02
ADULT	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
ADULT	VEG.ING.	5.05E-01	6.61E+00	5.05E-01	5.64E-01	1.85E+00	5.05E-01
ADULT	MEAT ING	9.41E-02	1.25E+00	9.41E-02	1.43E-01	4.41E-01	9.41E-02
ADULT	MILK ING	1.56E-01	1.73E+00	1.56E-01	3.99E-02	1.79E-01	1.56E-01
ADULT	TOTALS	1.10E+00	1.60E+01	2.57E+01	9.60E-01	4.14E+00	7.94E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	4.96E+01
INFANT	GROUND	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01
INFANT	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.23E-01	7.50E+00	7.23E-01	2.52E-01	1.24E+00	7.23E-01
INFANT	TOTALS	1.50E+00	1.44E+01	2.61E+01	8.98E-01	3.34E+00	5.08E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	4.96E+01
CHILD	GROUND	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01
CHILD	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
CHILD	VEG.ING.	5.62E-01	7.07E+00	5.62E-01	6.90E-01	2.35E+00	5.62E-01
CHILD	MEAT ING	8.56E-02	1.10E+00	8.56E-02	1.43E-01	4.60E-01	8.56E-02
CHILD	MILK ING	6.01E-01	6.47E+00	6.01E-01	1.82E-01	8.55E-01	6.01E-01
CHILD	TOTALS	2.03E+00	2.15E+01	2.66E+01	1.66E+00	5.76E+00	5.13E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	4.96E+01
TEENAGER	GROUND	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01
TEENAGER	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
TEENAGER	VEG.ING.	4.18E-01	5.42E+00	4.18E-01	5.15E-01	1.86E+00	4.18E-01
TEENAGER	MEAT ING	6.17E-02	8.12E-01	6.17E-02	1.04E-01	3.53E-01	6.17E-02
TEENAGER	MILK ING	3.33E-01	3.69E+00	3.33E-01	9.60E-02	4.78E-01	3.33E-01
TEENAGER	TOTALS	1.59E+00	1.68E+01	2.62E+01	1.36E+00	4.79E+00	5.09E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.05E-01	6.41E+00	2.49E+01	1.74E-01	1.63E+00	4.96E+01
ADULT	GROUND	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01	4.02E-01
ADULT	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
ADULT	VEG.ING.	5.05E-01	6.61E+00	5.05E-01	5.64E-01	1.85E+00	5.05E-01
ADULT	MEAT ING	9.41E-02	1.25E+00	9.41E-02	1.43E-01	4.41E-01	9.41E-02
ADULT	MILK ING	1.56E-01	1.73E+00	1.56E-01	4.00E-02	1.79E-01	1.56E-01
ADULT	TOTALS	1.53E+00	1.65E+01	2.61E+01	1.39E+00	4.57E+00	5.08E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, TRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.34E-01	3.82E+00	4.83E+00	2.07E-01	1.05E+00	0.
INFANT	GROUND	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02
INFANT	CLOUD	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.59E-01	6.37E+00	6.59E-01	3.01E-01	9.66E-01	6.59E-01
INFANT	TOTALS	8.08E-01	1.02E+01	5.50E+00	5.22E-01	2.03E+00	6.73E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.34E-01	3.82E+00	4.83E+00	2.07E-01	1.05E+00	0.
CHILD	GROUND	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02
CHILD	CLOUD	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07
CHILD	VEG.ING.	5.75E-01	6.98E+00	5.75E-01	8.22E-01	2.58E+00	5.75E-01
CHILD	MEAT ING	9.19E-02	1.16E+00	9.19E-02	1.71E-01	5.27E-01	9.19E-02
CHILD	MILK ING	5.91E-01	5.79E+00	5.91E-01	2.18E-01	7.33E-01	5.91E-01
CHILD	TOTALS	1.41E+00	1.78E+01	6.10E+00	1.43E+00	4.91E+00	1.27E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.34E-01	3.82E+00	4.83E+00	2.07E-01	1.05E+00	0.
TEENAGER	GROUND	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02
TEENAGER	CLOUD	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07
TEENAGER	VEG.ING.	4.42E-01	5.61E+00	4.42E-01	6.13E-01	2.04E+00	4.42E-01
TEENAGER	MEAT ING	6.74E-02	8.79E-01	6.74E-02	1.24E-01	4.04E-01	6.74E-02
TEENAGER	MILK ING	3.43E-01	3.60E+00	3.43E-01	1.15E-01	4.08E-01	3.43E-01
TEENAGER	TOTALS	1.00E+00	1.39E+01	5.69E+00	1.07E+00	3.92E+00	8.67E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.34E-01	3.82E+00	4.83E+00	2.07E-01	1.05E+00	0.
ADULT	GROUND	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02
ADULT	CLOUD	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07	1.63E-07
ADULT	VEG.ING.	5.43E-01	7.00E+00	5.43E-01	6.71E-01	2.04E+00	5.43E-01
ADULT	MEAT ING	1.04E-01	1.38E+00	1.04E-01	1.71E-01	5.05E-01	1.04E-01
ADULT	MILK ING	1.65E-01	1.75E+00	1.65E-01	4.77E-02	1.54E-01	1.65E-01
ADULT	TOTALS	9.60E-01	1.40E+01	5.65E+00	1.11E+00	3.77E+00	8.26E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.34E-01	3.83E+00	4.83E+00	2.07E-01	1.06E+00	3.80E+00
INFANT	GROUND	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01
INFANT	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.59E-01	6.37E+00	6.59E-01	3.01E-01	9.66E-01	6.59E-01
INFANT	TOTALS	1.25E+00	1.07E+01	5.94E+00	9.64E-01	2.48E+00	4.92E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.34E-01	3.83E+00	4.83E+00	2.07E-01	1.06E+00	3.80E+00
CHILD	GROUND	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01
CHILD	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
CHILD	VEG.ING.	5.75E-01	6.98E+00	5.75E-01	8.23E-01	2.58E+00	5.75E-01
CHILD	MEAT ING	9.20E-02	1.16E+00	9.20E-02	1.71E-01	5.27E-01	9.20E-02
CHILD	MILK ING	5.91E-01	5.79E+00	5.91E-01	2.18E-01	7.34E-01	5.91E-01
CHILD	TOTALS	1.85E+00	1.82E+01	6.54E+00	1.88E+00	5.36E+00	5.51E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.34E-01	3.83E+00	4.83E+00	2.07E-01	1.06E+00	3.80E+00
TEENAGER	GROUND	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01
TEENAGER	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
TEENAGER	VEG.ING.	4.42E-01	5.61E+00	4.42E-01	6.13E-01	2.04E+00	4.42E-01
TEENAGER	MEAT ING	6.74E-02	8.79E-01	6.74E-02	1.24E-01	4.04E-01	6.74E-02
TEENAGER	MILK ING	3.43E-01	3.60E+00	3.43E-01	1.15E-01	4.09E-01	3.43E-01
TEENAGER	TOTALS	1.44E+00	1.44E+01	6.14E+00	1.52E+00	4.37E+00	5.11E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.34E-01	3.83E+00	4.83E+00	2.07E-01	1.06E+00	3.80E+00
ADULT	GROUND	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01	4.20E-01
ADULT	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
ADULT	VEG.ING.	5.43E-01	7.00E+00	5.43E-01	6.72E-01	2.04E+00	5.43E-01
ADULT	MEAT ING	1.04E-01	1.38E+00	1.04E-01	1.71E-01	5.05E-01	1.04E-01
ADULT	MILK ING	1.65E-01	1.75E+00	1.65E-01	4.77E-02	1.54E-01	1.65E-01
ADULT	TOTALS	1.48E+00	1.44E+01	6.10E+00	1.55E+00	4.21E+00	5.07E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.97E-03	1.07E-01	1.84E-01	5.33E-03	2.92E-02	0.
INFANT	GROUND	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04
INFANT	CLOUD	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.48E-02	1.45E-01	1.48E-02	6.54E-03	2.23E-02	1.48E-02
INFANT	TOTALS	1.92E-02	2.52E-01	1.99E-01	1.23E-02	5.19E-02	1.52E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.97E-03	1.07E-01	1.84E-01	5.33E-03	2.92E-02	0.
CHILD	GROUND	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04
CHILD	CLOUD	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09
CHILD	VEG.ING.	1.27E-02	1.55E-01	1.27E-02	1.79E-02	5.67E-02	1.27E-02
CHILD	MEAT ING	2.02E-03	2.55E-02	2.02E-03	3.72E-03	1.15E-02	2.02E-03
CHILD	MILK ING	1.31E-02	1.30E-01	1.31E-02	4.73E-03	1.67E-02	1.31E-02
CHILD	TOTALS	3.22E-02	4.19E-01	2.12E-01	3.21E-02	1.15E-01	2.83E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.97E-03	1.07E-01	1.84E-01	5.33E-03	2.92E-02	0.
TEENAGER	GROUND	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04
TEENAGER	CLOUD	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09
TEENAGER	VEG.ING.	9.72E-03	1.24E-01	9.72E-03	1.33E-02	4.49E-02	9.72E-03
TEENAGER	MEAT ING	1.48E-03	1.93E-02	1.48E-03	2.70E-03	8.83E-03	1.48E-03
TEENAGER	MILK ING	7.57E-03	8.00E-02	7.57E-03	2.49E-03	9.30E-03	7.57E-03
TEENAGER	TOTALS	2.31E-02	3.31E-01	2.03E-01	2.43E-02	9.26E-02	1.92E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.97E-03	1.07E-01	1.84E-01	5.33E-03	2.92E-02	0.
ADULT	GROUND	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04
ADULT	CLOUD	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09	6.65E-09
ADULT	VEG.ING.	1.19E-02	1.54E-01	1.19E-02	1.46E-02	4.48E-02	1.19E-02
ADULT	MEAT ING	2.27E-03	3.02E-02	2.27E-03	3.72E-03	1.10E-02	2.27E-03
ADULT	MILK ING	3.62E-03	3.88E-02	3.62E-03	1.04E-03	3.49E-03	3.62E-03
ADULT	TOTALS	2.22E-02	3.31E-01	2.02E-01	2.51E-02	8.90E-02	1.82E-02

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IPTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.98E-03	1.08E-01	1.84E-01	5.42E-03	2.95E-02	1.75E-01
INFANT	GROUND	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03
INFANT	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.48E-02	1.45E-01	1.48E-02	6.59E-03	2.24E-02	1.48E-02
INFANT	TOTALS	3.07E-02	2.64E-01	2.10E-01	2.39E-02	6.38E-02	2.02E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.98E-03	1.08E-01	1.84E-01	5.42E-03	2.95E-02	1.75E-01
CHILD	GROUND	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03
CHILD	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
CHILD	VEG.ING.	1.27E-02	1.56E-01	1.27E-02	1.80E-02	5.71E-02	1.27E-02
CHILD	MEAT ING	2.02E-03	2.56E-02	2.02E-03	3.75E-03	1.16E-02	2.02E-03
CHILD	MILK ING	1.31E-02	1.31E-01	1.31E-02	4.77E-03	1.68E-02	1.31E-02
CHILD	TOTALS	4.37E-02	4.31E-01	2.24E-01	4.38E-02	1.27E-01	2.15E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.98E-03	1.08E-01	1.84E-01	5.42E-03	2.95E-02	1.75E-01
TEENAGER	GROUND	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03
TEENAGER	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
TEENAGER	VEG.ING.	9.73E-03	1.24E-01	9.73E-03	1.34E-02	4.51E-02	9.73E-03
TEENAGER	MEAT ING	1.48E-03	1.94E-02	1.48E-03	2.72E-03	8.89E-03	1.48E-03
TEENAGER	MILK ING	7.57E-03	8.00E-02	7.57E-03	2.51E-03	9.35E-03	7.57E-03
TEENAGER	TOTALS	3.46E-02	3.43E-01	2.14E-01	3.59E-02	1.05E-01	2.06E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.98E-03	1.08E-01	1.84E-01	5.42E-03	2.95E-02	1.75E-01
ADULT	GROUND	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03	9.24E-03
ADULT	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
ADULT	VEG.ING.	1.19E-02	1.54E-01	1.19E-02	1.47E-02	4.51E-02	1.19E-02
ADULT	MEAT ING	2.28E-03	3.03E-02	2.28E-03	3.74E-03	1.11E-02	2.28E-03
ADULT	MILK ING	3.62E-03	3.88E-02	3.62E-03	1.04E-03	3.51E-03	3.62E-03
ADULT	TOTALS	3.37E-02	3.43E-01	2.13E-01	3.68E-02	1.01E-01	2.05E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.58E-03	7.60E-02	8.82E-02	4.23E-03	2.11E-02	0.
INFANT	GROUND	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04
INFANT	CLOUD	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.38E-03	8.11E-02	8.38E-03	3.81E-03	1.23E-02	8.38E-03
INFANT	TOTALS	1.11E-02	1.57E-01	9.68E-02	8.23E-03	3.36E-02	8.57E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.58E-03	7.60E-02	8.82E-02	4.23E-03	2.11E-02	0.
CHILD	GROUND	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04
CHILD	CLOUD	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09
CHILD	VEG.ING.	7.30E-03	8.86E-02	7.30E-03	1.04E-02	3.27E-02	7.30E-03
CHILD	MEAT ING	1.17E-03	1.47E-02	1.17E-03	2.17E-03	6.68E-03	1.17E-03
CHILD	MILK ING	7.50E-03	7.36E-02	7.50E-03	2.76E-03	9.33E-03	7.50E-03
CHILD	TOTALS	1.87E-02	2.53E-01	1.04E-01	1.98E-02	7.00E-02	1.62E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.58E-03	7.60E-02	8.82E-02	4.23E-03	2.11E-02	0.
TEENAGER	GROUND	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04
TEENAGER	CLOUD	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09
TEENAGER	VEG.ING.	5.61E-03	7.11E-02	5.61E-03	7.77E-03	2.59E-02	5.61E-03
TEENAGER	MEAT ING	8.55E-04	1.12E-02	8.55E-04	1.57E-03	5.12E-03	8.55E-04
TEENAGER	MILK ING	4.35E-03	4.57E-02	4.35E-03	1.45E-03	5.20E-03	4.35E-03
TEENAGER	TOTALS	1.36E-02	2.04E-01	9.92E-02	1.52E-02	5.75E-02	1.10E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.58E-03	7.60E-02	8.82E-02	4.23E-03	2.11E-02	0.
ADULT	GROUND	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04
ADULT	CLOUD	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09	2.51E-09
ADULT	VEG.ING.	6.89E-03	8.88E-02	6.89E-03	8.51E-03	2.59E-02	6.89E-03
ADULT	MEAT ING	1.32E-03	1.75E-02	1.32E-03	2.17E-03	6.40E-03	1.32E-03
ADULT	MILK ING	2.09E-03	2.22E-02	2.09E-03	6.04E-04	1.95E-03	2.09E-03
ADULT	TOTALS	1.31E-02	2.05E-01	9.87E-02	1.57E-02	5.55E-02	1.05E-02

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.64E-03	7.80E-02	8.88E-02	4.74E-03	2.27E-02	1.41E-01
INFANT	GROUND	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03
INFANT	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.42E-03	8.18E-02	8.42E-03	4.05E-03	1.30E-02	8.42E-03
INFANT	TOTALS	1.89E-02	1.68E-01	1.05E-01	1.66E-02	4.35E-02	1.57E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.64E-03	7.80E-02	8.88E-02	4.74E-03	2.27E-02	1.41E-01
CHILD	GROUND	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03
CHILD	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
CHILD	VEG.ING.	7.41E-03	9.08E-02	7.41E-03	1.11E-02	3.47E-02	7.41E-03
CHILD	MEAT ING	1.19E-03	1.52E-02	1.19E-03	2.31E-03	7.10E-03	1.19E-03
CHILD	MILK ING	7.53E-03	7.42E-02	7.53E-03	2.93E-03	9.87E-03	7.53E-03
CHILD	TOTALS	2.66E-02	2.66E-01	1.13E-01	2.88E-02	8.22E-02	1.65E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.64E-03	7.80E-02	8.88E-02	4.74E-03	2.27E-02	1.41E-01
TEENAGER	GROUND	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03
TEENAGER	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
TEENAGER	VEG.ING.	5.67E-03	7.25E-02	5.67E-03	8.25E-03	2.74E-02	5.67E-03
TEENAGER	MEAT ING	8.67E-04	1.14E-02	8.67E-04	1.67E-03	5.44E-03	8.67E-04
TEENAGER	MILK ING	4.36E-03	4.59E-02	4.36E-03	1.54E-03	5.50E-03	4.36E-03
TEENAGER	TOTALS	2.13E-02	2.16E-01	1.07E-01	2.40E-02	6.89E-02	1.59E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.64E-03	7.80E-02	8.88E-02	4.74E-03	2.27E-02	1.41E-01
ADULT	GROUND	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03
ADULT	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
ADULT	VEG.ING.	6.95E-03	9.04E-02	6.95E-03	9.03E-03	2.74E-02	6.95E-03
ADULT	MEAT ING	1.33E-03	1.79E-02	1.33E-03	2.30E-03	6.80E-03	1.33E-03
ADULT	MILK ING	2.09E-03	2.24E-02	2.09E-03	6.42E-04	2.07E-03	2.09E-03
ADULT	TOTALS	2.08E-02	2.16E-01	1.07E-01	2.45E-02	6.68E-02	1.59E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	0.
INFANT	GROUND	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01
INFANT	CLOUD	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.41E+01	1.35E+02	1.41E+01	6.68E+00	2.02E+01	1.41E+01
INFANT	TOTALS	1.63E+01	1.96E+02	5.05E+01	1.06E+01	3.74E+01	1.44E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	0.
CHILD	GROUND	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01
CHILD	CLOUD	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07
CHILD	VEG.ING.	1.25E+01	1.52E+02	1.25E+01	1.83E+01	5.68E+01	1.25E+01
CHILD	MEAT ING	2.02E+00	2.54E+01	2.02E+00	3.80E+00	1.17E+01	2.02E+00
CHILD	MILK ING	1.28E+01	1.24E+02	1.28E+01	4.83E+00	1.56E+01	1.28E+01
CHILD	TOTALS	2.96E+01	3.61E+02	6.37E+01	3.08E+01	1.01E+02	2.76E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	0.
TEENAGER	GROUND	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01
TEENAGER	CLOUD	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07
TEENAGER	VEG.ING.	9.68E+00	1.22E+02	9.68E+00	1.36E+01	4.49E+01	9.68E+00
TEENAGER	MEAT ING	1.48E+00	1.93E+01	1.48E+00	2.75E+00	8.93E+00	1.48E+00
TEENAGER	MILK ING	7.49E+00	7.79E+01	7.49E+00	2.55E+00	8.68E+00	7.49E+00
TEENAGER	TOTALS	2.08E+01	2.80E+02	5.50E+01	2.28E+01	7.97E+01	1.89E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	0.
ADULT	GROUND	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01
ADULT	CLOUD	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07	8.92E-07
ADULT	VEG.ING.	1.19E+01	1.53E+02	1.19E+01	1.49E+01	4.49E+01	1.19E+01
ADULT	MEAT ING	2.29E+00	3.03E+01	2.29E+00	3.80E+00	1.12E+01	2.29E+00
ADULT	MILK ING	3.61E+00	3.82E+01	3.61E+00	1.06E+00	3.27E+00	3.61E+00
ADULT	TOTALS	2.00E+01	2.82E+02	5.41E+01	2.37E+01	7.65E+01	1.81E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	2.16E+01
INFANT	GROUND	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00
INFANT	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.41E+01	1.35E+02	1.41E+01	6.68E+00	2.02E+01	1.41E+01
INFANT	TOTALS	2.53E+01	2.05E+02	5.94E+01	1.95E+01	4.64E+01	4.50E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	2.16E+01
CHILD	GROUND	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00
CHILD	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
CHILD	VEG.ING.	1.25E+01	1.52E+02	1.25E+01	1.83E+01	5.68E+01	1.25E+01
CHILD	MEAT ING	2.02E+00	2.54E+01	2.02E+00	3.80E+00	1.17E+01	2.02E+00
CHILD	MILK ING	1.28E+01	1.24E+02	1.28E+01	4.83E+00	1.56E+01	1.28E+01
CHILD	TOTALS	3.86E+01	3.70E+02	7.27E+01	3.98E+01	1.10E+02	5.82E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	2.16E+01
TEENAGER	GROUND	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00
TEENAGER	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
TEENAGER	VEG.ING.	9.68E+00	1.22E+02	9.68E+00	1.36E+01	4.49E+01	9.68E+00
TEENAGER	MEAT ING	1.48E+00	1.93E+01	1.48E+00	2.75E+00	8.93E+00	1.48E+00
TEENAGER	MILK ING	7.49E+00	7.79E+01	7.49E+00	2.55E+00	8.68E+00	7.49E+00
TEENAGER	TOTALS	2.98E+01	2.89E+02	6.39E+01	3.18E+01	8.87E+01	4.95E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.96E+00	6.04E+01	3.61E+01	3.65E+00	1.69E+01	2.16E+01
ADULT	GROUND	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00	9.20E+00
ADULT	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
ADULT	VEG.ING.	1.19E+01	1.53E+02	1.19E+01	1.49E+01	4.49E+01	1.19E+01
ADULT	MEAT ING	2.29E+00	3.03E+01	2.29E+00	3.80E+00	1.12E+01	2.29E+00
ADULT	MILK ING	3.61E+00	3.82E+01	3.61E+00	1.06E+00	3.27E+00	3.61E+00
ADULT	TOTALS	2.90E+01	2.91E+02	6.31E+01	3.26E+01	8.55E+01	4.86E+01

TIME STEP NUMBER 1, AFTER 5 YEARS　　DURATION IN YRS IS... 5.0

NUMBER 11 NAME=GALLUP　　X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.17E-04	9.46E-03	3.07E-02	3.24E-04	2.46E-03	0.
INFANT	GROUND	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05
INFANT	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.22E-04	7.58E-03	7.22E-04	2.48E-04	1.29E-03	7.22E-04
INFANT	TOTALS	1.18E-03	1.71E-02	3.15E-02	6.15E-04	3.79E-03	7.64E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.17E-04	9.46E-03	3.07E-02	3.24E-04	2.46E-03	0.
CHILD	GROUND	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05
CHILD	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
CHILD	VEG.ING.	5.52E-04	7.03E-03	5.52E-04	6.78E-04	2.34E-03	5.52E-04
CHILD	MEAT ING	8.37E-05	1.08E-03	8.37E-05	1.41E-04	4.55E-04	8.37E-05
CHILD	MILK ING	5.92E-04	6.48E-03	5.92E-04	1.79E-04	8.81E-04	5.92E-04
CHILD	TOTALS	1.69E-03	2.41E-02	3.20E-02	1.37E-03	6.17E-03	1.27E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.17E-04	9.46E-03	3.07E-02	3.24E-04	2.46E-03	0.
TEENAGER	GROUND	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05
TEENAGER	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
TEENAGER	VEG.ING.	4.08E-04	5.33E-03	4.08E-04	5.06E-04	1.85E-03	4.08E-04
TEENAGER	MEAT ING	5.99E-05	7.95E-04	5.99E-05	1.02E-04	3.49E-04	5.99E-05
TEENAGER	MILK ING	3.25E-04	3.64E-03	3.25E-04	9.45E-05	4.93E-04	3.25E-04
TEENAGER	TOTALS	1.25E-03	1.93E-02	3.15E-02	1.07E-03	5.19E-03	8.35E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.17E-04	9.46E-03	3.07E-02	3.24E-04	2.46E-03	0.
ADULT	GROUND	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05	4.28E-05
ADULT	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
ADULT	VEG.ING.	4.90E-04	6.47E-03	4.90E-04	5.54E-04	1.84E-03	4.90E-04
ADULT	MEAT ING	9.11E-05	1.22E-03	9.11E-05	1.41E-04	4.36E-04	9.11E-05
ADULT	MILK ING	1.51E-04	1.70E-03	1.51E-04	3.93E-05	1.84E-04	1.51E-04
ADULT	TOTALS	1.19E-03	1.89E-02	3.15E-02	1.10E-03	4.96E-03	7.76E-04

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.99E-04	1.20E-02	3.14E-02	9.77E-04	4.59E-03	2.22E-01
INFANT	GROUND	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04
INFANT	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.70E-04	8.45E-03	7.70E-04	5.62E-04	2.16E-03	7.70E-04
INFANT	TOTALS	5.61E-03	2.48E-02	3.65E-02	5.88E-03	1.11E-02	2.27E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.99E-04	1.20E-02	3.14E-02	9.77E-04	4.59E-03	2.22E-01
CHILD	GROUND	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04
CHILD	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
CHILD	VEG.ING.	6.93E-04	9.84E-03	6.93E-04	1.52E-03	4.89E-03	6.93E-04
CHILD	MEAT ING	1.14E-04	1.68E-03	1.14E-04	3.20E-04	9.97E-04	1.14E-04
CHILD	MILK ING	6.30E-04	7.24E-03	6.30E-04	4.07E-04	1.57E-03	6.30E-04
CHILD	TOTALS	6.27E-03	3.51E-02	3.72E-02	7.56E-03	1.64E-02	2.28E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.99E-04	1.20E-02	3.14E-02	9.77E-04	4.59E-03	2.22E-01
TEENAGER	GROUND	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04
TEENAGER	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
TEENAGER	VEG.ING.	4.86E-04	7.10E-03	4.86E-04	1.13E-03	3.83E-03	4.86E-04
TEENAGER	MEAT ING	7.63E-05	1.16E-03	7.63E-05	2.32E-04	7.63E-04	7.63E-05
TEENAGER	MILK ING	3.40E-04	3.99E-03	3.40E-04	2.14E-04	8.77E-04	3.40E-04
TEENAGER	TOTALS	5.74E-03	2.86E-02	3.66E-02	6.88E-03	1.44E-02	2.27E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.99E-04	1.20E-02	3.14E-02	9.77E-04	4.59E-03	2.22E-01
ADULT	GROUND	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04	4.37E-04
ADULT	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
ADULT	VEG.ING.	5.73E-04	8.52E-03	5.73E-04	1.23E-03	3.79E-03	5.73E-04
ADULT	MEAT ING	1.13E-04	1.77E-03	1.13E-04	3.19E-04	9.51E-04	1.13E-04
ADULT	MILK ING	1.58E-04	1.85E-03	1.58E-04	8.92E-05	3.29E-04	1.58E-04
ADULT	TOTALS	5.68E-03	2.85E-02	3.66E-02	6.95E-03	1.40E-02	2.27E-01

TIME STEP NUMBER 1, AFTER 5 YEARS　　DURATION IN YRS IS... 5.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.70E-03	7.15E-02	3.41E-01	1.31E-03	1.77E-02	0.
INFANT	GROUND	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04
INFANT	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.68E-03	6.26E-02	5.68E-03	1.56E-03	1.12E-02	5.68E-03
INFANT	TOTALS	9.85E-03	1.35E-01	3.47E-01	3.33E-03	2.94E-02	6.15E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.70E-03	7.15E-02	3.41E-01	1.31E-03	1.77E-02	0.
CHILD	GROUND	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04
CHILD	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
CHILD	VEG.ING.	3.97E-03	5.23E-02	3.97E-03	4.26E-03	1.60E-02	3.97E-03
CHILD	MEAT ING	5.76E-04	7.62E-03	5.76E-04	8.86E-04	2.99E-03	5.76E-04
CHILD	MILK ING	4.39E-03	5.17E-02	4.39E-03	1.13E-03	7.32E-03	4.39E-03
CHILD	TOTALS	1.31E-02	1.84E-01	3.50E-01	8.05E-03	4.44E-02	9.40E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.70E-03	7.15E-02	3.41E-01	1.31E-03	1.77E-02	0.
TEENAGER	GROUND	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04
TEENAGER	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
TEENAGER	VEG.ING.	2.84E-03	3.80E-02	2.84E-03	3.18E-03	1.27E-02	2.84E-03
TEENAGER	MEAT ING	4.04E-04	5.44E-03	4.04E-04	6.43E-04	2.29E-03	4.04E-04
TEENAGER	MILK ING	2.31E-03	2.72E-02	2.31E-03	5.94E-04	4.10E-03	2.31E-03
TEENAGER	TOTALS	9.72E-03	1.43E-01	3.47E-01	6.19E-03	3.72E-02	6.02E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.70E-03	7.15E-02	3.41E-01	1.31E-03	1.77E-02	0.
ADULT	GROUND	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04	4.68E-04
ADULT	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
ADULT	VEG.ING.	3.35E-03	4.51E-02	3.35E-03	3.48E-03	1.26E-02	3.35E-03
ADULT	MEAT ING	6.06E-04	8.24E-03	6.06E-04	8.86E-04	2.86E-03	6.06E-04
ADULT	MILK ING	1.05E-03	1.23E-02	1.05E-03	2.47E-04	1.53E-03	1.05E-03
ADULT	TOTALS	9.18E-03	1.38E-01	3.46E-01	6.39E-03	3.51E-02	5.48E-03

REGION=UNC MILL RUN 7
METSET=GALLUP, 76-80

CODE=MILDOS,REV0 (7/79)

DATE= 15/12/81

TIME STEP NUMBER 1, AFTER 5 YEARS

DURATION IN YRS IS... 5.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IPTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.74E-03	7.27E-02	3.41E-01	1.63E-03	1.87E-02	3.61E-01
INFANT	GROUND	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03
INFANT	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.70E-03	6.30E-02	5.70E-03	1.71E-03	1.17E-02	5.70E-03
INFANT	TOTALS	1.81E-02	1.44E-01	3.56E-01	1.20E-02	3.91E-02	3.76E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.74E-03	7.27E-02	3.41E-01	1.63E-03	1.87E-02	3.61E-01
CHILD	GROUND	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03
CHILD	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
CHILD	VEG.ING.	4.04E-03	5.37E-02	4.04E-03	4.68E-03	1.73E-02	4.04E-03
CHILD	MEAT ING	5.91E-04	7.91E-03	5.91E-04	9.75E-04	3.26E-03	5.91E-04
CHILD	MILK ING	4.41E-03	5.21E-02	4.41E-03	1.24E-03	7.66E-03	4.41E-03
CHILD	TOTALS	2.14E-02	1.95E-01	3.59E-01	1.72E-02	5.56E-02	3.79E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.74E-03	7.27E-02	3.41E-01	1.63E-03	1.87E-02	3.61E-01
TEENAGER	GROUND	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03
TEENAGER	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
TEENAGER	VEG.ING.	2.88E-03	3.89E-02	2.88E-03	3.48E-03	1.36E-02	2.88E-03
TEENAGER	MEAT ING	4.12E-04	5.62E-03	4.12E-04	7.06E-04	2.50E-03	4.12E-04
TEENAGER	MILK ING	2.32E-03	2.74E-02	2.32E-03	6.53E-04	4.29E-03	2.32E-03
TEENAGER	TOTALS	1.80E-02	1.53E-01	3.56E-01	1.51E-02	4.78E-02	3.76E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.74E-03	7.27E-02	3.41E-01	1.63E-03	1.87E-02	3.61E-01
ADULT	GROUND	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.67E-03
ADULT	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
ADULT	VEG.ING.	3.39E-03	4.61E-02	3.39E-03	3.81E-03	1.35E-02	3.39E-03
ADULT	MEAT ING	6.17E-04	8.51E-03	6.17E-04	9.74E-04	3.12E-03	6.17E-04
ADULT	MILK ING	1.05E-03	1.24E-02	1.05E-03	2.72E-04	1.60E-03	1.05E-03
ADULT	TOTALS	1.75E-02	1.48E-01	3.55E-01	1.54E-02	4.56E-02	3.75E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	0.
INFANT	GROUND	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02
INFANT	CLOUD	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.23E+00	1.22E+01	1.23E+00	5.20E-01	1.92E+00	1.23E+00
INFANT	TOTALS	1.60E+00	2.03E+01	2.11E+01	8.96E-01	4.10E+00	1.27E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	0.
CHILD	GROUND	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02
CHILD	CLOUD	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07
CHILD	VEG.ING.	1.04E+00	1.27E+01	1.04E+00	1.42E+00	4.57E+00	1.04E+00
CHILD	MEAT ING	1.63E-01	2.07E+00	1.63E-01	2.96E-01	9.22E-01	1.63E-01
CHILD	MILK ING	1.08E+00	1.09E+01	1.08E+00	3.76E-01	1.41E+00	1.08E+00
CHILD	TOTALS	2.65E+00	3.38E+01	2.21E+01	2.47E+00	9.08E+00	2.32E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	0.
TEENAGER	GROUND	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02
TEENAGER	CLOUD	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07
TEENAGER	VEG.ING.	7.88E-01	1.01E+01	7.88E-01	1.06E+00	3.62E+00	7.88E-01
TEENAGER	MEAT ING	1.19E-01	1.56E+00	1.19E-01	2.15E-01	7.07E-01	1.19E-01
TEENAGER	MILK ING	6.15E-01	6.58E+00	6.15E-01	1.98E-01	7.87E-01	6.15E-01
TEENAGER	TOTALS	1.89E+00	2.63E+01	2.14E+01	1.85E+00	7.28E+00	1.56E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	0.
ADULT	GROUND	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02
ADULT	CLOUD	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07	8.05E-07
ADULT	VEG.ING.	9.62E-01	1.25E+01	9.62E-01	1.16E+00	3.61E+00	9.62E-01
ADULT	MEAT ING	1.83E-01	2.43E+00	1.83E-01	2.96E-01	8.84E-01	1.83E-01
ADULT	MILK ING	2.93E-01	3.16E+00	2.93E-01	8.25E-02	2.95E-01	2.93E-01
ADULT	TOTALS	1.81E+00	2.61E+01	2.13E+01	1.92E+00	6.96E+00	1.48E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	2.57E+01
INFANT	GROUND	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01
INFANT	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.23E+00	1.22E+01	1.23E+00	5.20E-01	1.92E+00	1.23E+00
INFANT	TOTALS	2.36E+00	2.11E+01	2.18E+01	1.66E+00	4.86E+00	2.77E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	2.57E+01
CHILD	GROUND	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01
CHILD	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
CHILD	VEG.ING.	1.04E+00	1.27E+01	1.04E+00	1.42E+00	4.57E+00	1.04E+00
CHILD	MEAT ING	1.63E-01	2.07E+00	1.63E-01	2.96E-01	9.22E-01	1.63E-01
CHILD	MILK ING	1.08E+00	1.09E+01	1.08E+00	3.76E-01	1.41E+00	1.08E+00
CHILD	TOTALS	3.40E+00	3.45E+01	2.29E+01	3.23E+00	9.84E+00	2.88E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	2.57E+01
TEENAGER	GROUND	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01
TEENAGER	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
TEENAGER	VEG.ING.	7.88E-01	1.01E+01	7.88E-01	1.06E+00	3.62E+00	7.88E-01
TEENAGER	MEAT ING	1.19E-01	1.56E+00	1.19E-01	2.15E-01	7.07E-01	1.19E-01
TEENAGER	MILK ING	6.15E-01	6.58E+00	6.15E-01	1.98E-01	7.87E-01	6.15E-01
TEENAGER	TOTALS	2.65E+00	2.70E+01	2.21E+01	2.61E+00	8.04E+00	2.80E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.28E-01	8.02E+00	1.98E+01	3.35E-01	2.13E+00	2.57E+01
ADULT	GROUND	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01	7.48E-01
ADULT	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
ADULT	VEG.ING.	9.62E-01	1.25E+01	9.62E-01	1.16E+00	3.61E+00	9.62E-01
ADULT	MEAT ING	1.83E-01	2.43E+00	1.83E-01	2.96E-01	8.84E-01	1.83E-01
ADULT	MILK ING	2.93E-01	3.16E+00	2.93E-01	8.25E-02	2.95E-01	2.93E-01
ADULT	TOTALS	2.57E+00	2.69E+01	2.20E+01	2.67E+00	7.72E+00	2.79E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.94E-02	1.28E+00	0.
INFANT	GROUND	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02
INFANT	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.51E-01	4.93E+00	4.51E-01	1.23E-01	8.63E-01	4.51E-01
INFANT	TOTALS	7.59E-01	1.02E+01	2.58E+01	2.48E-01	2.18E+00	4.86E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.94E-02	1.28E+00	0.
CHILD	GROUND	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02
CHILD	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
CHILD	VEG.ING.	3.18E-01	4.15E+00	3.18E-01	3.36E-01	1.25E+00	3.18E-01
CHILD	MEAT ING	4.63E-02	6.06E-01	4.63E-02	6.98E-02	2.35E-01	4.63E-02
CHILD	MILK ING	3.52E-01	4.09E+00	3.52E-01	8.88E-02	5.64E-01	3.52E-01
CHILD	TOTALS	1.02E+00	1.41E+01	2.61E+01	6.20E-01	3.37E+00	7.51E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.94E-02	1.28E+00	0.
TEENAGER	GROUND	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02
TEENAGER	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
TEENAGER	VEG.ING.	2.29E-01	3.04E+00	2.29E-01	2.51E-01	9.91E-01	2.29E-01
TEENAGER	MEAT ING	3.27E-02	4.36E-01	3.27E-02	5.06E-02	1.80E-01	3.27E-02
TEENAGER	MILK ING	1.86E-01	2.18E+00	1.86E-01	4.68E-02	3.16E-01	1.86E-01
TEENAGER	TOTALS	7.57E-01	1.09E+01	2.58E+01	4.73E-01	2.81E+00	4.84E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.94E-02	1.28E+00	0.
ADULT	GROUND	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02	3.56E-02
ADULT	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
ADULT	VEG.ING.	2.72E-01	3.62E+00	2.72E-01	2.75E-01	9.87E-01	2.72E-01
ADULT	MEAT ING	4.92E-02	6.63E-01	4.92E-02	6.98E-02	2.25E-01	4.92E-02
ADULT	MILK ING	8.53E-02	9.89E-01	8.53E-02	1.95E-02	1.18E-01	8.53E-02
ADULT	TOTALS	7.14E-01	1.05E+01	2.58E+01	4.89E-01	2.65E+00	4.42E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.96E-02	1.28E+00	1.43E+01
INFANT	GROUND	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01
INFANT	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.51E-01	4.93E+00	4.51E-01	1.23E-01	8.63E-01	4.51E-01
INFANT	TOTALS	9.94E-01	1.04E+01	2.61E+01	4.83E-01	2.42E+00	1.50E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.96E-02	1.28E+00	1.43E+01
CHILD	GROUND	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01
CHILD	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
CHILD	VEG.ING.	3.18E-01	4.15E+00	3.18E-01	3.36E-01	1.25E+00	3.18E-01
CHILD	MEAT ING	4.63E-02	6.06E-01	4.63E-02	6.99E-02	2.35E-01	4.63E-02
CHILD	MILK ING	3.52E-01	4.09E+00	3.52E-01	8.89E-02	5.64E-01	3.52E-01
CHILD	TOTALS	1.26E+00	1.43E+01	2.63E+01	8.55E-01	3.61E+00	1.53E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.96E-02	1.28E+00	1.43E+01
TEENAGER	GROUND	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01
TEENAGER	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
TEENAGER	VEG.ING.	2.29E-01	3.04E+00	2.29E-01	2.51E-01	9.92E-01	2.29E-01
TEENAGER	MEAT ING	3.27E-02	4.36E-01	3.27E-02	5.07E-02	1.80E-01	3.27E-02
TEENAGER	MILK ING	1.86E-01	2.18E+00	1.86E-01	4.68E-02	3.16E-01	1.86E-01
TEENAGER	TOTALS	9.92E-01	1.11E+01	2.61E+01	7.08E-01	3.04E+00	1.50E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.73E-01	5.21E+00	2.54E+01	8.96E-02	1.28E+00	1.43E+01
ADULT	GROUND	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.14E-01
ADULT	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
ADULT	VEG.ING.	2.72E-01	3.62E+00	2.72E-01	2.75E-01	9.87E-01	2.72E-01
ADULT	MEAT ING	4.92E-02	6.63E-01	4.92E-02	6.99E-02	2.25E-01	4.92E-02
ADULT	MILK ING	8.53E-02	9.89E-01	8.53E-02	1.95E-02	1.18E-01	8.53E-02
ADULT	TOTALS	9.49E-01	1.08E+01	2.60E+01	7.24E-01	2.88E+00	1.50E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE N DIRECTION, THETA EQUALS 0.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.057E-03	3.823E-04	1.508E-04	1.904E-04	1.907E+01	1.871E+01	9.960E+00	4.520E+00	3.738E-06	8.663E-05
2.5	3.336E-03	1.969E-04	7.816E-05	9.998E-05	8.936E+00	8.878E+00	6.383E+00	4.156E+00	6.422E-06	5.701E-05
3.5	1.848E-03	1.244E-04	4.951E-05	6.378E-05	5.527E+00	5.514E+00	4.534E+00	3.526E+00	8.488E-06	4.182E-05
4.5	1.106E-03	8.634E-05	3.440E-05	4.455E-05	3.901E+00	3.898E+00	3.435E+00	2.939E+00	9.985E-06	3.239E-05
7.5	3.390E-04	3.908E-05	1.561E-05	2.040E-05	1.981E+00	1.982E+00	1.885E+00	1.787E+00	1.238E-05	1.827E-05
15.0	5.919E-05	1.251E-05	5.007E-06	6.606E-06	8.397E-01	8.402E-01	8.303E-01	8.157E-01	1.385E-05	8.118E-06
25.0	1.864E-05	5.296E-06	2.121E-06	2.807E-06	4.592E-01	4.595E-01	4.595E-01	4.574E-01	1.411E-05	4.509E-06
35.0	9.350E-06	2.982E-06	1.195E-06	1.583E-06	3.089E-01	3.091E-01	3.101E-01	3.103E-01	1.404E-05	3.048E-06
45.0	5.651E-06	1.992E-06	7.981E-07	1.058E-06	2.291E-01	2.293E-01	2.303E-01	2.308E-01	1.389E-05	2.265E-06
55.0	3.738E-06	1.414E-06	5.666E-07	7.516E-07	1.797E-01	1.798E-01	1.807E-01	1.813E-01	1.371E-05	1.778E-06
65.0	2.587E-06	1.018E-06	4.079E-07	5.413E-07	1.462E-01	1.462E-01	1.470E-01	1.475E-01	1.352E-05	1.446E-06
75.0	1.839E-06	7.308E-07	2.929E-07	3.886E-07	1.219E-01	1.220E-01	1.226E-01	1.231E-01	1.331E-05	1.206E-06

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	2.127E+04	6.888E+03	2.716E+03	2.716E+03	2.716E+03	2.731E+03	2.731E+03	2.731E+03	4.669E+00
2.5	1.165E+04	3.335E+03	1.326E+03	1.326E+03	1.326E+03	1.333E+03	1.333E+03	1.333E+03	8.022E+00
3.5	6.469E+03	2.047E+03	8.151E+02	8.151E+02	8.151E+02	8.195E+02	8.195E+02	8.195E+02	1.060E+01
4.5	3.886E+03	1.388E+03	5.529E+02	5.529E+02	5.529E+02	5.560E+02	5.560E+02	5.560E+02	1.247E+01
7.5	1.206E+03	5.914E+02	2.357E+02	2.357E+02	2.357E+02	2.373E+02	2.373E+02	2.373E+02	1.546E+01
15.0	2.160E+02	1.671E+02	6.663E+01	6.663E+01	6.663E+01	6.730E+01	6.730E+01	6.730E+01	1.730E+01
25.0	6.866E+01	6.239E+01	2.490E+01	2.490E+01	2.490E+01	2.526E+01	2.526E+01	2.526E+01	1.763E+01
35.0	3.436E+01	3.185E+01	1.271E+01	1.271E+01	1.271E+01	1.296E+01	1.296E+01	1.296E+01	1.754E+01
45.0	2.073E+01	1.961E+01	7.827E+00	7.827E+00	7.827E+00	8.008E+00	8.008E+00	8.008E+00	1.736E+01
55.0	1.368E+01	1.307E+01	5.216E+00	5.216E+00	5.216E+00	5.359E+00	5.359E+00	5.359E+00	1.713E+01
65.0	9.445E+00	8.963E+00	3.578E+00	3.578E+00	3.578E+00	3.694E+00	3.694E+00	3.694E+00	1.688E+01
75.0	6.689E+00	6.202E+00	2.476E+00	2.476E+00	2.476E+00	2.573E+00	2.573E+00	2.573E+00	1.663E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	6.277E-05	2.043E-05	8.090E-06	1.045E-05
2.5	3.438E-05	9.894E-06	3.950E-06	5.206E-06
3.5	1.909E-05	6.073E-06	2.428E-06	3.225E-06
4.5	1.147E-05	4.117E-06	1.647E-06	2.203E-06
7.5	3.559E-06	1.754E-06	7.019E-07	9.650E-07
15.0	6.376E-07	4.954E-07	1.984E-07	3.045E-07
25.0	2.027E-07	1.850E-07	7.411E-08	1.407E-07
35.0	1.014E-07	9.442E-08	3.783E-08	9.235E-08
45.0	6.120E-08	5.811E-08	2.329E-08	7.261E-08
55.0	4.040E-08	3.872E-08	1.552E-08	6.175E-08
65.0	2.788E-08	2.656E-08	1.064E-08	5.469E-08
75.0	1.974E-08	1.838E-08	7.365E-09	4.972E-08

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE ENE DIRECTION, THETA EQUALS 67.5 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	7.431E-03	5.779E-03	2.321E-03	3.096E-03	2.704E+01	2.566E+01	1.168E+01	4.622E+00	3.115E-06	1.029E-04
2.5	3.886E-03	3.116E-03	1.251E-03	1.669E-03	1.094E+01	1.069E+01	6.970E+00	4.222E+00	5.702E-06	6.209E-05
3.5	2.157E-03	1.716E-03	6.888E-04	9.181E-04	6.275E+00	6.203E+00	4.745E+00	3.527E+00	7.661E-06	4.361E-05
4.5	1.319E-03	1.104E-03	4.430E-04	5.904E-04	4.254E+00	4.229E+00	3.514E+00	2.912E+00	9.086E-06	3.304E-05
7.5	4.465E-04	4.469E-04	1.793E-04	2.389E-04	2.072E+00	2.070E+00	1.895E+00	1.761E+00	1.150E-05	1.831E-05
15.0	9.972E-05	1.296E-04	5.198E-05	6.924E-05	8.423E-01	8.428E-01	8.180E-01	7.921E-01	1.288E-05	7.970E-06
25.0	3.754E-05	5.261E-05	2.111E-05	2.811E-05	4.502E-01	4.505E-01	4.468E-01	4.408E-01	1.305E-05	4.374E-06
35.0	2.049E-05	2.902E-05	1.164E-05	1.551E-05	2.990E-01	2.992E-01	2.990E-01	2.975E-01	1.292E-05	2.934E-06
45.0	1.325E-05	1.916E-05	7.687E-06	1.024E-05	2.205E-01	2.206E-01	2.211E-01	2.209E-01	1.275E-05	2.172E-06
55.0	9.251E-06	1.362E-05	5.465E-06	7.280E-06	1.723E-01	1.724E-01	1.731E-01	1.733E-01	1.256E-05	1.701E-06
65.0	6.664E-06	9.847E-06	3.950E-06	5.263E-06	1.396E-01	1.397E-01	1.404E-01	1.407E-01	1.237E-05	1.380E-06
75.0	4.871E-06	7.098E-06	2.848E-06	3.794E-06	1.160E-01	1.161E-01	1.166E-01	1.170E-01	1.217E-05	1.147E-06

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	3.663E+04	1.103E+05	4.413E+04	4.413E+04	4.413E+04	4.415E+04	4.415E+04	4.415E+04	3.891E+00
2.5	1.891E+04	5.744E+04	2.298E+04	2.298E+04	2.298E+04	2.299E+04	2.299E+04	2.299E+04	7.123E+00
3.5	1.035E+04	3.072E+04	1.229E+04	1.229E+04	1.229E+04	1.229E+04	1.229E+04	1.229E+04	9.570E+00
4.5	6.365E+03	1.928E+04	7.708E+03	7.708E+03	7.708E+03	7.712E+03	7.712E+03	7.712E+03	1.135E+01
7.5	2.225E+03	7.345E+03	2.936E+03	2.936E+03	2.936E+03	2.937E+03	2.937E+03	2.937E+03	1.436E+01
15.0	5.167E+02	1.900E+03	7.590E+02	7.590E+02	7.590E+02	7.597E+02	7.597E+02	7.597E+02	1.609E+01
25.0	1.899E+02	6.904E+02	2.758E+02	2.758E+02	2.758E+02	2.761E+02	2.761E+02	2.761E+02	1.630E+01
35.0	1.001E+02	3.483E+02	1.391E+02	1.391E+02	1.391E+02	1.394E+02	1.394E+02	1.394E+02	1.613E+01
45.0	6.303E+01	2.130E+02	8.506E+01	8.506E+01	8.506E+01	8.523E+01	8.523E+01	8.523E+01	1.592E+01
55.0	4.315E+01	1.425E+02	5.691E+01	5.691E+01	5.691E+01	5.705E+01	5.705E+01	5.705E+01	1.570E+01
65.0	3.054E+01	9.835E+01	3.928E+01	3.928E+01	3.928E+01	3.939E+01	3.939E+01	3.939E+01	1.546E+01
75.0	2.195E+01	6.850E+01	2.736E+01	2.736E+01	2.736E+01	2.746E+01	2.746E+01	2.746E+01	1.521E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	1.083E-04	3.271E-04	1.314E-04	1.756E-04
2.5	5.590E-05	1.704E-04	6.846E-05	9.142E-05
3.5	3.061E-05	9.113E-05	3.660E-05	4.886E-05
4.5	1.882E-05	5.718E-05	2.296E-05	3.065E-05
7.5	6.580E-06	2.179E-05	8.743E-06	1.168E-05
15.0	1.528E-06	5.635E-06	2.260E-06	3.047E-06
25.0	5.616E-07	2.047E-06	8.210E-07	1.132E-06
35.0	2.959E-07	1.033E-06	4.142E-07	5.898E-07
45.0	1.863E-07	6.313E-07	2.532E-07	3.751E-07
55.0	1.276E-07	4.224E-07	1.694E-07	2.631E-07
65.0	9.027E-08	2.915E-07	1.169E-07	1.927E-07
75.0	6.487E-08	2.030E-07	8.142E-08	1.449E-07

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE E DIRECTION, THETA EQUALS 90.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	5.473E-03	1.410E-02	5.667E-03	7.576E-03	2.154E+01	2.015E+01	8.096E+00	2.938E+00	1.854E-06	7.276E-05
2.5	2.355E-03	3.234E-03	1.299E-03	1.736E-03	7.304E+00	7.142E+00	4.567E+00	2.689E+00	3.485E-06	4.054E-05
3.5	1.258E-03	1.392E-03	5.590E-04	7.463E-04	4.000E+00	3.959E+00	3.021E+00	2.218E+00	4.665E-06	2.767E-05
4.5	7.547E-04	7.706E-04	3.095E-04	4.130E-04	2.641E+00	2.628E+00	2.192E+00	1.807E+00	5.499E-06	2.056E-05
7.5	2.499E-04	2.418E-04	9.709E-05	1.295E-04	1.229E+00	1.228E+00	1.133E+00	1.055E+00	6.799E-06	1.094E-05
15.0	5.502E-05	5.389E-05	2.163E-05	2.881E-05	4.824E-01	4.827E-01	4.706E-01	4.572E-01	7.434E-06	4.588E-06
25.0	2.091E-05	1.911E-05	7.667E-06	1.021E-05	2.546E-01	2.548E-01	2.533E-01	2.505E-01	7.448E-06	2.481E-06
35.0	1.154E-05	9.972E-06	4.000E-06	5.324E-06	1.688E-01	1.689E-01	1.690E-01	1.684E-01	7.360E-06	1.659E-06
45.0	7.494E-06	6.469E-06	2.595E-06	3.454E-06	1.245E-01	1.246E-01	1.249E-01	1.249E-01	7.267E-06	1.228E-06
55.0	5.251E-06	4.560E-06	1.829E-06	2.434E-06	9.732E-02	9.738E-02	9.778E-02	9.796E-02	7.164E-06	9.614E-07
65.0	3.808E-06	3.282E-06	1.316E-06	1.752E-06	7.889E-02	7.893E-02	7.931E-02	7.953E-02	7.056E-06	7.800E-07
75.0	2.816E-06	2.359E-06	9.461E-07	1.259E-06	6.556E-02	6.560E-02	6.593E-02	6.615E-02	6.943E-06	6.486E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	4.476E+04	2.750E+05	1.101E+05	1.101E+05	1.101E+05	1.101E+05	1.101E+05	1.101E+05	2.316E+00
2.5	1.370E+04	6.006E+04	2.404E+04	2.404E+04	2.404E+04	2.405E+04	2.405E+04	2.405E+04	4.354E+00
3.5	6.639E+03	2.499E+04	1.000E+04	1.000E+04	1.000E+04	1.001E+04	1.001E+04	1.001E+04	5.828E+00
4.5	3.834E+03	1.346E+04	5.385E+03	5.385E+03	5.385E+03	5.387E+03	5.387E+03	5.387E+03	6.869E+00
7.5	1.218E+03	3.946E+03	1.578E+03	1.578E+03	1.578E+03	1.579E+03	1.579E+03	1.579E+03	8.494E+00
15.0	2.577E+02	7.741E+02	3.094E+02	3.094E+02	3.094E+02	3.098E+02	3.098E+02	3.098E+02	9.287E+00
25.0	9.244E+01	2.423E+02	9.679E+01	9.679E+01	9.679E+01	9.699E+01	9.699E+01	9.699E+01	9.304E+00
35.0	4.895E+01	1.144E+02	4.570E+01	4.570E+01	4.570E+01	4.583E+01	4.583E+01	4.583E+01	9.194E+00
45.0	3.106E+01	6.824E+01	2.725E+01	2.725E+01	2.725E+01	2.735E+01	2.735E+01	2.735E+01	9.077E+00
55.0	2.141E+01	4.501E+01	1.798E+01	1.798E+01	1.798E+01	1.805E+01	1.805E+01	1.805E+01	8.949E+00
65.0	1.531E+01	3.079E+01	1.230E+01	1.230E+01	1.230E+01	1.236E+01	1.236E+01	1.236E+01	8.814E+00
75.0	1.117E+01	2.128E+01	8.501E+00	8.501E+00	8.501E+00	8.553E+00	8.553E+00	8.553E+00	8.672E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	1.326E-04	8.159E-04	3.279E-04	4.385E-04
2.5	4.054E-05	1.782E-04	7.161E-05	9.572E-05
3.5	1.964E-05	7.414E-05	2.979E-05	3.981E-05
4.5	1.134E-05	3.993E-05	1.604E-05	2.144E-05
7.5	3.602E-06	1.171E-05	4.700E-06	6.291E-06
15.0	7.618E-07	2.296E-06	9.212E-07	1.249E-06
25.0	2.732E-07	7.184E-07	2.881E-07	4.058E-07
35.0	1.446E-07	3.392E-07	1.360E-07	2.030E-07
45.0	9.176E-08	2.023E-07	8.111E-08	1.297E-07
55.0	6.324E-08	1.334E-07	5.349E-08	9.265E-08
65.0	4.522E-08	9.124E-08	3.659E-08	6.984E-08
75.0	3.298E-08	6.306E-08	2.529E-08	5.447E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE S DIRECTION, THETA EQUALS 180.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	2.844E-03	4.401E-04	1.763E-04	2.326E-04	1.359E+01	1.319E+01	6.170E+00	2.547E+00	1.880E-06	5.437E-05
2.5	1.504E-03	1.874E-04	5.893E-05	7.712E-05	5.001E+00	4.961E+00	3.419E+00	2.127E+00	3.024E-06	3.038E-05
3.5	8.301E-04	7.587E-05	3.032E-05	3.961E-05	2.833E+00	2.825E+00	2.274E+00	1.724E+00	3.887E-06	2.087E-05
4.5	4.981E-04	4.735E-05	1.892E-05	2.473E-05	1.924E+00	1.922E+00	1.673E+00	1.410E+00	4.533E-06	1.572E-05
7.5	1.581E-04	1.838E-05	7.349E-06	9.636E-06	9.257E-01	9.261E-01	8.781E-01	8.290E-01	5.538E-06	8.498E-06
15.0	3.087E-05	5.153E-06	2.062E-06	2.718E-06	3.735E-01	3.737E-01	3.692E-01	3.624E-01	6.048E-06	3.608E-06
25.0	1.083E-05	2.039E-06	8.162E-07	1.077E-06	2.021E-01	2.022E-01	2.022E-01	2.013E-01	6.142E-06	1.984E-06
35.0	5.767E-06	1.108E-06	4.436E-07	5.854E-07	1.353E-01	1.354E-01	1.358E-01	1.359E-01	6.099E-06	1.335E-06
45.0	3.622E-06	7.230E-07	2.894E-07	3.821E-07	1.001E-01	1.002E-01	1.006E-01	1.009E-01	6.029E-06	9.896E-07
55.0	2.468E-06	5.075E-07	2.032E-07	2.683E-07	7.840E-02	7.845E-02	7.884E-02	7.910E-02	5.945E-06	7.756E-07
65.0	1.758E-06	3.610E-07	1.445E-07	1.909E-07	6.366E-02	6.370E-02	6.403E-02	6.426E-02	5.854E-06	6.299E-07
75.0	1.288E-06	2.556E-07	1.023E-07	1.351E-07	5.302E-02	5.306E-02	5.334E-02	5.354E-02	5.760E-06	5.248E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.043E+04	8.113E+03	3.245E+03	3.245E+03	3.245E+03	3.256E+03	3.256E+03	3.256E+03	2.348E+00
2.5	5.345E+03	2.546E+03	1.018E+03	1.018E+03	1.018E+03	1.022E+03	1.022E+03	1.022E+03	3.778E+00
3.5	2.934E+03	1.259E+03	5.032E+02	5.032E+02	5.032E+02	5.054E+02	5.054E+02	5.054E+02	4.856E+00
4.5	1.761E+03	7.613E+02	3.042E+02	3.042E+02	3.042E+02	3.057E+02	3.057E+02	3.057E+02	5.663E+00
7.5	5.616E+02	2.743E+02	1.095E+02	1.095E+02	1.095E+02	1.102E+02	1.102E+02	1.102E+02	6.918E+00
15.0	1.106E+02	6.670E+01	2.663E+01	2.663E+01	2.663E+01	2.692E+01	2.692E+01	2.692E+01	7.555E+00
25.0	3.867E+01	2.285E+01	9.119E+00	9.119E+00	9.119E+00	9.279E+00	9.279E+00	9.279E+00	7.672E+00
35.0	2.044E+01	1.107E+01	4.417E+00	4.417E+00	4.417E+00	4.525E+00	4.525E+00	4.525E+00	7.619E+00
45.0	1.278E+01	6.569E+00	2.621E+00	2.621E+00	2.621E+00	2.701E+00	2.701E+00	2.701E+00	7.531E+00
55.0	8.679E+00	4.280E+00	1.708E+00	1.708E+00	1.708E+00	1.770E+00	1.770E+00	1.770E+00	7.427E+00
65.0	6.160E+00	2.869E+00	1.145E+00	1.145E+00	1.145E+00	1.195E+00	1.195E+00	1.195E+00	7.313E+00
75.0	4.095E+00	1.935E+00	7.719E-01	7.719E-01	7.719E-01	8.140E-01	8.140E-01	8.140E-01	7.196E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	3.078E-05	2.407E-05	9.667E-06	1.289E-05
2.5	1.577E-05	7.554E-06	3.032E-06	4.042E-06
3.5	8.660E-06	3.735E-06	1.499E-06	2.003E-06
4.5	5.197E-06	2.258E-06	9.058E-07	1.217E-06
7.5	1.658E-06	8.135E-07	3.261E-07	4.494E-07
15.0	3.265E-07	1.978E-07	7.927E-08	1.233E-07
25.0	1.101E-07	6.774E-08	2.714E-08	5.443E-08
35.0	6.032E-08	3.281E-08	1.314E-08	3.573E-08
45.0	3.771E-08	1.947E-08	7.798E-09	2.843E-08
55.0	2.561E-08	1.268E-08	5.080E-09	2.457E-08
65.0	1.818E-08	8.499E-09	3.405E-09	2.208E-08
75.0	1.327E-08	5.730E-09	2.295E-09	2.032E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE W DIRECTION, THETA EQUALS 270.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	4.949E-03	1.210E-04	4.756E-05	5.783E-05	1.569E+01	1.554E+01	9.078E+00	4.500E+00	4.199E-06	7.881E-05
2.5	2.786E-03	6.943E-05	2.732E-05	3.332E-05	7.552E+00	7.531E+00	5.706E+00	3.891E+00	6.560E-06	5.120E-05
3.5	1.538E-03	4.526E-05	1.787E-05	2.212E-05	4.771E+00	4.768E+00	4.064E+00	3.251E+00	8.375E-06	3.764E-05
4.5	9.112E-04	3.209E-05	1.270E-05	1.592E-05	3.403E+00	3.403E+00	3.082E+00	2.690E+00	9.658E-06	2.917E-05
7.5	2.674E-04	1.499E-05	5.962E-06	7.648E-06	1.753E+00	1.754E+00	1.696E+00	1.626E+00	1.168E-05	1.647E-05
15.0	4.071E-05	4.858E-06	1.941E-06	2.541E-06	7.463E-01	7.467E-01	7.431E-01	7.353E-01	1.282E-05	7.279E-06
25.0	1.135E-05	2.038E-06	8.155E-07	1.075E-06	4.064E-01	4.067E-01	4.078E-01	4.075E-01	1.292E-05	4.006E-06
35.0	5.391E-06	1.135E-06	4.545E-07	6.001E-07	2.728E-01	2.730E-01	2.742E-01	2.748E-01	1.279E-05	2.696E-06
45.0	3.154E-06	7.540E-07	3.019E-07	3.992E-07	2.020E-01	2.022E-01	2.032E-01	2.038E-01	1.262E-05	1.999E-06
55.0	2.044E-06	5.313E-07	2.128E-07	2.815E-07	1.583E-01	1.584E-01	1.592E-01	1.598E-01	1.243E-05	1.567E-06
65.0	1.401E-06	3.783E-07	1.515E-07	2.005E-07	1.287E-01	1.287E-01	1.294E-01	1.299E-01	1.223E-05	1.273E-06
75.0	9.951E-07	2.671E-07	1.070E-07	1.416E-07	1.073E-01	1.074E-01	1.079E-01	1.084E-01	1.204E-05	1.062E-06

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.698E+04	1.975E+03	7.854E+02	7.854E+02	7.854E+02	7.977E+02	7.977E+02	7.977E+02	5.246E+00
2.5	9.553E+03	1.094E+03	4.350E+02	4.350E+02	4.350E+02	4.409E+02	4.409E+02	4.409E+02	8.195E+00
3.5	5.281E+03	7.006E+02	2.788E+02	2.788E+02	2.788E+02	2.826E+02	2.826E+02	2.826E+02	1.046E+01
4.5	3.136E+03	4.894E+02	1.948E+02	1.948E+02	1.948E+02	1.975E+02	1.975E+02	1.975E+02	1.206E+01
7.5	9.273E+02	2.179E+02	8.680E+01	8.680E+01	8.680E+01	8.819E+01	8.819E+01	8.819E+01	1.459E+01
15.0	1.437E+02	6.236E+01	2.486E+01	2.486E+01	2.486E+01	2.545E+01	2.545E+01	2.545E+01	1.602E+01
25.0	4.042E+01	2.268E+01	9.045E+00	9.045E+00	9.045E+00	9.367E+00	9.367E+00	9.367E+00	1.614E+01
35.0	1.918E+01	1.123E+01	4.479E+00	4.479E+00	4.479E+00	4.695E+00	4.695E+00	4.695E+00	1.597E+01
45.0	1.120E+01	6.755E+00	2.695E+00	2.695E+00	2.695E+00	2.855E+00	2.855E+00	2.855E+00	1.576E+01
55.0	7.248E+00	4.405E+00	1.758E+00	1.758E+00	1.758E+00	1.883E+00	1.883E+00	1.883E+00	1.552E+01
65.0	4.954E+00	2.949E+00	1.177E+00	1.177E+00	1.177E+00	1.279E+00	1.279E+00	1.279E+00	1.528E+01
75.0	3.505E+00	1.980E+00	7.900E-01	7.900E-01	7.900E-01	8.751E-01	8.751E-01	8.751E-01	1.504E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	5.012E-05	5.858E-06	2.339E-06	3.068E-06
2.5	2.819E-05	3.244E-06	1.295E-06	1.712E-06
3.5	1.558E-05	2.078E-06	8.303E-07	1.113E-06
4.5	9.255E-06	1.452E-06	5.803E-07	7.905E-07
7.5	2.736E-06	6.464E-07	2.585E-07	3.755E-07
15.0	4.240E-07	1.849E-07	7.402E-08	1.363E-07
25.0	1.193E-07	6.723E-08	2.692E-08	7.441E-08
35.0	5.660E-08	3.328E-08	1.333E-08	5.602E-08
45.0	3.307E-08	2.002E-08	8.017E-09	4.847E-08
55.0	2.139E-08	1.305E-08	5.227E-09	4.421E-08
65.0	1.462E-08	8.734E-09	3.499E-09	4.134E-08
75.0	1.034E-08	5.864E-09	2.349E-09	3.923E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	9.312E-03	0.	0.	0.	5.983E-04	2.460E-04	7.754E-05	2.590E-05	1.321E-04	4.640E-05	3.618E-05	9.806E-06
NNE	0.	0.	0.	0.	6.492E-04	1.873E-04	2.535E-04	5.194E-05	1.087E-05	1.086E-04	1.202E-04	1.321E-05
NE	0.	0.	3.117E-03	0.	1.354E-03	5.338E-04	7.312E-04	2.273E-04	5.561E-06	1.355E-05	1.363E-04	3.530E-04
ENE	0.	0.	2.266E-03	0.	4.715E-04	2.042E-03	8.470E-04	3.599E-04	4.766E-05	1.108E-04	1.040E-04	0.
E	0.	0.	0.	0.	3.917E-03	8.943E-04	5.906E-04	1.483E-02	7.541E-04	4.627E-05	4.671E-05	4.438E-05
ESE	0.	0.	0.	2.960E-04	1.234E-03	2.839E-04	3.780E-04	1.856E-04	2.903E-04	1.227E-04	4.637E-06	2.494E-05
SE	0.	0.	3.094E-04	1.193E-04	5.355E-04	4.043E-05	8.981E-05	1.757E-04	1.318E-04	2.289E-05	8.093E-05	5.276E-04
SSE	0.	0.	1.328E-04	1.953E-04	1.114E-04	6.682E-05	2.671E-05	1.637E-05	9.541E-06	7.142E-06	3.980E-06	2.289E-05
S	0.	0.	0.	2.570E-04	1.141E-04	4.408E-04	1.854E-05	3.910E-05	2.855E-05	9.115E-07	2.169E-06	0.
SSW	0.	1.279E-03	1.278E-04	2.213E-04	1.002E-04	3.474E-04	1.421E-05	8.524E-05	5.538E-05	1.841E-05	5.810E-05	5.774E-04
SW	0.	0.	0.	2.385E-04	1.774E-03	4.652E-05	4.638E-03	2.107E-04	2.986E-05	6.995E-05	3.637E-05	6.047E-06
WSW	2.789E-03	6.053E-04	0.	0.	9.729E-04	2.015E-04	9.968E-03	3.641E-04	1.029E-04	1.870E-05	6.928E-06	5.836E-06
W	0.	0.	0.	0.	1.118E-03	2.160E-04	4.187E-04	1.309E-04	2.352E-04	1.841E-04	7.967E-06	6.883E-06
WNW	0.	0.	0.	0.	1.943E-04	2.219E-04	3.512E-04	2.427E-04	2.191E-05	2.125E-04	3.962E-06	3.525E-06
NW	0.	0.	0.	0.	2.038E-04	7.759E-05	5.014E-05	8.833E-05	6.355E-07	1.057E-04	2.660E-05	3.001E-06
NNW	3.287E-03	5.131E-04	0.	9.931E-05	3.088E-04	1.259E-04	6.775E-05	4.292E-05	4.418E-04	1.491E-04	7.785E-05	1.110E-04

TOTAL DOSE COMMITMENT IS 8.639E-02 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.851E-01	0.	0.	0.	1.314E-02	6.039E-03	2.024E-03	6.973E-04	3.644E-03	1.304E-03	1.032E-03	2.832E-04
NNE	0.	0.	0.	0.	1.683E-02	5.158E-03	7.157E-03	1.483E-03	3.133E-04	3.154E-03	3.513E-03	3.877E-04
NE	0.	0.	8.356E-02	0.	3.835E-02	1.566E-02	2.173E-02	6.793E-03	1.669E-04	4.081E-04	4.113E-03	1.067E-02
ENE	0.	0.	6.410E-02	0.	1.366E-02	6.056E-02	2.534E-02	1.081E-02	1.436E-03	3.350E-03	3.148E-03	0.
E	0.	0.	0.	0.	1.132E-01	2.603E-02	1.720E-02	4.318E-01	2.204E-02	1.357E-03	1.373E-03	1.306E-03
ESE	0.	0.	0.	8.446E-03	3.500E-02	8.054E-03	1.069E-02	5.248E-03	8.241E-03	3.496E-03	1.325E-04	7.127E-04
SE	0.	0.	8.253E-03	3.171E-03	1.429E-02	1.093E-03	2.431E-03	4.766E-03	3.601E-03	6.298E-04	2.238E-03	1.463E-02
SSE	0.	0.	3.291E-03	4.789E-03	2.733E-03	1.683E-03	6.810E-04	4.221E-04	2.496E-04	1.896E-04	1.070E-04	6.223E-04
S	0.	0.	0.	5.448E-03	2.512E-03	1.045E-02	4.577E-04	9.894E-04	7.402E-04	2.415E-05	5.852E-05	0.
SSW	0.	2.532E-02	2.524E-03	4.427E-03	2.102E-03	8.025E-03	3.494E-04	2.175E-03	1.459E-03	4.975E-04	1.603E-03	1.621E-02
SW	0.	0.	0.	4.508E-03	3.448E-02	9.887E-04	1.078E-01	5.213E-03	7.754E-04	1.885E-03	1.008E-03	1.714E-04
WSW	5.397E-02	1.176E-02	0.	0.	2.043E-02	4.705E-03	2.491E-01	9.447E-03	2.751E-03	5.119E-04	1.932E-04	1.653E-04
W	0.	0.	0.	0.	2.226E-02	4.921E-03	1.052E-02	3.462E-03	6.454E-03	5.189E-03	2.289E-04	2.007E-04
WNW	0.	0.	0.	0.	3.714E-03	4.761E-03	8.444E-03	6.257E-03	5.938E-04	5.960E-03	1.139E-04	1.031E-04
NW	0.	0.	0.	0.	4.180E-03	1.793E-03	1.263E-03	2.336E-03	1.743E-05	2.978E-03	7.645E-04	8.754E-05
NNW	6.546E-02	1.018E-02	0.	2.055E-03	6.847E-03	3.150E-03	1.812E-03	1.185E-03	1.250E-02	4.294E-03	2.271E-03	3.271E-03

TOTAL DOSE COMMITMENT IS 2.184E+00 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS AVG.LUNG

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	8.223E-01	0.	0.	0.	4.569E-02	1.511E-02	4.045E-03	1.210E-03	5.552E-03	1.765E-03	1.247E-03	3.055E-04
NNE	0.	0.	0.	0.	3.420E-02	8.235E-03	1.027E-02	2.018E-03	4.044E-04	3.882E-03	4.135E-03	4.360E-04
NE	0.	0.	1.444E-01	0.	5.157E-02	1.776E-02	2.335E-02	7.162E-03	1.727E-04	4.150E-04	4.115E-03	1.050E-02
ENE	0.	0.	8.414E-02	0.	1.607E-02	6.397E-02	2.608E-02	1.106E-02	1.454E-03	3.347E-03	3.107E-03	0.
E	0.	0.	0.	0.	1.354E-01	3.103E-02	2.101E-02	5.339E-01	2.687E-02	1.622E-03	1.609E-03	1.503E-03
ESE	0.	0.	0.	1.069E-02	4.707E-02	1.118E-02	1.540E-02	7.647E-03	1.185E-02	4.929E-03	1.836E-04	9.749E-04
SE	0.	0.	1.458E-02	5.729E-03	2.581E-02	1.912E-03	4.288E-03	8.377E-03	6.142E-03	1.037E-03	3.570E-03	2.270E-02
SSE	0.	0.	7.808E-03	1.184E-02	6.803E-03	3.876E-03	1.503E-03	8.891E-04	4.920E-04	3.475E-04	1.824E-04	9.846E-04
S	0.	0.	0.	2.074E-02	8.695E-03	2.933E-02	1.122E-03	2.201E-03	1.479E-03	4.338E-05	9.477E-05	0.
SSW	0.	1.138E-01	1.143E-02	1.946E-02	8.260E-03	2.430E-02	8.621E-04	4.626E-03	2.680E-03	7.957E-04	2.245E-03	1.992E-02
SW	0.	0.	0.	2.255E-02	1.622E-01	3.737E-03	3.113E-01	1.193E-02	1.427E-03	2.838E-03	1.263E-03	1.810E-04
WSW	2.555E-01	5.524E-02	0.	0.	7.995E-02	1.378E-02	5.809E-01	1.877E-02	4.712E-03	7.649E-04	2.538E-04	1.914E-04
W	0.	0.	0.	0.	9.911E-02	1.543E-02	2.374E-02	6.217E-03	9.479E-03	6.388E-03	2.400E-04	1.810E-04
WNW	0.	0.	0.	0.	1.811E-02	1.748E-02	2.171E-02	1.206E-02	8.840E-04	7.076E-03	1.107E-04	8.379E-05
NW	0.	0.	0.	0.	1.730E-02	5.385E-03	2.820E-03	4.208E-03	2.581E-05	3.696E-03	8.084E-04	7.969E-05
NNW	2.896E-01	4.553E-02	0.	8.312E-03	2.319E-02	7.380E-03	3.268E-03	1.820E-03	1.659E-02	5.012E-03	2.351E-03	3.007E-03

TOTAL DOSE COMMITMENT IS 4.899E+00 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BRONCHI

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.793E-01	0.	0.	0.	6.685E-02	4.933E-02	2.124E-02	8.108E-03	4.339E-02	1.561E-02	1.242E-02	3.429E-03
NNE	0.	0.	0.	0.	3.930E-02	1.561E-02	2.648E-02	6.197E-03	1.388E-03	1.468E-02	1.740E-02	2.069E-03
NE	0.	0.	8.393E-02	0.	4.002E-02	2.062E-02	3.475E-02	1.239E-02	3.268E-04	8.520E-04	9.321E-03	2.678E-02
ENE	0.	0.	4.314E-02	0.	1.165E-02	7.160E-02	3.827E-02	1.906E-02	2.756E-03	6.893E-03	7.069E-03	0.
E	0.	0.	0.	0.	1.052E-01	4.100E-02	3.836E-02	1.169E+00	6.543E-02	4.319E-03	4.733E-03	4.958E-03
ESE	0.	0.	0.	6.263E-03	3.605E-02	1.331E-02	2.395E-02	1.394E-02	2.396E-02	1.091E-02	4.485E-04	2.660E-03
SE	0.	0.	9.575E-03	4.065E-03	2.368E-02	2.669E-03	7.763E-03	1.778E-02	1.456E-02	2.712E-03	1.037E-02	7.389E-02
SSE	0.	0.	8.832E-03	1.392E-02	1.010E-02	9.287E-03	4.974E-03	3.502E-03	2.182E-03	1.704E-03	9.881E-04	5.906E-03
S	0.	0.	0.	2.044E-02	1.273E-02	8.427E-02	4.799E-03	1.158E-02	8.947E-03	2.940E-04	7.162E-04	0.
SSW	0.	1.178E-01	1.200E-02	2.263E-02	1.412E-02	8.610E-02	4.832E-03	3.284E-02	2.222E-02	7.460E-03	2.358E-02	2.333E-01
SW	0.	0.	0.	2.268E-02	2.747E-01	1.621E-02	2.407E+00	1.223E-01	1.747E-02	3.968E-02	1.968E-02	3.093E-03
WSW	2.347E-01	4.336E-02	0.	0.	1.281E-01	5.144E-02	3.548E+00	1.464E-01	4.267E-02	7.767E-03	2.859E-03	2.381E-03
W	0.	0.	0.	0.	1.699E-01	6.950E-02	1.936E-01	6.752E-02	1.225E-01	9.390E-02	3.941E-03	3.286E-03
WNW	0.	0.	0.	0.	3.244E-02	8.686E-02	2.066E-01	1.584E-01	1.420E-02	1.318E-01	2.319E-03	1.934E-03
NW	0.	0.	0.	0.	2.919E-02	2.317E-02	2.133E-02	4.226E-02	3.106E-04	5.113E-02	1.260E-02	1.383E-03
NNW	2.645E-01	3.463E-02	0.	8.125E-03	3.673E-02	2.793E-02	2.080E-02	1.505E-02	1.612E-01	5.533E-02	2.931E-02	4.236E-02

TOTAL DOSE COMMITMENT IS 1.333E+01 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS GROUND EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.213E-02	0.	0.	0.	2.540E-03	1.220E-03	3.593E-04	1.052E-04	4.720E-04	1.462E-04	9.993E-05	2.345E-05
NNE	0.	0.	0.	0.	4.877E-03	1.391E-03	1.703E-03	3.146E-04	6.008E-05	5.542E-04	5.702E-04	5.826E-05
NE	0.	0.	2.973E-02	0.	1.318E-02	4.842E-03	5.924E-03	1.666E-03	3.733E-05	8.462E-05	8.008E-04	1.966E-03
ENE	0.	0.	2.504E-02	0.	4.890E-03	1.909E-02	6.942E-03	2.631E-03	3.158E-04	6.772E-04	5.927E-04	0.
E	0.	0.	0.	0.	4.003E-02	7.804E-03	4.342E-03	9.462E-02	4.296E-03	2.400E-04	2.228E-04	1.951E-04
ESE	0.	0.	0.	3.155E-03	1.170E-02	2.231E-03	2.462E-03	1.044E-03	1.453E-03	5.584E-04	1.939E-05	9.598E-05
SE	0.	0.	2.872E-03	1.051E-03	4.297E-03	2.765E-04	5.106E-04	8.602E-04	5.737E-04	9.040E-05	2.914E-04	1.728E-03
SSE	0.	0.	9.855E-04	1.343E-03	6.872E-04	3.575E-04	1.178E-04	6.120E-05	3.115E-05	2.074E-05	1.032E-05	5.271E-05
S	0.	0.	0.	1.041E-03	4.810E-04	1.902E-03	6.942E-05	1.237E-04	7.809E-05	2.181E-06	4.512E-06	0.
SSW	0.	3.947E-03	3.699E-04	6.591E-04	3.343E-04	1.299E-03	4.793E-05	2.439E-04	1.362E-04	3.918E-05	1.062E-04	8.965E-04
SW	0.	0.	0.	5.017E-04	3.923E-03	1.131E-04	1.024E-02	3.919E-04	4.728E-05	9.520E-05	4.269E-05	6.146E-06
WSW	7.905E-03	1.675E-03	0.	0.	3.314E-03	7.942E-04	3.588E-02	1.113E-03	2.695E-04	4.218E-05	1.340E-05	9.592E-06
W	0.	0.	0.	0.	2.939E-03	7.622E-04	1.420E-03	3.743E-04	5.671E-04	3.745E-04	1.357E-05	9.720E-06
WNW	0.	0.	0.	0.	4.087E-04	6.119E-04	9.547E-04	5.580E-04	4.250E-05	3.461E-04	5.375E-06	3.962E-06
NW	0.	0.	0.	0.	6.470E-04	3.082E-04	1.917E-04	2.922E-04	1.814E-06	2.594E-04	5.555E-05	5.271E-06
NNW	1.129E-02	1.634E-03	0.	3.645E-04	1.372E-03	6.649E-04	3.305E-04	1.791E-04	1.587E-03	4.615E-04	2.056E-04	2.459E-04

TOTAL DOSE COMMITMENT IS 4.634E-01 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS CLOUD EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.251E-03	0.	0.	0.	1.064E-03	8.415E-04	3.709E-04	1.427E-04	7.657E-04	2.759E-04	2.196E-04	6.063E-05
NNE	0.	0.	0.	0.	6.004E-04	2.600E-04	4.571E-04	1.084E-04	2.442E-05	2.590E-04	3.074E-04	3.657E-05
NE	0.	0.	8.647E-04	0.	5.937E-04	3.378E-04	5.944E-04	2.157E-04	5.732E-06	1.500E-05	1.645E-04	4.730E-04
ENE	0.	0.	4.434E-04	0.	1.753E-04	1.185E-03	6.576E-04	3.325E-04	4.838E-05	1.214E-04	1.247E-04	0.
E	0.	0.	0.	0.	1.597E-03	6.834E-04	6.619E-04	2.044E-02	1.151E-03	7.614E-05	8.358E-05	8.762E-05
ESE	0.	0.	0.	7.405E-05	5.316E-04	2.184E-04	4.104E-04	2.430E-04	4.208E-04	1.922E-04	7.916E-06	4.700E-05
SE	0.	0.	9.621E-05	4.948E-05	3.560E-04	4.430E-05	1.339E-04	3.109E-04	2.562E-04	4.783E-05	1.831E-04	1.306E-03
SSE	0.	0.	9.356E-05	1.778E-04	1.579E-04	1.576E-04	8.666E-05	6.156E-05	3.848E-05	3.009E-05	1.746E-05	1.044E-04
S	0.	0.	0.	2.687E-04	2.012E-04	1.436E-03	8.380E-05	2.038E-04	1.579E-04	5.195E-06	1.266E-05	0.
SSW	0.	1.002E-03	1.374E-04	3.038E-04	2.254E-04	1.473E-03	8.454E-05	5.786E-04	3.923E-04	1.318E-04	4.169E-04	4.126E-03
SW	0.	0.	0.	3.141E-04	4.462E-03	2.800E-04	4.227E-02	2.158E-03	3.088E-04	7.015E-04	3.480E-04	5.470E-05
WSW	1.295E-03	4.027E-04	0.	0.	2.065E-03	8.837E-04	6.216E-02	2.580E-03	7.535E-04	1.373E-04	5.056E-05	4.211E-05
W	0.	0.	0.	0.	2.775E-03	1.201E-03	3.400E-03	1.191E-03	2.164E-03	1.660E-03	6.968E-05	5.811E-05
WNW	0.	0.	0.	0.	5.317E-04	1.505E-03	3.633E-03	2.797E-03	2.511E-04	2.330E-03	4.101E-05	3.419E-05
NW	0.	0.	0.	0.	4.750E-04	4.001E-04	3.747E-04	7.457E-04	5.489E-06	9.039E-04	2.229E-04	2.446E-05
NNW	1.374E-03	3.154E-04	0.	1.122E-04	5.933E-04	4.804E-04	3.648E-04	2.653E-04	2.848E-03	9.780E-04	5.182E-04	7.491E-04

TOTAL DOSE COMMITMENT IS 2.139E-01 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS VEG.ING. EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	5.732E-04	4.756E-04	4.035E-04	3.467E-04	1.195E-03	1.330E-03	8.565E-04	6.493E-04	5.512E-04	4.878E-04	4.381E-04	3.972E-04
NNE	1.011E-03	9.123E-04	7.858E-04	6.870E-04	2.453E-03	2.803E-03	1.815E-03	1.349E-03	1.108E-03	9.408E-04	8.019E-04	6.822E-04
NE	2.359E-03	2.701E-03	2.487E-03	2.235E-03	8.270E-03	9.722E-03	6.335E-03	4.681E-03	3.799E-03	3.181E-03	2.660E-03	2.206E-03
ENE	8.205E-03	7.123E-03	5.330E-03	4.299E-03	1.363E-02	1.409E-02	8.568E-03	6.086E-03	4.821E-03	3.980E-03	3.286E-03	2.684E-03
E	2.030E-02	7.415E-03	4.324E-03	2.997E-03	7.332E-03	5.766E-03	3.034E-03	2.030E-03	1.580E-03	1.295E-03	1.071E-03	8.794E-04
ESE	1.018E-02	2.484E-03	1.273E-03	8.633E-04	2.068E-03	1.650E-03	8.950E-04	6.111E-04	4.752E-04	3.889E-04	3.208E-04	2.632E-04
SE	2.875E-03	6.721E-04	3.960E-04	2.882E-04	7.828E-04	7.150E-04	4.107E-04	2.867E-04	2.263E-04	1.877E-04	1.563E-04	1.298E-04
SSE	1.060E-03	3.677E-04	2.103E-04	1.449E-04	3.538E-04	2.864E-04	1.590E-04	1.132E-04	9.186E-05	7.915E-05	6.963E-05	6.212E-05
S	6.321E-04	3.434E-04	2.401E-04	1.866E-04	5.557E-04	5.417E-04	3.259E-04	2.397E-04	2.009E-04	1.781E-04	1.610E-04	1.475E-04
SSW	4.458E-04	2.037E-04	1.472E-04	1.190E-04	3.716E-04	3.729E-04	2.310E-04	1.752E-04	1.513E-04	1.382E-04	1.291E-04	1.224E-04
SW	4.185E-04	2.694E-04	1.861E-04	1.418E-04	3.859E-04	3.304E-04	2.082E-04	1.745E-04	1.668E-04	1.678E-04	1.720E-04	1.780E-04
WSW	2.894E-04	2.606E-04	2.081E-04	1.717E-04	5.467E-04	5.533E-04	3.446E-04	2.632E-04	2.286E-04	2.093E-04	1.959E-04	1.862E-04
W	2.064E-04	1.916E-04	1.648E-04	1.423E-04	4.892E-04	5.377E-04	3.517E-04	2.785E-04	2.503E-04	2.362E-04	2.276E-04	2.222E-04
WNW	1.538E-04	1.139E-04	8.882E-05	7.102E-05	2.130E-04	2.101E-04	1.396E-04	1.167E-04	1.108E-04	1.099E-04	1.108E-04	1.128E-04
NW	1.651E-04	1.384E-04	1.134E-04	9.462E-05	3.071E-04	3.213E-04	2.083E-04	1.640E-04	1.455E-04	1.352E-04	1.279E-04	1.227E-04
NNW	2.947E-04	2.531E-04	2.153E-04	1.856E-04	6.450E-04	7.093E-04	4.429E-04	3.277E-04	2.754E-04	2.419E-04	2.157E-04	1.942E-04

TOTAL DOSE COMMITMENT IS 2.689E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS VEG.ING.   EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.427E-03	6.201E-03	5.244E-03	4.490E-03	1.538E-02	1.719E-02	1.139E-02	8.986E-03	7.955E-03	7.358E-03	6.927E-03	6.601E-03
NNE	1.276E-02	1.153E-02	9.920E-03	8.664E-03	3.087E-02	3.534E-02	2.306E-02	1.734E-02	1.444E-02	1.245E-02	1.082E-02	9.421E-03
NE	2.967E-02	3.390E-02	3.118E-02	2.800E-02	1.035E-01	1.217E-01	7.955E-02	5.905E-02	4.819E-02	4.062E-02	3.425E-02	2.871E-02
ENE	1.026E-01	8.908E-02	6.666E-02	5.376E-02	1.704E-01	1.763E-01	1.075E-01	7.676E-02	6.116E-02	5.084E-02	4.236E-02	3.501E-02
E	2.532E-01	9.259E-02	5.402E-02	3.745E-02	9.169E-02	7.227E-02	3.826E-02	2.583E-02	2.031E-02	1.686E-02	1.415E-02	1.186E-02
ESE	1.269E-01	3.102E-02	1.591E-02	1.080E-02	2.589E-02	2.072E-02	1.131E-02	7.799E-03	6.133E-03	5.085E-03	4.263E-03	3.571E-03
SE	3.589E-02	8.417E-03	4.968E-03	3.617E-03	9.836E-03	9.022E-03	5.236E-03	3.707E-03	2.974E-03	2.513E-03	2.143E-03	1.832E-03
SSE	1.325E-02	4.622E-03	2.652E-03	1.830E-03	4.482E-03	3.666E-03	2.088E-03	1.539E-03	1.296E-03	1.161E-03	1.065E-03	9.941E-04
S	8.018E-03	4.404E-03	3.090E-03	2.403E-03	7.152E-03	7.046E-03	4.396E-03	3.396E-03	2.993E-03	2.790E-03	2.656E-03	2.565E-03
SSW	5.689E-03	2.660E-03	1.930E-03	1.558E-03	4.848E-03	4.924E-03	3.197E-03	2.578E-03	2.362E-03	2.279E-03	2.246E-03	2.241E-03
SW	5.454E-03	3.580E-03	2.494E-03	1.904E-03	5.194E-03	4.607E-03	3.178E-03	2.915E-03	2.985E-03	3.162E-03	3.375E-03	3.606E-03
WSW	3.799E-03	3.426E-03	2.733E-03	2.249E-03	7.124E-03	7.293E-03	4.758E-03	3.860E-03	3.554E-03	3.437E-03	3.391E-03	3.388E-03
W	2.819E-03	2.621E-03	2.237E-03	1.915E-03	6.496E-03	7.208E-03	4.994E-03	4.251E-03	4.079E-03	4.080E-03	4.146E-03	4.247E-03
WNW	2.057E-03	1.554E-03	1.213E-03	9.677E-04	2.886E-03	2.914E-03	2.098E-03	1.911E-03	1.943E-03	2.036E-03	2.150E-03	2.273E-03
NW	2.178E-03	1.839E-03	1.503E-03	1.249E-03	4.024E-03	4.258E-03	2.899E-03	2.428E-03	2.283E-03	2.240E-03	2.233E-03	2.249E-03
NNW	3.8[illegible]3E-03	3.297E-03	2.796E-03	2.401E-03	8.288E-03	9.160E-03	5.900E-03	4.564E-03	4.020E-03	3.708E-03	3.485E-03	3.318E-03

TOTAL DOSE COMMITMENT IS 3.435E+00 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.524E-05	3.735E-05	3.188E-05	2.757E-05	9.647E-05	1.096E-04	7.203E-05	5.582E-05	4.850E-05	4.399E-05	4.057E-05	3.785E-05
NNE	8.265E-05	7.469E-05	6.449E-05	5.649E-05	2.026E-04	2.327E-04	1.514E-04	1.132E-04	9.357E-05	8.006E-05	6.890E-05	5.931E-05
NE	1.946E-04	2.236E-04	2.062E-04	1.855E-04	6.874E-04	8.098E-04	5.286E-04	3.914E-04	3.185E-04	2.674E-04	2.246E-04	1.872E-04
ENE	6.826E-04	5.926E-04	4.434E-04	3.576E-04	1.135E-03	1.174E-03	7.151E-04	5.090E-04	4.042E-04	3.347E-04	2.775E-04	2.280E-04
E	1.695E-03	6.182E-04	3.602E-04	2.496E-04	6.103E-04	4.802E-04	2.531E-04	1.699E-04	1.327E-04	1.095E-04	9.112E-05	7.555E-05
ESE	8.497E-04	2.071E-04	1.060E-04	7.184E-05	1.719E-04	1.371E-04	7.445E-05	5.097E-05	3.981E-05	3.277E-05	2.722E-05	2.255E-05
SE	2.399E-04	5.581E-05	3.282E-05	2.387E-05	6.480E-05	5.923E-05	3.409E-05	2.390E-05	1.899E-05	1.589E-05	1.338E-05	1.127E-05
SSE	8.819E-05	3.040E-05	1.732E-05	1.191E-05	2.906E-05	2.362E-05	1.323E-05	9.561E-06	7.901E-06	6.950E-06	6.258E-06	5.727E-06
S	5.161E-05	2.763E-05	1.924E-05	1.497E-05	4.485E-05	4.441E-05	2.724E-05	2.054E-05	1.770E-05	1.615E-05	1.505E-05	1.423E-05
SSW	3.612E-05	1.600E-05	1.151E-05	9.340E-06	2.959E-05	3.052E-05	1.949E-05	1.530E-05	1.369E-05	1.293E-05	1.248E-05	1.222E-05
SW	3.292E-05	2.061E-05	1.410E-05	1.075E-05	2.967E-05	2.674E-05	1.805E-05	1.609E-05	1.617E-05	1.688E-05	1.783E-05	1.889E-05
WSW	2.253E-05	2.027E-05	1.623E-05	1.347E-05	4.358E-05	4.542E-05	2.919E-05	2.306E-05	2.073E-05	1.960E-05	1.895E-05	1.857E-05
W	1.511E-05	1.402E-05	1.224E-05	1.073E-05	3.822E-05	4.416E-05	3.021E-05	2.499E-05	2.338E-05	2.287E-05	2.277E-05	2.292E-05
WNW	1.162E-05	8.361E-06	6.537E-06	5.267E-06	1.628E-05	1.716E-05	1.220E-05	1.080E-05	1.075E-05	1.106E-05	1.150E-05	1.201E-05
NW	1.275E-05	1.059E-05	8.732E-06	7.342E-06	2.435E-05	2.643E-05	1.777E-05	1.452E-05	1.335E-05	1.281E-05	1.251E-05	1.236E-05
NNW	2.328E-05	1.990E-05	1.703E-05	1.479E-05	5.219E-05	5.868E-05	3.743E-05	2.838E-05	2.447E-05	2.208E-05	2.028E-05	1.884E-05

TOTAL DOSE COMMITMENT IS 2.248E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.030E-04	5.004E-04	4.266E-04	3.685E-04	1.289E-03	1.487E-03	1.016E-03	8.277E-04	7.560E-04	7.206E-04	6.987E-04	6.850E-04
NNE	1.086E-03	9.842E-04	8.497E-04	7.443E-04	2.669E-03	3.079E-03	2.025E-03	1.537E-03	1.293E-03	1.129E-03	9.946E-04	8.808E-04
NE	2.560E-03	2.938E-03	2.709E-03	2.436E-03	9.028E-03	1.065E-02	6.981E-03	5.200E-03	4.262E-03	3.610E-03	3.064E-03	2.589E-03
ENE	8.963E-03	7.781E-03	5.821E-03	4.695E-03	1.490E-02	1.549E-02	9.441E-03	6.761E-03	5.411E-03	4.521E-03	3.792E-03	3.162E-03
E	2.223E-02	8.111E-03	4.728E-03	3.276E-03	8.015E-03	6.323E-03	3.357E-03	2.279E-03	1.805E-03	1.512E-03	1.283E-03	1.090E-03
ESE	1.114E-02	2.717E-03	1.391E-03	9.432E-04	2.259E-03	1.808E-03	9.892E-04	6.852E-04	5.427E-04	4.541E-04	3.850E-04	3.272E-04
SE	3.147E-03	7.333E-04	4.316E-04	3.139E-04	8.532E-04	7.836E-04	4.566E-04	3.258E-04	2.643E-04	2.264E-04	1.962E-04	1.711E-04
SSE	1.158E-03	4.001E-04	2.284E-04	1.572E-04	3.847E-04	3.168E-04	1.834E-04	1.383E-04	1.196E-04	1.101E-04	1.039E-04	9.969E-05
S	6.823E-04	3.673E-04	2.564E-04	1.995E-04	5.995E-04	6.049E-04	3.893E-04	3.118E-04	2.849E-04	2.748E-04	2.702E-04	2.688E-04
SSW	4.789E-04	2.147E-04	1.549E-04	1.257E-04	3.992E-04	4.225E-04	2.874E-04	2.428E-04	2.320E-04	2.320E-04	2.360E-04	2.420E-04
SW	4.412E-04	2.794E-04	1.922E-04	1.469E-04	4.093E-04	3.920E-04	2.969E-04	2.920E-04	3.135E-04	3.428E-04	3.746E-04	4.071E-04
WSW	3.031E-04	2.730E-04	2.187E-04	1.813E-04	5.876E-04	6.282E-04	4.297E-04	3.650E-04	3.499E-04	3.504E-04	3.564E-04	3.655E-04
W	2.081E-04	1.934E-04	1.682E-04	1.469E-04	5.223E-04	6.226E-04	4.601E-04	4.139E-04	4.148E-04	4.295E-04	4.489E-04	4.708E-04
WNW	1.579E-04	1.151E-04	9.015E-05	7.268E-05	2.258E-04	2.508E-04	1.978E-04	1.925E-04	2.046E-04	2.213E-04	2.392E-04	2.577E-04
NW	1.720E-04	1.435E-04	1.182E-04	9.929E-05	3.296E-04	3.681E-04	2.645E-04	2.327E-04	2.279E-04	2.312E-04	2.373E-04	2.450E-04
NNW	3.108E-04	2.666E-04	2.279E-04	1.976E-04	6.971E-04	7.961E-04	5.300E-04	4.246E-04	3.867E-04	3.683E-04	3.571E-04	3.503E-04

TOTAL DOSE COMMITMENT IS 3.027E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.383E-05	3.649E-05	3.079E-05	2.630E-05	8.935E-05	9.684E-05	6.032E-05	4.383E-05	3.544E-05	2.967E-05	2.496E-05	2.095E-05
NNE	7.495E-05	6.747E-05	5.798E-05	5.059E-05	1.798E-04	2.041E-04	1.310E-04	9.638E-05	7.818E-05	6.537E-05	5.467E-05	4.539E-05
NE	1.732E-04	1.977E-04	1.818E-04	1.632E-04	6.026E-04	7.066E-04	4.590E-04	3.378E-04	2.729E-04	2.272E-04	1.885E-04	1.548E-04
ENE	5.973E-04	5.186E-04	3.881E-04	3.130E-04	9.917E-04	1.023E-03	6.206E-04	4.392E-04	3.462E-04	2.840E-04	2.326E-04	1.879E-04
E	1.473E-03	5.387E-04	3.144E-04	2.180E-04	5.334E-04	4.190E-04	2.197E-04	1.460E-04	1.126E-04	9.135E-05	7.443E-05	5.997E-05
ESE	7.381E-04	1.805E-04	9.262E-05	6.284E-05	1.506E-04	1.201E-04	6.494E-05	4.406E-05	3.397E-05	2.749E-05	2.234E-05	1.797E-05
SE	2.088E-04	4.901E-05	2.894E-05	2.107E-05	5.725E-05	5.218E-05	2.981E-05	2.060E-05	1.604E-05	1.307E-05	1.065E-05	8.580E-06
SSE	7.714E-05	2.693E-05	1.546E-05	1.066E-05	2.605E-05	2.092E-05	1.139E-05	7.871E-06	6.150E-06	5.071E-06	4.232E-06	3.547E-06
S	4.682E-05	2.578E-05	1.809E-05	1.405E-05	4.153E-05	3.963E-05	2.302E-05	1.611E-05	1.273E-05	1.056E-05	8.827E-06	7.385E-06
SSW	3.326E-05	1.562E-05	1.133E-05	9.121E-06	2.807E-05	2.720E-05	1.597E-05	1.130E-05	9.020E-06	7.565E-06	6.431E-06	5.499E-06
SW	3.205E-05	2.111E-05	1.470E-05	1.119E-05	2.997E-05	2.397E-05	1.335E-05	9.727E-06	8.134E-06	7.237E-06	6.631E-06	6.202E-06
WSW	2.236E-05	2.015E-05	1.605E-05	1.317E-05	4.127E-05	4.025E-05	2.374E-05	1.691E-05	1.361E-05	1.147E-05	9.798E-06	8.430E-06
W	1.674E-05	1.555E-05	1.321E-05	1.126E-05	3.751E-05	3.887E-05	2.353E-05	1.697E-05	1.384E-05	1.180E-05	1.020E-05	8.898E-06
WNW	1.218E-05	9.215E-06	7.171E-06	5.696E-06	1.661E-05	1.511E-05	8.920E-06	6.527E-06	5.462E-06	4.798E-06	4.300E-06	3.908E-06
NW	1.285E-05	1.084E-05	8.842E-06	7.323E-06	2.328E-05	2.327E-05	1.416E-05	1.034E-05	8.459E-06	7.209E-06	6.211E-06	5.385E-06
NNW	2.251E-05	1.939E-05	1.640E-05	1.405E-05	4.809E-05	5.146E-05	3.098E-05	2.185E-05	1.738E-05	1.433E-05	1.184E-05	9.717E-06

TOTAL DOSE COMMITMENT IS 1.934E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.931E-04	4.148E-04	3.471E-04	2.938E-04	9.778E-04	1.041E-03	6.526E-04	4.828E-04	3.988E-04	3.426E-04	2.975E-04	2.598E-04
NNE	7.943E-04	7.149E-04	6.123E-04	5.324E-04	1.880E-03	2.124E-03	1.367E-03	1.010E-03	8.243E-04	6.941E-04	5.857E-04	4.920E-04
NE	1.812E-03	2.056E-03	1.885E-03	1.689E-03	6.216E-03	7.274E-03	4.730E-03	3.489E-03	2.825E-03	2.358E-03	1.965E-03	1.621E-03
ENE	6.152E-03	5.340E-03	3.998E-03	3.223E-03	1.020E-02	1.052E-02	6.389E-03	4.532E-03	3.582E-03	2.948E-03	2.425E-03	1.970E-03
E	1.507E-02	5.525E-03	3.229E-03	2.241E-03	5.489E-03	4.319E-03	2.274E-03	1.519E-03	1.178E-03	9.613E-04	7.892E-04	6.424E-04
ESE	7.546E-03	1.852E-03	9.525E-04	6.470E-04	1.554E-03	1.243E-03	6.760E-04	4.615E-04	3.580E-04	2.917E-04	2.391E-04	1.945E-04
SE	2.139E-03	5.066E-04	3.002E-04	2.189E-04	5.958E-04	5.450E-04	3.137E-04	2.187E-04	1.718E-04	1.414E-04	1.166E-04	9.553E-05
SSE	7.943E-04	2.808E-04	1.623E-04	1.124E-04	2.757E-04	2.228E-04	1.231E-04	8.676E-05	6.919E-05	5.832E-05	4.999E-05	4.325E-05
S	4.994E-04	2.822E-04	1.993E-04	1.548E-04	4.546E-04	4.313E-04	2.545E-04	1.829E-04	1.487E-04	1.274E-04	1.107E-04	9.716E-05
SSW	3.597E-04	1.778E-04	1.299E-04	1.041E-04	3.153E-04	3.009E-04	1.796E-04	1.312E-04	1.086E-04	9.481E-05	8.450E-05	7.634E-05
SW	3.636E-04	2.493E-04	1.762E-04	1.342E-04	3.567E-04	2.829E-04	1.634E-04	1.262E-04	1.119E-04	1.054E-04	1.022E-04	1.008E-04
WSW	2.576E-04	2.326E-04	1.846E-04	1.504E-04	4.625E-04	4.431E-04	2.653E-04	1.950E-04	1.625E-04	1.425E-04	1.276E-04	1.158E-04
W	2.086E-04	1.942E-04	1.623E-04	1.359E-04	4.354E-04	4.351E-04	2.670E-04	2.002E-04	1.706E-04	1.528E-04	1.399E-04	1.300E-04
WNW	1.460E-04	1.146E-04	8.909E-05	7.029E-05	1.997E-04	1.759E-04	1.062E-04	8.190E-05	7.247E-05	6.754E-05	6.446E-05	6.252E-05
NW	1.496E-04	1.280E-04	1.037E-04	8.502E-05	2.636E-04	2.570E-04	1.583E-04	1.191E-04	1.009E-04	8.957E-05	8.093E-05	7.410E-05
NNW	2.534E-04	2.199E-04	1.845E-04	1.565E-04	5.242E-04	5.506E-04	3.339E-04	2.404E-04	1.960E-04	1.665E-04	1.429E-04	1.232E-04

TOTAL DOSE COMMITMENT IS 2.023E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

SUMMARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 2--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	8.639E-02	2.184E+00	4.899E+00	1.275E-01	6.735E-01	1.333E+01
GROUND	4.634E-01	4.634E-01	4.634E-01	4.634E-01	4.634E-01	4.634E-01
CLOUD	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01
VEG.ING.	2.689E-01	3.435E+00	2.689E-01	3.716E-01	1.168E+00	2.689E-01
MEAT ING	2.248E-02	3.027E-01	2.248E-02	4.259E-02	1.290E-01	2.248E-02
MILK ING	1.934E-02	2.023E-01	1.934E-02	7.230E-03	2.481E-02	1.934E-02
RNPLUS50	0.	0.	0.	0.	0.	0.
TOTALS	1.074E+00	6.802E+00	5.887E+00	1.226E+00	2.672E+00	1.432E+01

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.	0.	0.	0.	0.	0.
GROUND	0.	0.	0.	0.	0.	0.
CLOUD	0.	0.	0.	0.	0.	0.
VEG.ING.	0.	0.	0.	0.	0.	0.
MEAT ING	0.	0.	0.	0.	0.	0.
MILK ING	0.	0.	0.	0.	0.	0.
RNPLUS50	2.660E+00	3.568E+01	5.838E-01	2.660E+00	2.660E+00	1.687E+01
TOTALS	2.660E+00	3.568E+01	5.838E-01	2.660E+00	2.660E+00	1.687E+01

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	8.639E-02	2.184E+00	4.899E+00	1.275E-01	6.735E-01	1.333E+01
GROUND	4.634E-01	4.634E-01	4.634E-01	4.634E-01	4.634E-01	4.634E-01
CLOUD	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01	2.139E-01
VEG.ING.	2.689E-01	3.435E+00	2.689E-01	3.716E-01	1.168E+00	2.689E-01
MEAT ING	2.248E-02	3.027E-01	2.248E-02	4.259E-02	1.290E-01	2.248E-02
MILK ING	1.934E-02	2.023E-01	1.934E-02	7.230E-03	2.481E-02	1.934E-02
RNPLUS50	2.660E+00	3.568E+01	5.838E-01	2.660E+00	2.660E+00	1.687E+01
TOTALS	3.734E+00	4.248E+01	6.470E+00	3.886E+00	5.332E+00	3.119E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTS7	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
1	NORTH BOUNDARY	1	1.944E-02	5.299E-05	1.750E-05	1.489E-06	6.590E+04	1.796E+02	5.907E+01	5.907E+01
1	NORTH BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
1	NORTH BOUNDARY	3	8.280E-05	4.093E-04	1.645E-04	2.200E-04	2.806E+02	1.387E+03	5.552E+02	5.552E+02
1	NORTH BOUNDARY	4	1.403E-04	6.265E-04	2.516E-04	3.359E-04	4.170E+03	1.862E+04	7.448E+03	7.448E+03
	CONCENTRATION TOTALS		1.967E-02	1.089E-03	4.336E-04	5.574E-04	7.035E+04	2.018E+04	8.062E+03	8.062E+03
2	NORTHEAST BOUNDARY	1	4.222E-03	1.147E-05	3.788E-06	3.219E-07	1.431E+04	3.886E+01	1.278E+01	1.278E+01
2	NORTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
2	NORTHEAST BOUNDARY	3	7.551E-04	6.421E-03	2.581E-03	3.456E-03	2.559E+03	2.176E+04	8.713E+03	8.713E+03
2	NORTHEAST BOUNDARY	4	1.243E-03	1.057E-02	4.250E-03	5.683E-03	3.694E+04	3.142E+05	1.258E+05	1.258E+05
	CONCENTRATION TOTALS		6.221E-03	1.701E-02	6.835E-03	9.139E-03	5.381E+04	3.360E+05	1.345E+05	1.345E+05
3	SOUTHEAST BOUNDARY	1	3.716E-04	9.949E-07	3.292E-07	2.787E-08	1.260E+03	3.372E+00	1.111E+00	1.111E+00
3	SOUTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
3	SOUTHEAST BOUNDARY	3	3.673E-05	3.159E-04	1.270E-04	1.700E-04	1.245E+02	1.070E+03	4.285E+02	4.285E+02
3	SOUTHEAST BOUNDARY	4	5.250E-05	4.524E-04	1.818E-04	2.430E-04	1.560E+03	1.344E+04	5.381E+03	5.381E+03
	CONCENTRATION TOTALS		4.609E-04	7.692E-04	3.091E-04	4.130E-04	2.944E+03	1.451E+04	5.810E+03	5.810E+03
4	SOUTHWEST BOUNDARY	1	1.759E-03	4.783E-06	1.580E-06	1.343E-07	5.960E+03	1.621E+01	5.332E+00	5.332E+00
4	SOUTHWEST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
4	SOUTHWEST BOUNDARY	3	1.733E-05	1.458E-04	5.861E-05	7.843E-05	5.872E+01	4.942E+02	1.978E+02	1.978E+02
4	SOUTHWEST BOUNDARY	4	2.325E-05	1.949E-04	7.832E-05	1.046E-04	6.910E+02	5.792E+03	2.318E+03	2.318E+03
	CONCENTRATION TOTALS		1.799E-03	3.456E-04	1.385E-04	1.832E-04	6.710E+03	6.303E+03	2.521E+03	2.521E+03
5	NEAREST RESIDENT	1	2.318E-02	6.209E-05	2.054E-05	1.739E-06	7.858E+04	2.104E+02	6.934E+01	6.934E+01
5	NEAREST RESIDENT	2	0.	0.	0.	0.	0.	0.	0.	0.
5	NEAREST RESIDENT	3	5.006E-05	3.105E-04	1.241E-04	1.643E-04	1.697E+02	1.052E+03	4.190E+02	4.190E+02
5	NEAREST RESIDENT	4	7.480E-05	4.476E-04	1.787E-04	2.357E-04	2.223E+03	1.330E+04	5.290E+03	5.290E+03
	CONCENTRATION TOTALS		2.331E-02	8.203E-04	3.234E-04	4.017E-04	8.097E+04	1.456E+04	5.778E+03	5.778E+03
6	ENV MONITOR STA A	1	1.016E-02	2.721E-05	9.003E-06	7.624E-07	3.443E+04	9.222E+01	3.039E+01	3.039E+01
6	ENV MONITOR STA A	2	0.	0.	0.	0.	0.	0.	0.	0.
6	ENV MONITOR STA A	3	5.877E-05	3.844E-04	1.521E-04	1.971E-04	1.992E+02	1.303E+03	5.135E+02	5.135E+02
6	ENV MONITOR STA A	4	8.742E-05	5.615E-04	2.215E-04	2.848E-04	2.598E+03	1.668E+04	6.556E+03	6.556E+03
	CONCENTRATION TOTALS		1.030E-02	9.731E-04	3.826E-04	4.826E-04	3.722E+04	1.808E+04	7.100E+03	7.100E+03
7	NEAREST DOWNWIND RES	1	1.183E-03	3.124E-06	1.035E-06	8.730E-08	4.010E+03	1.059E+01	3.494E+00	3.494E+00
7	NEAREST DOWNWIND RES	2	0.	0.	0.	0.	0.	0.	0.	0.
7	NEAREST DOWNWIND RES	3	6.452E-05	5.112E-04	2.052E-04	2.740E-04	2.187E+02	1.732E+03	6.926E+02	6.926E+02
7	NEAREST DOWNWIND RES	4	7.945E-05	6.287E-04	2.522E-04	3.357E-04	2.361E+03	1.868E+04	7.464E+03	7.464E+03
	CONCENTRATION TOTALS		1.327E-03	1.143E-03	4.584E-04	6.098E-04	6.590E+03	2.042E+04	8.160E+03	8.160E+03
8	NEAREST COMMUNITY	1	5.528E-05	1.473E-07	4.875E-08	4.122E-09	1.874E+02	4.991E-01	1.645E-01	1.645E-01
8	NEAREST COMMUNITY	2	0.	0.	0.	0.	0.	0.	0.	0.
8	NEAREST COMMUNITY	3	1.794E-06	1.489E-05	5.983E-06	8.000E-06	6.080E+00	5.048E+01	2.020E+01	2.020E+01
8	NEAREST COMMUNITY	4	1.591E-06	1.323E-05	5.309E-06	7.073E-06	4.729E+01	3.931E+02	1.571E+02	1.571E+02
	CONCENTRATION TOTALS		5.867E-05	2.827E-05	1.134E-05	1.508E-05	2.407E+02	4.441E+02	1.775E+02	1.775E+02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
9	NEAREST DOWNWIND COM	1	1.697E-05	4.531E-08	1.499E-08	1.269E-09	5.750E+01	1.535E-01	5.061E-02	5.061E-02
9	NEAREST DOWNWIND COM	2	0.	0.	0.	0.	0.	0.	0.	0.
9	NEAREST DOWNWIND COM	3	1.700E-06	1.397E-05	5.611E-06	7.496E-06	5.763E+00	4.736E+01	1.894E+01	1.894E+01
9	NEAREST DOWNWIND COM	4	8.807E-07	7.112E-06	2.852E-06	3.795E-06	2.617E+01	2.113E+02	8.441E+01	8.441E+01
	CONCENTRATION TOTALS		1.955E-05	2.113E-05	8.478E-06	1.129E-05	8.944E+01	2.588E+02	1.034E+02	1.034E+02
10	NEAREST GRAZING AREA	1	9.889E-04	2.650E-06	8.768E-07	7.426E-08	3.351E+03	8.982E+00	2.960E+00	2.960E+00
10	NEAREST GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
10	NEAREST GRAZING AREA	3	8.076E-04	7.075E-03	2.844E-03	3.808E-03	2.737E+03	2.398E+04	9.600E+03	9.600E+03
10	NEAREST GRAZING AREA	4	1.641E-03	1.436E-02	5.774E-03	7.720E-03	4.875E+04	4.268E+05	1.709E+05	1.709E+05
	CONCENTRATION TOTALS		3.437E-03	2.144E-02	8.619E-03	1.153E-02	5.484E+04	4.508E+05	1.805E+05	1.805E+05
11	GALLUP	1	1.178E-05	3.140E-08	1.039E-08	8.789E-10	3.991E+01	1.064E-01	3.508E-02	3.508E-02
11	GALLUP	2	0.	0.	0.	0.	0.	0.	0.	0.
11	GALLUP	3	1.338E-07	1.100E-06	4.415E-07	5.897E-07	4.535E-01	3.727E+00	1.490E+00	1.490E+00
11	GALLUP	4	5.380E-08	4.417E-07	1.770E-07	2.354E-07	1.599E+00	1.312E+01	5.240E+00	5.240E+00
	CONCENTRATION TOTALS		1.196E-05	1.573E-06	6.289E-07	8.260E-07	4.196E+01	1.696E+01	6.765E+00	6.765E+00
12	SPRINGSTEAD TR. PARK	1	1.436E-04	3.863E-07	1.277E-07	1.083E-08	4.866E+02	1.309E+00	4.311E-01	4.311E-01
12	SPRINGSTEAD TR. PARK	2	0.	0.	0.	0.	0.	0.	0.	0.
12	SPRINGSTEAD TR. PARK	3	3.996E-07	3.264E-06	1.311E-06	1.751E-06	1.354E+00	1.106E+01	4.424E+00	4.424E+00
12	SPRINGSTEAD TR. PARK	4	3.946E-07	3.187E-06	1.278E-06	1.700E-06	1.173E+01	9.470E+01	3.783E+01	3.783E+01
	CONCENTRATION TOTALS		1.444E-04	6.837E-06	2.716E-06	3.463E-06	4.997E+02	1.071E+02	4.268E+01	4.268E+01
13	NAVAJO GRAZING AREA	1	7.174E-03	1.949E-05	6.438E-06	5.472E-07	2.431E+04	6.605E+01	2.173E+01	2.173E+01
13	NAVAJO GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
13	NAVAJO GRAZING AREA	3	1.238E-04	7.578E-04	3.041E-04	4.059E-04	4.195E+02	2.568E+03	1.027E+03	1.027E+03
13	NAVAJO GRAZING AREA	4	1.853E-04	1.104E-03	4.427E-04	5.886E-04	5.507E+03	3.281E+04	1.310E+04	1.310E+04
	CONCENTRATION TOTALS		7.483E-03	1.882E-03	7.533E-04	9.950E-04	3.024E+04	3.549E+04	1.415E+04	1.415E+04
14	NEXT NEAREST RESIDEN	1	1.074E-02	2.864E-05	9.481E-06	8.019E-07	3.640E+04	9.707E+01	3.200E+01	3.200E+01
14	NEXT NEAREST RESIDEN	2	0.	0.	0.	0.	0.	0.	0.	0.
14	NEXT NEAREST RESIDEN	3	2.465E-05	1.853E-04	7.321E-05	9.458E-05	8.355E+01	6.279E+02	2.471E+02	2.471E+02
14	NEXT NEAREST RESIDEN	4	3.736E-05	2.805E-04	1.098E-04	1.387E-04	1.110E+03	8.336E+03	3.249E+03	3.249E+03
	CONCENTRATION TOTALS		1.080E-02	4.945E-04	1.925E-04	2.341E-04	3.760E+04	9.061E+03	3.529E+03	3.529E+03

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

INDIVIDUAL RECEPTOR RADON AND RADON DAUGHTER CONCENTRATIONS

	AIRBORNE CONCENTRATIONS, PCI/M3								GROUND CONCENTRATIONS, PCI/M2			
NO.	RN-222	PO-218	PB-214	BI-214	PB-210	BI-210	PO-210	WL	PO-218	PB-214	BI-214	PB-210
1	7.288E+02	4.141E+02	2.536E+01	1.763E+00	3.310E-07	1.347E-10	1.773E-15	5.617E-04	3.280E+02	3.280E+02	3.280E+02	4.134E-01
2	3.833E+01	3.478E+01	1.096E+01	3.088E+00	1.392E-06	7.808E-10	1.300E-14	1.029E-04	2.755E+01	2.755E+01	2.755E+01	1.739E+00
3	3.999E+00	3.853E+00	1.831E+00	7.746E-01	6.077E-07	5.774E-10	1.596E-14	1.614E-05	3.052E+00	3.052E+00	3.052E+00	7.591E-01
4	1.332E+01	1.301E+01	6.302E+00	2.659E+00	2.018E-06	1.819E-09	4.711E-14	5.527E-05	1.031E+01	1.031E+01	1.031E+01	2.520E+00
5	1.081E+02	9.629E+01	1.941E+01	3.398E+00	9.732E-07	4.308E-10	6.826E-15	2.102E-04	7.626E+01	7.626E+01	7.626E+01	1.216E+00
6	7.934E+01	7.358E+01	1.983E+01	4.494E+00	1.597E-06	7.833E-10	1.299E-14	1.931E-04	5.828E+01	5.828E+01	5.828E+01	1.995E+00
7	6.080E+00	5.995E+00	4.822E+00	3.164E+00	6.221E-06	1.314E-08	7.608E-13	4.040E-05	4.748E+00	4.748E+00	4.748E+00	7.771E+00
8	2.804E-01	2.804E-01	2.570E-01	2.378E-01	1.522E-06	9.192E-09	1.438E-12	2.479E-06	2.221E-01	2.221E-01	2.221E-01	1.901E+00
9	2.251E-01	2.252E-01	2.247E-01	2.231E-01	8.562E-06	2.829E-07	2.348E-10	2.204E-06	1.784E-01	1.784E-01	1.784E-01	1.070E+01
10	3.460E+01	2.361E+01	3.514E+00	5.463E-01	1.323E-07	4.235E-11	3.603E-16	4.417E-05	1.870E+01	1.870E+01	1.870E+01	1.653E-01
11	3.555E-01	3.558E-01	3.565E-01	3.560E-01	1.105E-05	2.873E-07	1.863E-10	3.502E-06	2.818E-01	2.818E-01	2.818E-01	1.380E+01
12	5.783E-01	5.787E-01	5.631E-01	5.450E-01	5.442E-06	4.863E-08	1.102E-11	5.484E-06	4.583E-01	4.583E-01	4.583E-01	6.798E+00
13	4.108E+01	3.785E+01	1.264E+01	3.593E+00	1.601E-06	9.028E-10	1.571E-14	1.165E-04	2.998E+01	2.998E+01	2.998E+01	1.999E+00
14	2.289E+01	2.235E+01	1.076E+01	4.359E+00	3.076E-06	2.643E-09	6.798E-14	9.381E-05	1.770E+01	1.770E+01	1.770E+01	3.842E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	0.
INFANT	GROUND	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01
INFANT	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	9.97E-01	1.07E+01	9.97E-01	3.15E-01	1.87E+00	9.97E-01
INFANT	TOTALS	1.76E+00	2.10E+01	4.77E+01	7.59E-01	4.61E+00	1.24E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	0.
CHILD	GROUND	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01
CHILD	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
CHILD	VEG.ING.	7.61E-01	9.74E+00	7.61E-01	8.49E-01	3.04E+00	7.61E-01
CHILD	MEAT ING	1.09E-01	1.43E+00	1.09E-01	1.79E-01	5.87E-01	1.09E-01
CHILD	MILK ING	7.97E-01	9.01E+00	7.97E-01	2.28E-01	1.25E+00	7.97E-01
CHILD	TOTALS	2.43E+00	3.05E+01	4.84E+01	1.70E+00	7.62E+00	1.91E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	0.
TEENAGER	GROUND	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01
TEENAGER	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
TEENAGER	VEG.ING.	5.56E-01	7.27E+00	5.56E-01	6.33E-01	2.40E+00	5.56E-01
TEENAGER	MEAT ING	7.77E-02	1.04E+00	7.77E-02	1.30E-01	4.50E-01	7.77E-02
TEENAGER	MILK ING	4.29E-01	4.92E+00	4.29E-01	1.20E-01	7.01E-01	4.29E-01
TEENAGER	TOTALS	1.82E+00	2.35E+01	4.78E+01	1.33E+00	6.29E+00	1.31E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	0.
ADULT	GROUND	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01
ADULT	CLOUD	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06	2.02E-06
ADULT	VEG.ING.	6.63E-01	8.74E+00	6.63E-01	6.93E-01	2.39E+00	6.63E-01
ADULT	MEAT ING	1.17E-01	1.59E+00	1.17E-01	1.79E-01	5.63E-01	1.17E-01
ADULT	MILK ING	1.98E-01	2.26E+00	1.98E-01	4.99E-02	2.62E-01	1.98E-01
ADULT	TOTALS	1.74E+00	2.29E+01	4.77E+01	1.37E+00	5.95E+00	1.23E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	4.55E+02
INFANT	GROUND	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00
INFANT	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	9.97E-01	1.07E+01	9.97E-01	3.15E-01	1.87E+00	9.97E-01
INFANT	TOTALS	3.31E+00	2.25E+01	4.93E+01	2.31E+00	6.16E+00	4.58E+02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	4.55E+02
CHILD	GROUND	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00
CHILD	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
CHILD	VEG.ING.	7.61E-01	9.74E+00	7.61E-01	8.49E-01	3.04E+00	7.61E-01
CHILD	MEAT ING	1.09E-01	1.43E+00	1.09E-01	1.79E-01	5.87E-01	1.09E-01
CHILD	MILK ING	7.97E-01	9.01E+00	7.97E-01	2.28E-01	1.25E+00	7.97E-01
CHILD	TOTALS	3.98E+00	3.20E+01	4.99E+01	3.25E+00	9.17E+00	4.59E+02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	4.55E+02
TEENAGER	GROUND	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00
TEENAGER	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
TEENAGER	VEG.ING.	5.56E-01	7.27E+00	5.56E-01	6.33E-01	2.40E+00	5.56E-01
TEENAGER	MEAT ING	7.77E-02	1.04E+00	7.77E-02	1.30E-01	4.51E-01	7.77E-02
TEENAGER	MILK ING	4.29E-01	4.92E+00	4.29E-01	1.20E-01	7.01E-01	4.29E-01
TEENAGER	TOTALS	3.38E+00	2.51E+01	4.93E+01	2.88E+00	7.85E+00	4.58E+02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.14E-01	1.00E+01	4.65E+01	1.98E-01	2.49E+00	4.55E+02
ADULT	GROUND	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00
ADULT	CLOUD	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02
ADULT	VEG.ING.	6.63E-01	8.74E+00	6.63E-01	6.93E-01	2.39E+00	6.63E-01
ADULT	MEAT ING	1.17E-01	1.59E+00	1.17E-01	1.79E-01	5.63E-01	1.17E-01
ADULT	MILK ING	1.98E-01	2.26E+00	1.98E-01	4.99E-02	2.62E-01	1.98E-01
ADULT	TOTALS	3.29E+00	2.44E+01	4.93E+01	2.92E+00	7.51E+00	4.58E+02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, TRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	0.
INFANT	GROUND	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01
INFANT	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.12E+01	1.07E+02	1.12E+01	5.30E+00	1.62E+01	1.12E+01
INFANT	TOTALS	1.36E+01	1.59E+02	5.04E+01	8.97E+00	3.10E+01	1.19E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	0.
CHILD	GROUND	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01
CHILD	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
CHILD	VEG.ING.	1.03E+01	1.23E+02	1.03E+01	1.43E+01	4.45E+01	1.03E+01
CHILD	MEAT ING	1.60E+00	2.01E+01	1.60E+00	3.01E+00	9.24E+00	1.60E+00
CHILD	MILK ING	1.01E+01	9.83E+01	1.01E+01	3.83E+00	1.24E+01	1.01E+01
CHILD	TOTALS	2.44E+01	2.93E+02	6.13E+01	2.48E+01	8.10E+01	2.27E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	0.
TEENAGER	GROUND	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01
TEENAGER	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
TEENAGER	VEG.ING.	7.95E+00	9.96E+01	7.95E+00	1.06E+01	3.52E+01	7.95E+00
TEENAGER	MEAT ING	1.17E+00	1.53E+01	1.17E+00	2.18E+00	7.08E+00	1.17E+00
TEENAGER	MILK ING	5.92E+00	6.17E+01	5.92E+00	2.02E+00	6.93E+00	5.92E+00
TEENAGER	TOTALS	1.74E+01	2.28E+02	5.43E+01	1.85E+01	6.40E+01	1.57E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	0.
ADULT	GROUND	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01	6.91E-01
ADULT	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
ADULT	VEG.ING.	9.79E+00	1.25E+02	9.79E+00	1.16E+01	3.52E+01	9.79E+00
ADULT	MEAT ING	1.81E+00	2.40E+01	1.81E+00	3.01E+00	8.85E+00	1.81E+00
ADULT	MILK ING	2.85E+00	3.02E+01	2.85E+00	8.39E-01	2.61E+00	2.85E+00
ADULT	TOTALS	1.68E+01	2.30E+02	5.37E+01	1.92E+01	6.15E+01	1.51E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	2.40E+01
INFANT	GROUND	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01
INFANT	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.12E+01	1.07E+02	1.12E+01	5.30E+00	1.62E+01	1.12E+01
INFANT	TOTALS	3.77E+01	1.83E+02	7.45E+01	3.31E+01	5.51E+01	6.00E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	2.40E+01
CHILD	GROUND	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01
CHILD	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
CHILD	VEG.ING.	1.03E+01	1.23E+02	1.03E+01	1.43E+01	4.45E+01	1.03E+01
CHILD	MEAT ING	1.60E+00	2.01E+01	1.60E+00	3.01E+00	9.24E+00	1.60E+00
CHILD	MILK ING	1.01E+01	9.83E+01	1.01E+01	3.83E+00	1.24E+01	1.01E+01
CHILD	TOTALS	4.85E+01	3.17E+02	8.54E+01	4.89E+01	1.05E+02	7.08E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	2.40E+01
TEENAGER	GROUND	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01
TEENAGER	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
TEENAGER	VEG.ING.	7.95E+00	9.96E+01	7.95E+00	1.06E+01	3.52E+01	7.95E+00
TEENAGER	MEAT ING	1.17E+00	1.53E+01	1.17E+00	2.18E+00	7.08E+00	1.17E+00
TEENAGER	MILK ING	5.92E+00	6.17E+01	5.92E+00	2.02E+00	6.93E+00	5.92E+00
TEENAGER	TOTALS	4.15E+01	2.52E+02	7.84E+01	4.26E+01	8.81E+01	6.38E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.67E+00	5.06E+01	3.85E+01	2.98E+00	1.41E+01	2.40E+01
ADULT	GROUND	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01
ADULT	CLOUD	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02	4.48E-02
ADULT	VEG.ING.	9.79E+00	1.25E+02	9.79E+00	1.16E+01	3.52E+01	9.79E+00
ADULT	MEAT ING	1.81E+00	2.40E+01	1.81E+00	3.01E+00	8.85E+00	1.81E+00
ADULT	MILK ING	2.85E+00	3.02E+01	2.85E+00	8.39E-01	2.61E+00	2.85E+00
ADULT	TOTALS	4.09E+01	2.54E+02	7.78E+01	4.33E+01	8.56E+01	6.32E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	0.
INFANT	GROUND	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02
INFANT	CLOUD	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.87E-01	4.68E+00	4.87E-01	2.29E-01	7.07E-01	4.87E-01
INFANT	TOTALS	5.99E-01	7.10E+00	2.73E+00	3.98E-01	1.40E+00	5.19E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	0.
CHILD	GROUND	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02
CHILD	CLOUD	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08
CHILD	VEG.ING.	4.46E-01	5.34E+00	4.46E-01	6.17E-01	1.93E+00	4.46E-01
CHILD	MEAT ING	6.90E-02	8.69E-01	6.90E-02	1.30E-01	3.99E-01	6.90E-02
CHILD	MILK ING	4.40E-01	4.27E+00	4.40E-01	1.65E-01	5.42E-01	4.40E-01
CHILD	TOTALS	1.07E+00	1.29E+01	3.20E+00	1.08E+00	3.57E+00	9.87E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	0.
TEENAGER	GROUND	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02
TEENAGER	CLOUD	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08
TEENAGER	VEG.ING.	3.44E-01	4.32E+00	3.44E-01	4.59E-01	1.52E+00	3.44E-01
TEENAGER	MEAT ING	5.06E-02	6.60E-01	5.06E-02	9.42E-02	3.06E-01	5.06E-02
TEENAGER	MILK ING	2.56E-01	2.67E+00	2.56E-01	8.71E-02	3.02E-01	2.56E-01
TEENAGER	TOTALS	7.63E-01	1.01E+01	2.90E+00	8.09E-01	2.83E+00	6.83E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	0.
ADULT	GROUND	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02	3.17E-02
ADULT	CLOUD	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08	6.64E-08
ADULT	VEG.ING.	4.23E-01	5.40E+00	4.23E-01	5.03E-01	1.52E+00	4.23E-01
ADULT	MEAT ING	7.81E-02	1.04E+00	7.81E-02	1.30E-01	3.83E-01	7.81E-02
ADULT	MILK ING	1.23E-01	1.31E+00	1.23E-01	3.62E-02	1.14E-01	1.23E-01
ADULT	TOTALS	7.37E-01	1.02E+01	2.87E+00	8.38E-01	2.71E+00	6.56E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	2.50E+00
INFANT	GROUND	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00
INFANT	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.87E-01	4.68E+00	4.87E-01	2.29E-01	7.07E-01	4.87E-01
INFANT	TOTALS	1.65E+00	8.15E+00	3.78E+00	1.45E+00	2.45E+00	4.07E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	2.50E+00
CHILD	GROUND	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00
CHILD	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
CHILD	VEG.ING.	4.46E-01	5.34E+00	4.46E-01	6.17E-01	1.93E+00	4.46E-01
CHILD	MEAT ING	6.90E-02	8.69E-01	6.90E-02	1.30E-01	3.99E-01	6.90E-02
CHILD	MILK ING	4.40E-01	4.27E+00	4.40E-01	1.65E-01	5.42E-01	4.40E-01
CHILD	TOTALS	2.12E+00	1.40E+01	4.25E+00	2.13E+00	4.61E+00	4.54E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	2.50E+00
TEENAGER	GROUND	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00
TEENAGER	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
TEENAGER	VEG.ING.	3.44E-01	4.32E+00	3.44E-01	4.59E-01	1.52E+00	3.44E-01
TEENAGER	MEAT ING	5.06E-02	6.60E-01	5.06E-02	9.42E-02	3.06E-01	5.06E-02
TEENAGER	MILK ING	2.56E-01	2.67E+00	2.56E-01	8.71E-02	3.02E-01	2.56E-01
TEENAGER	TOTALS	1.81E+00	1.11E+01	3.94E+00	1.86E+00	3.88E+00	4.23E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.05E-02	2.39E+00	2.21E+00	1.37E-01	6.66E-01	2.50E+00
ADULT	GROUND	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00
ADULT	CLOUD	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03	9.95E-03
ADULT	VEG.ING.	4.23E-01	5.40E+00	4.23E-01	5.03E-01	1.52E+00	4.23E-01
ADULT	MEAT ING	7.81E-02	1.04E+00	7.81E-02	1.30E-01	3.83E-01	7.81E-02
ADULT	MILK ING	1.23E-01	1.31E+00	1.23E-01	3.62E-02	1.14E-01	1.23E-01
ADULT	TOTALS	1.79E+00	1.12E+01	3.92E+00	1.89E+00	3.76E+00	4.20E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IPTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	7.01E-02	1.64E+00	4.65E+00	6.26E-02	4.32E-01	0.
INFANT	GROUND	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02
INFANT	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.38E-01	2.38E+00	2.38E-01	9.90E-02	3.80E-01	2.38E-01
INFANT	TOTALS	3.38E-01	4.05E+00	4.91E+00	1.92E-01	8.42E-01	2.68E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	7.01E-02	1.64E+00	4.65E+00	6.26E-02	4.32E-01	0.
CHILD	GROUND	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02
CHILD	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
CHILD	VEG.ING.	2.05E-01	2.51E+00	2.05E-01	2.67E-01	8.66E-01	2.05E-01
CHILD	MEAT ING	3.11E-02	3.95E-01	3.11E-02	5.63E-02	1.76E-01	3.11E-02
CHILD	MILK ING	2.06E-01	2.11E+00	2.06E-01	7.16E-02	2.76E-01	2.06E-01
CHILD	TOTALS	5.43E-01	6.68E+00	5.12E+00	4.88E-01	1.78E+00	4.73E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	7.01E-02	1.64E+00	4.65E+00	6.26E-02	4.32E-01	0.
TEENAGER	GROUND	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02
TEENAGER	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
TEENAGER	VEG.ING.	1.56E-01	1.98E+00	1.56E-01	1.99E-01	6.84E-01	1.56E-01
TEENAGER	MEAT ING	2.26E-02	2.96E-01	2.26E-02	4.08E-02	1.35E-01	2.26E-02
TEENAGER	MILK ING	1.17E-01	1.26E+00	1.17E-01	3.77E-02	1.54E-01	1.17E-01
TEENAGER	TOTALS	3.96E-01	5.21E+00	4.97E+00	3.70E-01	1.44E+00	3.26E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	7.01E-02	1.64E+00	4.65E+00	6.26E-02	4.32E-01	0.
ADULT	GROUND	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02	3.04E-02
ADULT	CLOUD	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07	1.91E-07
ADULT	VEG.ING.	1.90E-01	2.45E+00	1.90E-01	2.18E-01	6.83E-01	1.90E-01
ADULT	MEAT ING	3.46E-02	4.62E-01	3.46E-02	5.62E-02	1.69E-01	3.46E-02
ADULT	MILK ING	5.57E-02	6.04E-01	5.57E-02	1.57E-02	5.78E-02	5.57E-02
ADULT	TOTALS	3.81E-01	5.19E+00	4.96E+00	3.83E-01	1.37E+00	3.11E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, TRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	7.01E-02	1.65E+00	4.65E+00	6.27E-02	4.33E-01	8.33E+00
INFANT	GROUND	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01
INFANT	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.38E-01	2.38E+00	2.38E-01	9.90E-02	3.80E-01	2.38E-01
INFANT	TOTALS	8.25E-01	4.54E+00	5.40E+00	6.79E-01	1.33E+00	9.08E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	7.01E-02	1.65E+00	4.65E+00	6.27E-02	4.33E-01	8.33E+00
CHILD	GROUND	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01
CHILD	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
CHILD	VEG.ING.	2.05E-01	2.51E+00	2.05E-01	2.67E-01	8.66E-01	2.05E-01
CHILD	MEAT ING	3.11E-02	3.96E-01	3.11E-02	5.63E-02	1.76E-01	3.11E-02
CHILD	MILK ING	2.06E-01	2.11E+00	2.06E-01	7.17E-02	2.76E-01	2.06E-01
CHILD	TOTALS	1.03E+00	7.17E+00	5.61E+00	9.75E-01	2.27E+00	9.29E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	7.01E-02	1.65E+00	4.65E+00	6.27E-02	4.33E-01	8.33E+00
TEENAGER	GROUND	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01
TEENAGER	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
TEENAGER	VEG.ING.	1.56E-01	1.98E+00	1.56E-01	1.99E-01	6.84E-01	1.56E-01
TEENAGER	MEAT ING	2.26E-02	2.96E-01	2.26E-02	4.08E-02	1.35E-01	2.26E-02
TEENAGER	MILK ING	1.17E-01	1.26E+00	1.17E-01	3.77E-02	1.54E-01	1.17E-01
TEENAGER	TOTALS	8.83E-01	5.70E+00	5.46E+00	8.57E-01	1.92E+00	9.14E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	7.01E-02	1.65E+00	4.65E+00	6.27E-02	4.33E-01	8.33E+00
ADULT	GROUND	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01
ADULT	CLOUD	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02
ADULT	VEG.ING.	1.90E-01	2.45E+00	1.90E-01	2.18E-01	6.83E-01	1.90E-01
ADULT	MEAT ING	3.46E-02	4.62E-01	3.46E-02	5.63E-02	1.69E-01	3.46E-02
ADULT	MILK ING	5.57E-02	6.04E-01	5.57E-02	1.57E-02	5.78E-02	5.57E-02
ADULT	TOTALS	8.67E-01	5.67E+00	5.44E+00	8.70E-01	1.86E+00	9.13E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	0.
INFANT	GROUND	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01
INFANT	CLOUD	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.62E-01	9.61E+00	8.62E-01	2.22E-01	1.74E+00	8.62E-01
INFANT	TOTALS	1.70E+00	2.05E+01	5.56E+01	6.48E-01	4.60E+00	1.13E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	0.
CHILD	GROUND	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01
CHILD	CLOUD	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06
CHILD	VEG.ING.	6.10E-01	8.04E+00	6.10E-01	6.00E-01	2.33E+00	6.10E-01
CHILD	MEAT ING	8.45E-02	1.12E+00	8.45E-02	1.26E-01	4.32E-01	8.45E-02
CHILD	MILK ING	6.57E-01	7.87E+00	6.57E-01	1.61E-01	1.12E+00	6.57E-01
CHILD	TOTALS	2.19E+00	2.79E+01	5.61E+01	1.31E+00	6.74E+00	1.62E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	0.
TEENAGER	GROUND	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01
TEENAGER	CLOUD	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06
TEENAGER	VEG.ING.	4.34E-01	5.79E+00	4.34E-01	4.47E-01	1.84E+00	4.34E-01
TEENAGER	MEAT ING	5.89E-02	7.96E-01	5.89E-02	9.16E-02	3.32E-01	5.89E-02
TEENAGER	MILK ING	3.42E-01	4.09E+00	3.42E-01	8.47E-02	6.30E-01	3.42E-01
TEENAGER	TOTALS	1.67E+00	2.15E+01	5.56E+01	1.05E+00	5.66E+00	1.10E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	0.
ADULT	GROUND	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01
ADULT	CLOUD	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06	2.39E-06
ADULT	VEG.ING.	5.10E-01	6.82E+00	5.10E-01	4.89E-01	1.83E+00	5.10E-01
ADULT	MEAT ING	8.81E-02	1.20E+00	8.81E-02	1.26E-01	4.14E-01	8.81E-02
ADULT	MILK ING	1.55E-01	1.83E+00	1.55E-01	3.52E-02	2.35E-01	1.55E-01
ADULT	TOTALS	1.59E+00	2.07E+01	5.55E+01	1.07E+00	5.33E+00	1.02E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	6.76E+01
INFANT	GROUND	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00
INFANT	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.62E-01	9.61E+00	8.62E-01	2.22E-01	1.74E+00	8.62E-01
INFANT	TOTALS	2.81E+00	2.16E+01	5.67E+01	1.75E+00	5.70E+00	6.98E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	6.76E+01
CHILD	GROUND	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00
CHILD	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
CHILD	VEG.ING.	6.10E-01	8.04E+00	6.10E-01	6.00E-01	2.33E+00	6.10E-01
CHILD	MEAT ING	8.45E-02	1.12E+00	8.45E-02	1.26E-01	4.32E-01	8.45E-02
CHILD	MILK ING	6.57E-01	7.87E+00	6.57E-01	1.61E-01	1.12E+00	6.57E-01
CHILD	TOTALS	3.30E+00	2.90E+01	5.72E+01	2.42E+00	7.85E+00	7.03E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	6.76E+01
TEENAGER	GROUND	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00
TEENAGER	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
TEENAGER	VEG.ING.	4.34E-01	5.79E+00	4.34E-01	4.47E-01	1.84E+00	4.34E-01
TEENAGER	MEAT ING	5.89E-02	7.96E-01	5.89E-02	9.17E-02	3.32E-01	5.89E-02
TEENAGER	MILK ING	3.42E-01	4.09E+00	3.42E-01	8.47E-02	6.30E-01	3.42E-01
TEENAGER	TOTALS	2.78E+00	2.26E+01	5.67E+01	2.15E+00	6.76E+00	6.98E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.68E-01	1.06E+01	5.45E+01	1.52E-01	2.58E+00	6.76E+01
ADULT	GROUND	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00
ADULT	CLOUD	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02	5.96E-02
ADULT	VEG.ING.	5.10E-01	6.82E+00	5.10E-01	4.89E-01	1.83E+00	5.10E-01
ADULT	MEAT ING	8.81E-02	1.20E+00	8.81E-02	1.26E-01	4.14E-01	8.81E-02
ADULT	MILK ING	1.55E-01	1.83E+00	1.55E-01	3.52E-02	2.35E-01	1.55E-01
ADULT	TOTALS	2.70E+00	2.18E+01	5.66E+01	2.18E+00	6.44E+00	6.97E+01

REGION=UNC MILL RUN 7 CODE=MILDOS.REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 87

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	0.
INFANT	GROUND	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01
INFANT	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.57E-01	7.83E+00	7.57E-01	2.69E-01	1.29E+00	7.57E-01
INFANT	TOTALS	1.20E+00	1.44E+01	2.59E+01	5.85E-01	3.06E+00	8.98E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	0.
CHILD	GROUND	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01
CHILD	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
CHILD	VEG.ING.	6.13E-01	7.63E+00	6.13E-01	7.25E-01	2.46E+00	6.13E-01
CHILD	MEAT ING	9.04E-02	1.16E+00	9.04E-02	1.53E-01	4.89E-01	9.04E-02
CHILD	MILK ING	6.31E-01	6.76E+00	6.31E-01	1.94E-01	8.96E-01	6.31E-01
CHILD	TOTALS	1.78E+00	2.21E+01	2.64E+01	1.39E+00	5.62E+00	1.48E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	0.
TEENAGER	GROUND	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01
TEENAGER	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
TEENAGER	VEG.ING.	4.58E-01	5.88E+00	4.58E-01	5.40E-01	1.95E+00	4.58E-01
TEENAGER	MEAT ING	6.51E-02	8.58E-01	6.51E-02	1.11E-01	3.75E-01	6.51E-02
TEENAGER	MILK ING	3.50E-01	3.87E+00	3.50E-01	1.02E-01	5.01E-01	3.50E-01
TEENAGER	TOTALS	1.32E+00	1.72E+01	2.60E+01	1.07E+00	4.60E+00	1.02E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	0.
ADULT	GROUND	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01	1.42E-01
ADULT	CLOUD	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06	1.07E-06
ADULT	VEG.ING.	5.53E-01	7.18E+00	5.53E-01	5.92E-01	1.94E+00	5.53E-01
ADULT	MEAT ING	9.94E-02	1.33E+00	9.94E-02	1.53E-01	4.68E-01	9.94E-02
ADULT	MILK ING	1.64E-01	1.82E+00	1.64E-01	4.26E-02	1.87E-01	1.64E-01
ADULT	TOTALS	1.27E+00	1.69E+01	2.59E+01	1.10E+00	4.37E+00	9.59E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	4.96E+01
INFANT	GROUND	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00
INFANT	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.57E-01	7.83E+00	7.57E-01	2.69E-01	1.29E+00	7.57E-01
INFANT	TOTALS	2.55E+00	1.58E+01	2.72E+01	1.94E+00	4.42E+00	5.18E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	4.96E+01
CHILD	GROUND	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00
CHILD	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
CHILD	VEG.ING.	6.13E-01	7.63E+00	6.13E-01	7.25E-01	2.46E+00	6.13E-01
CHILD	MEAT ING	9.04E-02	1.16E+00	9.04E-02	1.53E-01	4.89E-01	9.04E-02
CHILD	MILK ING	6.31E-01	6.76E+00	6.31E-01	1.94E-01	8.96E-01	6.31E-01
CHILD	TOTALS	3.13E+00	2.35E+01	2.78E+01	2.74E+00	6.98E+00	5.24E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	4.96E+01
TEENAGER	GROUND	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00
TEENAGER	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
TEENAGER	VEG.ING.	4.58E-01	5.88E+00	4.58E-01	5.40E-01	1.95E+00	4.58E-01
TEENAGER	MEAT ING	6.51E-02	8.58E-01	6.51E-02	1.11E-01	3.75E-01	6.51E-02
TEENAGER	MILK ING	3.50E-01	3.87E+00	3.50E-01	1.02E-01	5.01E-01	3.50E-01
TEENAGER	TOTALS	2.67E+00	1.85E+01	2.73E+01	2.42E+00	5.95E+00	5.20E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.06E-01	6.43E+00	2.50E+01	1.75E-01	1.63E+00	4.96E+01
ADULT	GROUND	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00
ADULT	CLOUD	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02	7.06E-02
ADULT	VEG.ING.	5.53E-01	7.18E+00	5.53E-01	5.92E-01	1.94E+00	5.53E-01
ADULT	MEAT ING	9.94E-02	1.33E+00	9.94E-02	1.53E-01	4.68E-01	9.94E-02
ADULT	MILK ING	1.64E-01	1.82E+00	1.64E-01	4.26E-02	1.87E-01	1.64E-01
ADULT	TOTALS	2.62E+00	1.82E+01	2.73E+01	2.45E+00	5.73E+00	5.19E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	0.
INFANT	GROUND	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02
INFANT	CLOUD	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.96E-01	6.73E+00	6.96E-01	3.20E-01	1.02E+00	6.96E-01
INFANT	TOTALS	8.83E-01	1.06E+01	5.59E+00	5.80E-01	2.13E+00	7.48E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	0.
CHILD	GROUND	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02
CHILD	CLOUD	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07
CHILD	VEG.ING.	6.31E-01	7.57E+00	6.31E-01	8.63E-01	2.71E+00	6.31E-01
CHILD	MEAT ING	9.73E-02	1.23E+00	9.73E-02	1.82E-01	5.60E-01	9.73E-02
CHILD	MILK ING	6.24E-01	6.11E+00	6.24E-01	2.31E-01	7.77E-01	6.24E-01
CHILD	TOTALS	1.54E+00	1.88E+01	6.25E+00	1.54E+00	5.16E+00	1.41E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	0.
TEENAGER	GROUND	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02
TEENAGER	CLOUD	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07
TEENAGER	VEG.ING.	4.86E-01	6.10E+00	4.86E-01	6.42E-01	2.14E+00	4.86E-01
TEENAGER	MEAT ING	7.13E-02	9.31E-01	7.13E-02	1.32E-01	4.29E-01	7.13E-02
TEENAGER	MILK ING	3.62E-01	3.80E+00	3.62E-01	1.22E-01	4.33E-01	3.62E-01
TEENAGER	TOTALS	1.11E+00	1.47E+01	5.81E+00	1.16E+00	4.11E+00	9.72E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	0.
ADULT	GROUND	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02	5.21E-02
ADULT	CLOUD	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07	1.64E-07
ADULT	VEG.ING.	5.97E-01	7.62E+00	5.97E-01	7.03E-01	2.14E+00	5.97E-01
ADULT	MEAT ING	1.10E-01	1.46E+00	1.10E-01	1.82E-01	5.37E-01	1.10E-01
ADULT	MILK ING	1.74E-01	1.85E+00	1.74E-01	5.07E-02	1.63E-01	1.74E-01
ADULT	TOTALS	1.07E+00	1.48E+01	5.78E+00	1.20E+00	3.95E+00	9.33E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	3.80E+00
INFANT	GROUND	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00
INFANT	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.96E-01	6.73E+00	6.96E-01	3.20E-01	1.02E+00	6.96E-01
INFANT	TOTALS	2.38E+00	1.21E+01	7.09E+00	2.08E+00	3.63E+00	6.04E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	3.80E+00
CHILD	GROUND	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00
CHILD	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
CHILD	VEG.ING.	6.31E-01	7.57E+00	6.31E-01	8.63E-01	2.71E+00	6.31E-01
CHILD	MEAT ING	9.74E-02	1.23E+00	9.74E-02	1.82E-01	5.60E-01	9.74E-02
CHILD	MILK ING	6.24E-01	6.11E+00	6.24E-01	2.32E-01	7.78E-01	6.24E-01
CHILD	TOTALS	3.04E+00	2.03E+01	7.74E+00	3.03E+00	6.66E+00	6.70E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	3.80E+00
TEENAGER	GROUND	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00
TEENAGER	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
TEENAGER	VEG.ING.	4.86E-01	6.10E+00	4.86E-01	6.43E-01	2.14E+00	4.86E-01
TEENAGER	MEAT ING	7.13E-02	9.31E-01	7.13E-02	1.32E-01	4.29E-01	7.13E-02
TEENAGER	MILK ING	3.62E-01	3.80E+00	3.62E-01	1.22E-01	4.33E-01	3.62E-01
TEENAGER	TOTALS	2.60E+00	1.62E+01	7.31E+00	2.65E+00	5.61E+00	6.27E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.35E-01	3.84E+00	4.84E+00	2.08E-01	1.06E+00	3.80E+00
ADULT	GROUND	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00
ADULT	CLOUD	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02	3.64E-02
ADULT	VEG.ING.	5.97E-01	7.62E+00	5.97E-01	7.04E-01	2.14E+00	5.97E-01
ADULT	MEAT ING	1.10E-01	1.46E+00	1.10E-01	1.82E-01	5.37E-01	1.10E-01
ADULT	MILK ING	1.74E-01	1.85E+00	1.74E-01	5.07E-02	1.63E-01	1.74E-01
ADULT	TOTALS	2.56E+00	1.63E+01	7.27E+00	2.69E+00	5.45E+00	6.23E+00

REGION=UNC MILL RUN 7 CODE=MILDOS,REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 91

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.99E-03	1.08E-01	1.84E-01	5.35E-03	2.93E-02	0.
INFANT	GROUND	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03
INFANT	CLOUD	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.56E-02	1.52E-01	1.56E-02	6.96E-03	2.36E-02	1.56E-02
INFANT	TOTALS	2.10E-02	2.62E-01	2.01E-01	1.37E-02	5.43E-02	1.70E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.99E-03	1.08E-01	1.84E-01	5.35E-03	2.93E-02	0.
CHILD	GROUND	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03
CHILD	CLOUD	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09
CHILD	VEG.ING.	1.39E-02	1.68E-01	1.39E-02	1.88E-02	5.95E-02	1.39E-02
CHILD	MEAT ING	2.14E-03	2.70E-02	2.14E-03	3.96E-03	1.22E-02	2.14E-03
CHILD	MILK ING	1.39E-02	1.38E-01	1.39E-02	5.04E-03	1.77E-02	1.39E-02
CHILD	TOTALS	3.53E-02	4.42E-01	2.16E-01	3.45E-02	1.20E-01	3.14E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.99E-03	1.08E-01	1.84E-01	5.35E-03	2.93E-02	0.
TEENAGER	GROUND	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03
TEENAGER	CLOUD	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09
TEENAGER	VEG.ING.	1.07E-02	1.35E-01	1.07E-02	1.40E-02	4.70E-02	1.07E-02
TEENAGER	MEAT ING	1.56E-03	2.04E-02	1.56E-03	2.87E-03	9.38E-03	1.56E-03
TEENAGER	MILK ING	7.99E-03	8.40E-02	7.99E-03	2.65E-03	9.84E-03	7.99E-03
TEENAGER	TOTALS	2.57E-02	3.49E-01	2.06E-01	2.63E-02	9.70E-02	2.17E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.99E-03	1.08E-01	1.84E-01	5.35E-03	2.93E-02	0.
ADULT	GROUND	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03
ADULT	CLOUD	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09	6.67E-09
ADULT	VEG.ING.	1.31E-02	1.68E-01	1.31E-02	1.53E-02	4.70E-02	1.31E-02
ADULT	MEAT ING	2.40E-03	3.20E-02	2.40E-03	3.95E-03	1.17E-02	2.40E-03
ADULT	MILK ING	3.83E-03	4.09E-02	3.83E-03	1.10E-03	3.70E-03	3.83E-03
ADULT	TOTALS	2.47E-02	3.50E-01	2.05E-01	2.71E-02	9.32E-02	2.08E-02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.00E-03	1.08E-01	1.84E-01	5.44E-03	2.96E-02	1.75E-01
INFANT	GROUND	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02
INFANT	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.56E-02	1.53E-01	1.56E-02	7.01E-03	2.37E-02	1.56E-02
INFANT	TOTALS	5.54E-02	2.97E-01	2.36E-01	4.83E-02	8.91E-02	2.27E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.00E-03	1.08E-01	1.84E-01	5.44E-03	2.96E-02	1.75E-01
CHILD	GROUND	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02
CHILD	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
CHILD	VEG.ING.	1.40E-02	1.69E-01	1.40E-02	1.89E-02	5.99E-02	1.40E-02
CHILD	MEAT ING	2.14E-03	2.71E-02	2.14E-03	3.98E-03	1.23E-02	2.14E-03
CHILD	MILK ING	1.39E-02	1.38E-01	1.39E-02	5.07E-03	1.78E-02	1.39E-02
CHILD	TOTALS	6.98E-02	4.77E-01	2.50E-01	6.92E-02	1.55E-01	2.41E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.00E-03	1.08E-01	1.84E-01	5.44E-03	2.96E-02	1.75E-01
TEENAGER	GROUND	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02
TEENAGER	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
TEENAGER	VEG.ING.	1.07E-02	1.35E-01	1.07E-02	1.41E-02	4.73E-02	1.07E-02
TEENAGER	MEAT ING	1.56E-03	2.05E-02	1.56E-03	2.89E-03	9.44E-03	1.56E-03
TEENAGER	MILK ING	7.99E-03	8.45E-02	7.99E-03	2.67E-03	9.89E-03	7.99E-03
TEENAGER	TOTALS	6.01E-02	3.84E-01	2.40E-01	6.09E-02	1.32E-01	2.31E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.00E-03	1.08E-01	1.84E-01	5.44E-03	2.96E-02	1.75E-01
ADULT	GROUND	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02	3.32E-02
ADULT	CLOUD	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
ADULT	VEG.ING.	1.31E-02	1.68E-01	1.31E-02	1.54E-02	4.73E-02	1.31E-02
ADULT	MEAT ING	2.41E-03	3.20E-02	2.41E-03	3.98E-03	1.18E-02	2.41E-03
ADULT	MILK ING	3.83E-03	4.10E-02	3.83E-03	1.11E-03	3.72E-03	3.83E-03
ADULT	TOTALS	5.92E-02	3.85E-01	2.39E-01	6.18E-02	1.28E-01	2.30E-01

TIME STEP NUMBER 2, AFTER 20 YEARS　　DURATION IN YRS IS... 15.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, TRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.59E-03	7.63E-02	8.85E-02	4.24E-03	2.11E-02	0.
INFANT	GROUND	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04
INFANT	CLOUD	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.84E-03	8.56E-02	8.84E-03	4.05E-03	1.30E-02	8.84E-03
INFANT	TOTALS	1.21E-02	1.63E-01	9.80E-02	8.97E-03	3.48E-02	9.52E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.59E-03	7.63E-02	8.85E-02	4.24E-03	2.11E-02	0.
CHILD	GROUND	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04
CHILD	CLOUD	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09
CHILD	VEG.ING.	8.01E-03	9.61E-02	8.01E-03	1.09E-02	3.44E-02	8.01E-03
CHILD	MEAT ING	1.23E-03	1.56E-02	1.23E-03	2.30E-03	7.10E-03	1.23E-03
CHILD	MILK ING.	7.92E-03	7.77E-02	7.92E-03	2.93E-03	9.89E-03	7.92E-03
CHILD	TOTALS	2.04E-02	2.66E-01	1.06E-01	2.11E-02	7.31E-02	1.78E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.59E-03	7.63E-02	8.85E-02	4.24E-03	2.11E-02	0.
TEENAGER	GROUND	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04
TEENAGER	CLOUD	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09
TEENAGER	VEG.ING.	6.16E-03	7.74E-02	6.16E-03	8.13E-03	2.71E-02	6.16E-03
TEENAGER	MEAT ING	9.04E-04	1.18E-02	9.04E-04	1.67E-03	5.44E-03	9.04E-04
TEENAGER	MILK ING	4.60E-03	4.82E-02	4.60E-03	1.54E-03	5.51E-03	4.60E-03
TEENAGER	TOTALS	1.49E-02	2.14E-01	1.01E-01	1.63E-02	5.99E-02	1.23E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.59E-03	7.63E-02	8.85E-02	4.24E-03	2.11E-02	0.
ADULT	GROUND	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04	6.78E-04
ADULT	CLOUD	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09	2.52E-09
ADULT	VEG.ING.	7.57E-03	9.67E-02	7.57E-03	8.91E-03	2.71E-02	7.57E-03
ADULT	MEAT ING	1.39E-03	1.85E-02	1.39E-03	2.30E-03	6.80E-03	1.39E-03
ADULT	MILK ING	2.21E-03	2.35E-02	2.21E-03	6.42E-04	2.07E-03	2.21E-03
ADULT	TOTALS	1.49E-02	2.16E-01	1.00E-01	1.68E-02	5.78E-02	1.18E-02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.65E-03	7.83E-02	8.90E-02	4.75E-03	2.28E-02	1.41E-01
INFANT	GROUND	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02
INFANT	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.88E-03	8.63E-02	8.88E-03	4.31E-03	1.38E-02	8.88E-03
INFANT	TOTALS	3.32E-02	1.86E-01	1.20E-01	3.07E-02	5.82E-02	1.71E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.65E-03	7.83E-02	8.90E-02	4.75E-03	2.28E-02	1.41E-01
CHILD	GROUND	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02
CHILD	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
CHILD	VEG.ING.	8.12E-03	9.84E-02	8.12E-03	1.16E-02	3.65E-02	8.12E-03
CHILD	MEAT ING	1.26E-03	1.61E-02	1.26E-03	2.45E-03	7.55E-03	1.26E-03
CHILD	MILK ING	7.96E-03	7.84E-02	7.96E-03	3.12E-03	1.05E-02	7.96E-03
CHILD	TOTALS	4.16E-02	2.93E-01	1.28E-01	4.36E-02	9.89E-02	1.80E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.65E-03	7.83E-02	8.90E-02	4.75E-03	2.28E-02	1.41E-01
TEENAGER	GROUND	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02
TEENAGER	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
TEENAGER	VEG.ING.	6.23E-03	7.89E-02	6.23E-03	8.64E-03	2.88E-02	6.23E-03
TEENAGER	MEAT ING	9.18E-04	1.21E-02	9.18E-04	1.78E-03	5.79E-03	9.18E-04
TEENAGER	MILK ING	4.61E-03	4.85E-02	4.61E-03	1.64E-03	5.83E-03	4.61E-03
TEENAGER	TOTALS	3.61E-02	2.39E-01	1.22E-01	3.85E-02	8.48E-02	1.74E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.65E-03	7.83E-02	8.90E-02	4.75E-03	2.28E-02	1.41E-01
ADULT	GROUND	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02
ADULT	CLOUD	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03	2.45E-03
ADULT	VEG.ING.	7.64E-03	9.83E-02	7.64E-03	9.46E-03	2.87E-02	7.64E-03
ADULT	MEAT ING	1.41E-03	1.89E-02	1.41E-03	2.45E-03	7.23E-03	1.41E-03
ADULT	MILK ING	2.21E-03	2.36E-02	2.21E-03	6.84E-04	2.19E-03	2.21E-03
ADULT	TOTALS	3.56E-02	2.41E-01	1.22E-01	3.90E-02	8.26E-02	1.74E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	0.
INFANT	GROUND	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01
INFANT	CLOUD	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.50E+01	1.43E+02	1.50E+01	7.11E+00	2.15E+01	1.50E+01
INFANT	TOTALS	1.78E+01	2.05E+02	5.21E+01	1.16E+01	3.94E+01	1.58E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	0.
CHILD	GROUND	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01
CHILD	CLOUD	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07
CHILD	VEG.ING.	1.38E+01	1.65E+02	1.38E+01	1.92E+01	5.97E+01	1.38E+01
CHILD	MEAT ING	2.14E+00	2.69E+01	2.14E+00	4.04E+00	1.24E+01	2.14E+00
CHILD	MILK ING	1.36E+01	1.31E+02	1.36E+01	5.14E+00	1.66E+01	1.36E+01
CHILD	TOTALS	3.23E+01	3.84E+02	6.66E+01	3.29E+01	1.07E+02	3.04E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	0.
TEENAGER	GROUND	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01
TEENAGER	CLOUD	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07
TEENAGER	VEG.ING.	1.06E+01	1.33E+02	1.06E+01	1.43E+01	4.71E+01	1.06E+01
TEENAGER	MEAT ING	1.57E+00	2.05E+01	1.57E+00	2.93E+00	9.49E+00	1.57E+00
TEENAGER	MILK ING	7.92E+00	8.24E+01	7.92E+00	2.71E+00	9.22E+00	7.92E+00
TEENAGER	TOTALS	2.30E+01	2.98E+02	5.73E+01	2.44E+01	8.37E+01	2.10E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	0.
ADULT	GROUND	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01	8.74E-01
ADULT	CLOUD	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07	8.97E-07
ADULT	VEG.ING.	1.31E+01	1.67E+02	1.31E+01	1.56E+01	4.71E+01	1.31E+01
ADULT	MEAT ING	2.42E+00	3.21E+01	2.42E+00	4.04E+00	1.19E+01	2.42E+00
ADULT	MILK ING	3.81E+00	4.04E+01	3.81E+00	1.13E+00	3.47E+00	3.81E+00
ADULT	TOTALS	2.22E+01	3.01E+02	5.65E+01	2.53E+01	8.04E+01	2.02E+01

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	2.16E+01
INFANT	GROUND	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01
INFANT	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.50E+01	1.43E+02	1.50E+01	7.11E+00	2.15E+01	1.50E+01
INFANT	TOTALS	5.01E+01	2.37E+02	8.44E+01	4.39E+01	7.17E+01	6.97E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	2.16E+01
CHILD	GROUND	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01
CHILD	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
CHILD	VEG.ING.	1.38E+01	1.65E+02	1.38E+01	1.92E+01	5.97E+01	1.38E+01
CHILD	MEAT ING	2.14E+00	2.69E+01	2.14E+00	4.04E+00	1.24E+01	2.14E+00
CHILD	MILK ING	1.36E+01	1.31E+02	1.36E+01	5.14E+00	1.66E+01	1.36E+01
CHILD	TOTALS	6.46E+01	4.16E+02	9.89E+01	6.52E+01	1.39E+02	8.43E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	2.16E+01
TEENAGER	GROUND	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01
TEENAGER	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
TEENAGER	VEG.ING.	1.06E+01	1.33E+02	1.06E+01	1.43E+01	4.71E+01	1.06E+01
TEENAGER	MEAT ING	1.57E+00	2.05E+01	1.57E+00	2.93E+00	9.49E+00	1.57E+00
TEENAGER	MILK ING	7.92E+00	8.20E+01	7.92E+00	2.71E+00	9.22E+00	7.92E+00
TEENAGER	TOTALS	5.53E+01	3.30E+02	8.95E+01	5.67E+01	1.16E+02	7.49E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.97E+00	6.07E+01	3.63E+01	3.67E+00	1.70E+01	2.16E+01
ADULT	GROUND	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01	3.31E+01
ADULT	CLOUD	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
ADULT	VEG.ING.	1.31E+01	1.67E+02	1.31E+01	1.56E+01	4.71E+01	1.31E+01
ADULT	MEAT ING	2.42E+00	3.21E+01	2.42E+00	4.04E+00	1.19E+01	2.42E+00
ADULT	MILK ING	3.81E+00	4.04E+01	3.81E+00	1.13E+00	3.47E+00	3.81E+00
ADULT	TOTALS	5.45E+01	3.33E+02	8.87E+01	5.76E+01	1.13E+02	7.41E+01

REGION=UNC MILL RUN 7
METSET=GALLUP, 76-80

CODE=MILDOS.REV0 (7/79)

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.18E-04	9.49E-03	3.08E-02	3.25E-04	2.47E-03	0.
INFANT	GROUND	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04
INFANT	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.53E-04	7.89E-03	7.53E-04	2.64E-04	1.34E-03	7.53E-04
INFANT	TOTALS	1.33E-03	1.75E-02	3.17E-02	7.44E-04	3.96E-03	9.08E-04
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.18E-04	9.49E-03	3.08E-02	3.25E-04	2.47E-03	0.
CHILD	GROUND	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04
CHILD	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
CHILD	VEG.ING.	6.01E-04	7.56E-03	6.01E-04	7.11E-04	2.45E-03	6.01E-04
CHILD	MEAT ING	8.82E-05	1.14E-03	8.82E-05	1.50E-04	4.82E-04	8.82E-05
CHILD	MILK ING	6.20E-04	6.76E-03	6.20E-04	1.91E-04	9.20E-04	6.20E-04
CHILD	TOTALS	1.88E-03	2.51E-02	3.22E-02	1.53E-03	6.47E-03	1.46E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.18E-04	9.49E-03	3.08E-02	3.25E-04	2.47E-03	0.
TEENAGER	GROUND	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04
TEENAGER	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
TEENAGER	VEG.ING.	4.46E-04	5.76E-03	4.46E-04	5.30E-04	1.93E-03	4.46E-04
TEENAGER	MEAT ING	6.32E-05	8.38E-04	6.32E-05	1.09E-04	3.70E-04	6.32E-05
TEENAGER	MILK ING	3.41E-04	3.82E-03	3.41E-04	1.00E-04	5.14E-04	3.41E-04
TEENAGER	TOTALS	1.42E-03	2.01E-02	3.18E-02	1.22E-03	5.44E-03	1.00E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.18E-04	9.49E-03	3.08E-02	3.25E-04	2.47E-03	0.
ADULT	GROUND	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04	1.55E-04
ADULT	CLOUD	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09	1.25E-09
ADULT	VEG.ING.	5.36E-04	7.00E-03	5.36E-04	5.80E-04	1.93E-03	5.36E-04
ADULT	MEAT ING	9.61E-05	1.29E-03	9.61E-05	1.50E-04	4.62E-04	9.61E-05
ADULT	MILK ING	1.59E-04	1.78E-03	1.59E-04	4.18E-05	1.92E-04	1.59E-04
ADULT	TOTALS	1.36E-03	1.97E-02	3.17E-02	1.25E-03	5.20E-03	9.46E-04

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

NUMBER 11 NAME=GALLUP   X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	5.01E-04	1.21E-02	3.15E-02	9.78E-04	4.60E-03	2.22E-01
INFANT	GROUND	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03
INFANT	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.06E-04	8.84E-03	8.06E-04	6.04E-04	2.29E-03	8.06E-04
INFANT	TOTALS	6.65E-03	2.62E-02	3.76E-02	6.92E-03	1.22E-02	2.28E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	5.01E-04	1.21E-02	3.15E-02	9.78E-04	4.60E-03	2.22E-01
CHILD	GROUND	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03
CHILD	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
CHILD	VEG.ING.	7.51E-04	1.06E-02	7.51E-04	1.61E-03	5.16E-03	7.51E-04
CHILD	MEAT ING	1.21E-04	1.79E-03	1.21E-04	3.44E-04	1.07E-03	1.21E-04
CHILD	MILK ING	6.62E-04	7.59E-03	6.62E-04	4.38E-04	1.67E-03	6.62E-04
CHILD	TOTALS	7.37E-03	3.73E-02	3.83E-02	8.71E-03	1.78E-02	2.29E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	5.01E-04	1.21E-02	3.15E-02	9.78E-04	4.60E-03	2.22E-01
TEENAGER	GROUND	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03
TEENAGER	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
TEENAGER	VEG.ING.	5.29E-04	7.64E-03	5.29E-04	1.19E-03	4.04E-03	5.29E-04
TEENAGER	MEAT ING	8.09E-05	1.24E-03	8.09E-05	2.49E-04	8.19E-04	8.09E-05
TEENAGER	MILK ING	3.57E-04	4.19E-03	3.57E-04	2.31E-04	9.31E-04	3.57E-04
TEENAGER	TOTALS	6.81E-03	3.05E-02	3.78E-02	7.98E-03	1.57E-02	2.29E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	5.01E-04	1.21E-02	3.15E-02	9.78E-04	4.60E-03	2.22E-01
ADULT	GROUND	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03	1.44E-03
ADULT	CLOUD	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03
ADULT	VEG.ING.	6.24E-04	9.18E-03	6.24E-04	1.29E-03	4.00E-03	6.24E-04
ADULT	MEAT ING	1.20E-04	1.88E-03	1.20E-04	3.43E-04	1.02E-03	1.20E-04
ADULT	MILK ING	1.66E-04	1.95E-03	1.66E-04	9.60E-05	3.49E-04	1.66E-04
ADULT	TOTALS	6.75E-03	3.04E-02	3.77E-02	8.05E-03	1.53E-02	2.28E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.71E-03	7.17E-02	3.42E-01	1.31E-03	1.77E-02	0.
INFANT	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
INFANT	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.89E-03	6.47E-02	5.89E-03	1.66E-03	1.16E-02	5.89E-03
INFANT	TOTALS	1.13E-02	1.38E-01	3.49E-01	4.66E-03	3.10E-02	7.59E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.71E-03	7.17E-02	3.42E-01	1.31E-03	1.77E-02	0.
CHILD	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
CHILD	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
CHILD	VEG.ING.	4.30E-03	5.60E-02	4.30E-03	4.47E-03	1.68E-02	4.30E-03
CHILD	MEAT ING	6.05E-04	7.99E-03	6.05E-04	9.43E-04	3.17E-03	6.05E-04
CHILD	MILK ING	4.58E-03	5.36E-02	4.58E-03	1.20E-03	7.58E-03	4.58E-03
CHILD	TOTALS	1.49E-02	1.91E-01	3.53E-01	9.62E-03	4.69E-02	1.12E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.71E-03	7.17E-02	3.42E-01	1.31E-03	1.77E-02	0.
TEENAGER	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
TEENAGER	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
TEENAGER	VEG.ING.	3.09E-03	4.10E-02	3.09E-03	3.33E-03	1.32E-02	3.09E-03
TEENAGER	MEAT ING	4.25E-04	5.72E-03	4.25E-04	6.84E-04	2.43E-03	4.25E-04
TEENAGER	MILK ING	2.41E-03	2.84E-02	2.41E-03	6.32E-04	4.25E-03	2.41E-03
TEENAGER	TOTALS	1.13E-02	1.48E-01	3.49E-01	7.65E-03	3.93E-02	7.63E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.71E-03	7.17E-02	3.42E-01	1.31E-03	1.77E-02	0.
ADULT	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
ADULT	CLOUD	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08	1.48E-08
ADULT	VEG.ING.	3.65E-03	4.86E-02	3.65E-03	3.65E-03	1.32E-02	3.65E-03
ADULT	MEAT ING	6.38E-04	8.67E-03	6.38E-04	9.42E-04	3.03E-03	6.38E-04
ADULT	MILK ING	1.10E-03	1.28E-02	1.10E-03	2.63E-04	1.58E-03	1.10E-03
ADULT	TOTALS	1.08E-02	1.44E-01	3.49E-01	7.86E-03	3.72E-02	7.09E-03

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.75E-03	7.29E-02	3.42E-01	1.64E-03	1.88E-02	3.61E-01
INFANT	GROUND	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03
INFANT	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.92E-03	6.52E-02	5.92E-03	1.83E-03	1.21E-02	5.92E-03
INFANT	TOTALS	2.51E-02	1.54E-01	3.63E-01	1.89E-02	4.63E-02	3.83E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.75E-03	7.29E-02	3.42E-01	1.64E-03	1.88E-02	3.61E-01
CHILD	GROUND	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03
CHILD	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
CHILD	VEG.ING.	4.37E-03	5.75E-02	4.37E-03	4.91E-03	1.81E-02	4.37E-03
CHILD	MEAT ING	6.21E-04	8.31E-03	6.21E-04	1.04E-03	3.46E-03	6.21E-04
CHILD	MILK ING	4.60E-03	5.40E-02	4.60E-03	1.32E-03	7.95E-03	4.60E-03
CHILD	TOTALS	2.88E-02	2.08E-01	3.67E-01	2.43E-02	6.37E-02	3.86E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.75E-03	7.29E-02	3.42E-01	1.64E-03	1.88E-02	3.61E-01
TEENAGER	GROUND	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03
TEENAGER	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
TEENAGER	VEG.ING.	3.13E-03	4.19E-02	3.13E-03	3.65E-03	1.43E-02	3.13E-03
TEENAGER	MEAT ING	4.34E-04	5.91E-03	4.34E-04	7.53E-04	2.65E-03	4.34E-04
TEENAGER	MILK ING	2.42E-03	2.86E-02	2.42E-03	6.96E-04	4.45E-03	2.42E-03
TEENAGER	TOTALS	2.52E-02	1.65E-01	3.64E-01	2.21E-02	5.56E-02	3.83E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.75E-03	7.29E-02	3.42E-01	1.64E-03	1.88E-02	3.61E-01
ADULT	GROUND	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03	9.42E-03
ADULT	CLOUD	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03	5.99E-03
ADULT	VEG.ING.	3.70E-03	4.97E-02	3.70E-03	4.00E-03	1.42E-02	3.70E-03
ADULT	MEAT ING	6.50E-04	8.96E-03	6.50E-04	1.04E-03	3.31E-03	6.50E-04
ADULT	MILK ING	1.11E-03	1.29E-02	1.11E-03	2.90E-04	1.66E-03	1.11E-03
ADULT	TOTALS	2.46E-02	1.60E-01	3.63E-01	2.24E-02	5.33E-02	3.82E-01

REGION=UNC MILL RUN 7
METSET=GALLUP, 76-80

CODE=MILDOS.REV0 (7/79)

DATE= 15/12/81
PAGE NO. 101

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.36E-01	2.14E+00	0.
INFANT	GROUND	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01
INFANT	CLOUD	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.30E+00	1.29E+01	1.30E+00	5.54E-01	2.02E+00	1.30E+00
INFANT	TOTALS	1.77E+00	2.11E+01	2.13E+01	1.04E+00	4.31E+00	1.45E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.36E-01	2.14E+00	0.
CHILD	GROUND	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01
CHILD	CLOUD	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07
CHILD	VEG.ING.	1.13E+00	1.38E+01	1.13E+00	1.49E+00	4.80E+00	1.13E+00
CHILD	MEAT ING	1.73E-01	2.19E+00	1.73E-01	3.15E-01	9.80E-01	1.73E-01
CHILD	MILK ING	1.14E+00	1.15E+01	1.14E+00	4.01E-01	1.49E+00	1.14E+00
CHILD	TOTALS	2.92E+00	3.57E+01	2.24E+01	2.69E+00	9.56E+00	2.59E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.36E-01	2.14E+00	0.
TEENAGER	GROUND	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01
TEENAGER	CLOUD	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07
TEENAGER	VEG.ING.	8.65E-01	1.09E+01	8.65E-01	1.11E+00	3.79E+00	8.65E-01
TEENAGER	MEAT ING	1.26E-01	1.65E+00	1.26E-01	2.28E-01	7.51E-01	1.26E-01
TEENAGER	MILK ING	6.50E-01	6.93E+00	6.50E-01	2.11E-01	8.30E-01	6.50E-01
TEENAGER	TOTALS	2.12E+00	2.77E+01	2.16E+01	2.03E+00	7.66E+00	1.79E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.36E-01	2.14E+00	0.
ADULT	GROUND	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01	1.48E-01
ADULT	CLOUD	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07	8.07E-07
ADULT	VEG.ING.	1.06E+00	1.36E+01	1.06E+00	1.22E+00	3.79E+00	1.06E+00
ADULT	MEAT ING	1.93E-01	2.57E+00	1.93E-01	3.15E-01	9.39E-01	1.93E-01
ADULT	MILK ING	3.10E-01	3.34E+00	3.10E-01	8.77E-02	3.12E-01	3.10E-01
ADULT	TOTALS	2.04E+00	2.77E+01	2.16E+01	2.10E+00	7.33E+00	1.71E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.37E-01	2.14E+00	2.57E+01
INFANT	GROUND	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00
INFANT	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.30E+00	1.29E+01	1.30E+00	5.54E-01	2.02E+00	1.30E+00
INFANT	TOTALS	4.36E+00	2.36E+01	2.39E+01	3.62E+00	6.90E+00	2.97E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.37E-01	2.14E+00	2.57E+01
CHILD	GROUND	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00
CHILD	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
CHILD	VEG.ING.	1.13E+00	1.38E+01	1.13E+00	1.49E+00	4.80E+00	1.13E+00
CHILD	MEAT ING	1.73E-01	2.19E+00	1.73E-01	3.15E-01	9.80E-01	1.73E-01
CHILD	MILK ING	1.14E+00	1.15E+01	1.14E+00	4.01E-01	1.49E+00	1.14E+00
CHILD	TOTALS	5.51E+00	3.82E+01	2.50E+01	5.28E+00	1.21E+01	3.09E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.37E-01	2.14E+00	2.57E+01
TEENAGER	GROUND	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00
TEENAGER	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
TEENAGER	VEG.ING.	8.65E-01	1.09E+01	8.65E-01	1.11E+00	3.79E+00	8.65E-01
TEENAGER	MEAT ING	1.26E-01	1.65E+00	1.26E-01	2.28E-01	7.51E-01	1.26E-01
TEENAGER	MILK ING	6.50E-01	6.93E+00	6.50E-01	2.11E-01	8.30E-01	6.50E-01
TEENAGER	TOTALS	4.70E+00	3.03E+01	2.42E+01	4.62E+00	1.02E+01	3.01E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.29E-01	8.05E+00	1.98E+01	3.37E-01	2.14E+00	2.57E+01
ADULT	GROUND	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00	2.68E+00
ADULT	CLOUD	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02	5.19E-02
ADULT	VEG.ING.	1.06E+00	1.36E+01	1.06E+00	1.22E+00	3.79E+00	1.06E+00
ADULT	MEAT ING	1.93E-01	2.57E+00	1.93E-01	3.15E-01	9.39E-01	1.93E-01
ADULT	MILK ING	3.10E-01	3.34E+00	3.10E-01	8.77E-02	3.12E-01	3.10E-01
ADULT	TOTALS	4.62E+00	3.03E+01	2.41E+01	4.69E+00	9.91E+00	3.00E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.74E-01	5.23E+00	2.54E+01	8.99E-02	1.29E+00	0.
INFANT	GROUND	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01
INFANT	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.68E-01	5.10E+00	4.68E-01	1.31E-01	8.92E-01	4.68E-01
INFANT	TOTALS	8.71E-01	1.05E+01	2.60E+01	3.50E-01	2.31E+00	5.97E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.74E-01	5.23E+00	2.54E+01	8.99E-02	1.29E+00	0.
CHILD	GROUND	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01
CHILD	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
CHILD	VEG.ING.	3.45E-01	4.45E+00	3.45E-01	3.54E-01	1.32E+00	3.45E-01
CHILD	MEAT ING	4.87E-02	6.36E-01	4.87E-02	7.45E-02	2.49E-01	4.87E-02
CHILD	MILK ING	3.67E-01	4.24E+00	3.67E-01	9.48E-02	5.85E-01	3.67E-01
CHILD	TOTALS	1.16E+00	1.47E+01	2.63E+01	7.41E-01	3.57E+00	8.89E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.74E-01	5.23E+00	2.54E+01	8.99E-02	1.29E+00	0.
TEENAGER	GROUND	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01
TEENAGER	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
TEENAGER	VEG.ING.	2.50E-01	3.28E+00	2.50E-01	2.63E-01	1.04E+00	2.50E-01
TEENAGER	MEAT ING	3.44E-02	4.59E-01	3.44E-02	5.40E-02	1.91E-01	3.44E-02
TEENAGER	MILK ING	1.95E-01	2.27E+00	1.95E-01	4.99E-02	3.28E-01	1.95E-01
TEENAGER	TOTALS	8.82E-01	1.14E+01	2.60E+01	5.86E-01	2.97E+00	6.08E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.74E-01	5.23E+00	2.54E+01	8.99E-02	1.29E+00	0.
ADULT	GROUND	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01
ADULT	CLOUD	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06	1.11E-06
ADULT	VEG.ING.	2.96E-01	3.92E+00	2.96E-01	2.89E-01	1.04E+00	2.96E-01
ADULT	MEAT ING	5.19E-02	6.98E-01	5.19E-02	7.45E-02	2.39E-01	5.19E-02
ADULT	MILK ING	8.95E-02	1.03E+00	8.95E-02	2.08E-02	1.22E-01	8.95E-02
ADULT	TOTALS	8.40E-01	1.10E+01	2.60E+01	6.03E-01	2.81E+00	5.67E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.74E-01	5.23E+00	2.54E+01	9.00E-02	1.29E+00	1.43E+01
INFANT	GROUND	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01
INFANT	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.68E-01	5.10E+00	4.68E-01	1.31E-01	8.92E-01	4.68E-01
INFANT	TOTALS	1.56E+00	1.11E+01	2.67E+01	1.04E+00	3.00E+00	1.56E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.74E-01	5.23E+00	2.54E+01	9.00E-02	1.29E+00	1.43E+01
CHILD	GROUND	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01
CHILD	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
CHILD	VEG.ING.	3.45E-01	4.45E+00	3.45E-01	3.54E-01	1.32E+00	3.45E-01
CHILD	MEAT ING	4.87E-02	6.37E-01	4.87E-02	7.46E-02	2.49E-01	4.87E-02
CHILD	MILK ING	3.67E-01	4.24E+00	3.67E-01	9.49E-02	5.86E-01	3.67E-01
CHILD	TOTALS	1.85E+00	1.54E+01	2.70E+01	1.43E+00	4.26E+00	1.59E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.74E-01	5.23E+00	2.54E+01	9.00E-02	1.29E+00	1.43E+01
TEENAGER	GROUND	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01
TEENAGER	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
TEENAGER	VEG.ING.	2.50E-01	3.28E+00	2.50E-01	2.64E-01	1.04E+00	2.50E-01
TEENAGER	MEAT ING	3.44E-02	4.59E-01	3.44E-02	5.41E-02	1.91E-01	3.44E-02
TEENAGER	MILK ING	1.95E-01	2.27E+00	1.95E-01	5.00E-02	3.28E-01	1.95E-01
TEENAGER	TOTALS	1.57E+00	1.21E+01	2.67E+01	1.28E+00	3.67E+00	1.56E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.74E-01	5.23E+00	2.54E+01	9.00E-02	1.29E+00	1.43E+01
ADULT	GROUND	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01	7.63E-01
ADULT	CLOUD	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02	5.66E-02
ADULT	VEG.ING.	2.96E-01	3.92E+00	2.96E-01	2.89E-01	1.04E+00	2.96E-01
ADULT	MEAT ING	5.19E-02	6.98E-01	5.19E-02	7.45E-02	2.39E-01	5.19E-02
ADULT	MILK ING	8.95E-02	1.03E+00	8.95E-02	2.08E-02	1.22E-01	8.95E-02
ADULT	TOTALS	1.53E+00	1.17E+01	2.67E+01	1.29E+00	3.50E+00	1.56E+01

TIME STEP NUMBER 3, AFTER 25 YEARS   DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE N DIRECTION, THETA EQUALS 0.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.150E-05	3.660E-04	1.454E-04	1.893E-04	2.005E+00	1.986E+00	1.284E+00	7.293E-01	8.616E-07	1.128E-05
2.5	3.208E-05	1.882E-04	7.531E-05	9.958E-05	1.196E+00	1.192E+00	9.270E-01	6.671E-01	1.295E-06	8.416E-06
3.5	1.952E-05	1.198E-04	4.798E-05	6.360E-05	8.385E-01	8.373E-01	7.154E-01	5.852E-01	1.660E-06	6.672E-06
4.5	1.304E-05	8.361E-05	3.351E-05	4.445E-05	6.345E-01	6.343E-01	5.707E-01	5.018E-01	1.936E-06	5.418E-06
7.5	5.437E-06	3.828E-05	1.535E-05	2.037E-05	3.540E-01	3.541E-01	3.388E-01	3.229E-01	2.402E-06	3.287E-06
15.0	1.597E-06	1.238E-05	4.963E-06	6.598E-06	1.596E-01	1.597E-01	1.580E-01	1.553E-01	2.718E-06	1.545E-06
25.0	6.567E-07	5.250E-06	2.106E-06	2.802E-06	8.885E-02	8.890E-02	8.893E-02	8.856E-02	2.782E-06	8.728E-07
35.0	3.662E-07	2.957E-06	1.186E-06	1.579E-06	6.029E-02	6.032E-02	6.054E-02	6.057E-02	2.778E-06	5.950E-07
45.0	2.427E-07	1.976E-06	7.926E-07	1.055E-06	4.496E-02	4.499E-02	4.519E-02	4.530E-02	2.755E-06	4.444E-07
55.0	1.714E-07	1.402E-06	5.627E-07	7.494E-07	3.541E-02	3.543E-02	3.561E-02	3.572E-02	2.725E-06	3.503E-07
65.0	1.231E-07	1.010E-06	4.051E-07	5.396E-07	2.891E-02	2.892E-02	2.907E-02	2.918E-02	2.693E-06	2.860E-07
75.0	8.829E-08	7.248E-07	2.908E-07	3.874E-07	2.419E-02	2.421E-02	2.434E-02	2.443E-02	2.659E-06	2.394E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	2.006E+04	8.294E+03	3.268E+03	3.268E+03	3.268E+03	3.270E+03	3.270E+03	3.270E+03	4.094E+00
2.5	1.097E+04	4.017E+03	1.596E+03	1.596E+03	1.596E+03	1.597E+03	1.597E+03	1.597E+03	6.957E+00
3.5	6.100E+03	2.467E+03	9.816E+02	9.816E+02	9.816E+02	9.823E+02	9.823E+02	9.823E+02	9.173E+00
4.5	3.669E+03	1.673E+03	6.660E+02	6.660E+02	6.660E+02	6.665E+02	6.665E+02	6.665E+02	1.078E+01
7.5	1.144E+03	7.133E+02	2.841E+02	2.841E+02	2.841E+02	2.844E+02	2.844E+02	2.844E+02	1.337E+01
15.0	2.068E+02	2.016E+02	8.035E+01	8.035E+01	8.035E+01	8.048E+01	8.048E+01	8.048E+01	1.497E+01
25.0	6.601E+01	7.531E+01	3.003E+01	3.003E+01	3.003E+01	3.010E+01	3.010E+01	3.010E+01	1.526E+01
35.0	3.306E+01	3.845E+01	1.533E+01	1.533E+01	1.533E+01	1.538E+01	1.538E+01	1.538E+01	1.519E+01
45.0	1.996E+01	2.367E+01	9.440E+00	9.440E+00	9.440E+00	9.476E+00	9.476E+00	9.476E+00	1.503E+01
55.0	1.318E+01	1.577E+01	6.291E+00	6.291E+00	6.291E+00	6.319E+00	6.319E+00	6.319E+00	1.484E+01
65.0	9.093E+00	1.082E+01	4.316E+00	4.316E+00	4.316E+00	4.339E+00	4.339E+00	4.339E+00	1.463E+01
75.0	6.435E+00	7.487E+00	2.987E+00	2.987E+00	2.987E+00	3.006E+00	3.006E+00	3.006E+00	1.441E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	2.570E-06	2.040E-05	8.084E-06	1.046E-05
2.5	1.242E-06	9.884E-06	3.951E-06	5.206E-06
3.5	7.559E-07	6.079E-06	2.433E-06	3.218E-06
4.5	5.081E-07	4.127E-06	1.652E-06	2.189E-06
7.5	2.127E-07	1.763E-06	7.059E-07	9.402E-07
15.0	5.898E-08	4.989E-07	1.998E-07	2.726E-07
25.0	2.190E-08	1.863E-07	7.464E-08	1.072E-07
35.0	1.116E-08	9.502E-08	3.809E-08	5.880E-08
45.0	6.860E-09	5.846E-08	2.343E-08	3.933E-08
55.0	4.567E-09	3.893E-08	1.561E-08	2.887E-08
65.0	3.132E-09	2.669E-08	1.070E-08	2.228E-08
75.0	2.167E-09	1.846E-08	7.403E-09	1.780E-08

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE ENE DIRECTION, THETA EQUALS 67.5 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.801E-04	5.777E-03	2.321E-03	3.095E-03	5.201E+00	4.901E+00	2.045E+00	7.603E-01	5.099E-07	1.825E-05
2.5	3.672E-04	3.123E-03	1.255E-03	1.672E-03	2.225E+00	2.163E+00	1.341E+00	7.736E-01	9.841E-07	1.191E-05
3.5	2.022E-04	1.719E-03	6.905E-04	9.200E-04	1.271E+00	1.254E+00	9.323E-01	6.727E-01	1.375E-06	8.528E-06
4.5	1.299E-04	1.106E-03	4.441E-04	5.915E-04	8.710E-01	8.649E-01	7.058E-01	5.739E-01	1.691E-06	6.610E-06
7.5	5.233E-05	4.476E-04	1.797E-04	2.392E-04	4.200E-01	4.197E-01	3.819E-01	3.531E-01	2.213E-06	3.685E-06
15.0	1.508E-05	1.297E-04	5.205E-05	6.926E-05	1.681E-01	1.682E-01	1.630E-01	1.577E-01	2.517E-06	1.588E-06
25.0	6.106E-06	5.261E-05	2.111E-05	2.810E-05	8.912E-02	8.917E-02	8.843E-02	8.719E-02	2.555E-06	8.654E-07
35.0	3.365E-06	2.900E-05	1.164E-05	1.549E-05	5.908E-02	5.911E-02	5.907E-02	5.876E-02	2.536E-06	5.795E-07
45.0	2.219E-06	1.913E-05	7.677E-06	1.022E-05	4.357E-02	4.359E-02	4.369E-02	4.364E-02	2.508E-06	4.292E-07
55.0	1.577E-06	1.360E-05	5.456E-06	7.266E-06	3.417E-02	3.419E-02	3.432E-02	3.436E-02	2.484E-06	3.374E-07
65.0	1.139E-06	9.825E-06	3.943E-06	5.251E-06	2.782E-02	2.784E-02	2.796E-02	2.803E-02	2.459E-06	2.750E-07
75.0	8.212E-07	7.081E-06	2.841E-06	3.785E-06	2.319E-02	2.321E-02	2.332E-02	2.339E-02	2.429E-06	2.294E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	3.761E+04	1.331E+05	5.320E+04	5.320E+04	5.320E+04	5.321E+04	5.321E+04	5.321E+04	3.324E+00
2.5	1.944E+04	6.937E+04	2.773E+04	2.773E+04	2.773E+04	2.773E+04	2.773E+04	2.773E+04	6.107E+00
3.5	1.062E+04	3.710E+04	1.482E+04	1.482E+04	1.482E+04	1.483E+04	1.483E+04	1.483E+04	8.227E+00
4.5	6.543E+03	2.328E+04	9.301E+03	9.301E+03	9.301E+03	9.302E+03	9.302E+03	9.302E+03	9.783E+00
7.5	2.307E+03	8.871E+03	3.542E+03	3.542E+03	3.542E+03	3.543E+03	3.543E+03	3.543E+03	1.241E+01
15.0	5.417E+02	2.295E+03	9.159E+02	9.159E+02	9.159E+02	9.160E+02	9.160E+02	9.160E+02	1.392E+01
25.0	1.989E+02	8.338E+02	3.327E+02	3.327E+02	3.327E+02	3.328E+02	3.328E+02	3.328E+02	1.410E+01
35.0	1.043E+02	4.207E+02	1.679E+02	1.679E+02	1.679E+02	1.679E+02	1.679E+02	1.679E+02	1.396E+01
45.0	6.549E+01	2.572E+02	1.026E+02	1.026E+02	1.026E+02	1.027E+02	1.027E+02	1.027E+02	1.378E+01
55.0	4.473E+01	1.721E+02	6.867E+01	6.867E+01	6.867E+01	6.870E+01	6.870E+01	6.870E+01	1.359E+01
65.0	3.158E+01	1.188E+02	4.740E+01	4.740E+01	4.740E+01	4.742E+01	4.742E+01	4.742E+01	1.339E+01
75.0	2.263E+01	8.274E+01	3.302E+01	3.302E+01	3.302E+01	3.304E+01	3.304E+01	3.304E+01	1.318E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	3.787E-05	3.299E-04	1.326E-04	1.763E-04
2.5	1.977E-05	1.723E-04	6.922E-05	9.205E-05
3.5	1.058E-05	9.215E-05	3.701E-05	4.919E-05
4.5	6.641E-06	5.783E-05	2.322E-05	3.085E-05
7.5	2.530E-06	2.203E-05	8.840E-06	1.174E-05
15.0	6.540E-07	5.695E-06	2.284E-06	3.036E-06
25.0	2.375E-07	2.068E-06	8.291E-07	1.107E-06
35.0	1.198E-07	1.042E-06	4.180E-07	5.619E-07
45.0	7.320E-08	6.369E-07	2.554E-07	3.462E-07
55.0	4.896E-08	4.259E-07	1.708E-07	2.340E-07
65.0	3.378E-08	2.939E-07	1.178E-07	1.637E-07
75.0	2.353E-08	2.046E-07	8.206E-08	1.162E-07

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE E DIRECTION, THETA EQUALS 90.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	1.633E-03	1.424E-02	5.725E-03	7.635E-03	9.770E+00	8.887E+00	2.819E+00	8.189E-01	4.218E-07	2.650E-05
2.5	3.774E-04	3.259E-03	1.310E-03	1.747E-03	2.496E+00	2.420E+00	1.418E+00	7.558E-01	8.378E-07	1.250E-05
3.5	1.630E-04	1.401E-03	5.628E-04	7.505E-04	1.209E+00	1.193E+00	8.682E-01	6.020E-01	1.107E-06	7.876E-06
4.5	9.038E-05	7.749E-04	3.113E-04	4.151E-04	7.441E-01	7.389E-01	5.990E-01	4.773E-01	1.294E-06	5.578E-06
7.5	2.837E-05	2.427E-04	9.749E-05	1.299E-04	3.049E-01	3.046E-01	2.783E-01	2.571E-01	1.533E-06	2.684E-06
15.0	6.312E-06	5.397E-05	2.166E-05	2.885E-05	1.057E-01	1.058E-01	1.029E-01	9.981E-02	1.566E-06	1.003E-06
25.0	2.259E-06	1.910E-05	7.664E-06	1.021E-05	5.265E-02	5.268E-02	5.234E-02	5.172E-02	1.509E-06	5.126E-07
35.0	1.169E-06	9.951E-06	3.993E-06	5.317E-06	3.415E-02	3.417E-02	3.418E-02	3.405E-02	1.471E-06	3.355E-07
45.0	7.577E-07	6.451E-06	2.588E-06	3.447E-06	2.508E-02	2.510E-02	2.517E-02	2.517E-02	1.451E-06	2.474E-07
55.0	5.337E-07	4.545E-06	1.824E-06	2.429E-06	1.961E-02	1.962E-02	1.970E-02	1.974E-02	1.434E-06	1.937E-07
65.0	3.841E-07	3.270E-06	1.312E-06	1.748E-06	1.593E-02	1.594E-02	1.602E-02	1.606E-02	1.417E-06	1.575E-07
75.0	2.762E-07	2.349E-06	9.426E-07	1.256E-06	1.327E-02	1.328E-02	1.334E-02	1.339E-02	1.398E-06	1.313E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	5.041E+04	3.325E+05	1.330E+05	1.330E+05	1.330E+05	1.330E+05	1.330E+05	1.330E+05	2.028E+00
2.5	1.467E+04	7.261E+04	2.904E+04	2.904E+04	2.904E+04	2.904E+04	2.904E+04	2.904E+04	3.833E+00
3.5	6.979E+03	3.021E+04	1.208E+04	1.208E+04	1.208E+04	1.208E+04	1.208E+04	1.208E+04	5.124E+00
4.5	4.000E+03	1.627E+04	6.503E+03	6.503E+03	6.503E+03	6.503E+03	6.503E+03	6.503E+03	6.035E+00
7.5	1.261E+03	4.769E+03	1.905E+03	1.905E+03	1.905E+03	1.906E+03	1.906E+03	1.906E+03	7.434E+00
15.0	2.648E+02	9.352E+02	3.734E+02	3.734E+02	3.734E+02	3.735E+02	3.735E+02	3.735E+02	8.081E+00
25.0	9.385E+01	2.926E+02	1.168E+02	1.168E+02	1.168E+02	1.168E+02	1.168E+02	1.168E+02	8.072E+00
35.0	4.926E+01	1.382E+02	5.514E+01	5.514E+01	5.514E+01	5.517E+01	5.517E+01	5.517E+01	7.967E+00
45.0	3.112E+01	8.241E+01	3.289E+01	3.289E+01	3.289E+01	3.290E+01	3.290E+01	3.290E+01	7.866E+00
55.0	2.139E+01	5.436E+01	2.169E+01	2.169E+01	2.169E+01	2.171E+01	2.171E+01	2.171E+01	7.756E+00
65.0	1.525E+01	3.718E+01	1.484E+01	1.484E+01	1.484E+01	1.485E+01	1.485E+01	1.485E+01	7.641E+00
75.0	1.109E+01	2.570E+01	1.026E+01	1.026E+01	1.026E+01	1.027E+01	1.027E+01	1.027E+01	7.520E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	9.457E-05	8.296E-04	3.334E-04	4.439E-04
2.5	2.068E-05	1.810E-04	7.274E-05	9.680E-05
3.5	8.609E-06	7.526E-05	3.024E-05	4.023E-05
4.5	4.638E-06	4.050E-05	1.627E-05	2.164E-05
7.5	1.360E-06	1.186E-05	4.763E-06	6.333E-06
15.0	2.669E-07	2.323E-06	9.319E-07	1.241E-06
25.0	8.356E-08	7.257E-07	2.910E-07	3.905E-07
35.0	3.947E-08	3.423E-07	1.373E-07	1.864E-07
45.0	2.354E-08	2.040E-07	8.179E-08	1.128E-07
55.0	1.552E-08	1.344E-07	5.391E-08	7.581E-08
65.0	1.062E-08	9.191E-08	3.686E-08	5.315E-08
75.0	7.342E-09	6.350E-08	2.547E-08	3.799E-08

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE S . DIRECTION, THETA EQUALS 180.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	5.849E-05	4.359E-04	1.752E-04	2.336E-04	5.250E+00	5.014E+00	1.867E+00	6.276E-01	3.742E-07	1.697E-05
2.5	2.115E-05	1.443E-04	5.797E-05	7.727E-05	1.381E+00	1.365E+00	8.585E-01	4.773E-01	5.549E-07	7.539E-06
3.5	1.104E-95	7.408E-05	2.976E-05	3.965E-05	6.904E-01	6.875E-01	5.280E-01	3.756E-01	7.171E-07	4.786E-06
4.5	6.834E-06	4.626E-05	1.858E-05	2.475E-05	4.536E-01	4.530E-01	3.844E-01	3.124E-01	8.745E-07	3.581E-06
7.5	2.551E-06	1.803E-05	7.238E-06	9.638E-06	2.072E-01	2.073E-01	1.954E-01	1.831E-01	1.120E-06	1.887E-06
15.0	6.760E-07	5.083E-06	2.040E-06	2.715E-06	8.000E-02	8.005E-02	7.900E-02	7.748E-02	1.241E-06	7.719E-07
25.0	2.632E-07	2.012E-06	8.073E-07	1.075E-06	4.184E-02	4.187E-02	4.186E-02	4.165E-02	1.242E-06	4.107E-07
35.0	1.426E-07	1.093E-06	4.384E-07	5.839E-07	2.762E-02	2.764E-02	2.773E-02	2.774E-02	1.226E-06	2.725E-07
45.0	9.256E-08	7.128E-07	2.860E-07	3.810E-07	2.030E-02	2.032E-02	2.041E-02	2.046E-02	1.208E-06	2.007E-07
55.0	6.473E-08	5.003E-07	2.007E-07	2.674E-07	1.585E-02	1.586E-02	1.593E-02	1.599E-02	1.190E-06	1.567E-07
65.0	4.603E-08	3.557E-07	1.427E-07	1.902E-07	1.284E-02	1.285E-02	1.291E-02	1.296E-02	1.171E-06	1.270E-07
75.0	3.271E-08	2.517E-07	1.010E-07	1.346E-07	1.068E-02	1.069E-02	1.075E-02	1.079E-02	1.153E-06	1.057E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	9.981E+03	9.798E+03	3.916E+03	3.916E+03	3.916E+03	3.920E+03	3.920E+03	3.920E+03	2.034E+00
2.5	5.066E+03	3.073E+03	1.228E+03	1.228E+03	1.228E+03	1.229E+03	1.229E+03	1.229E+03	3.253E+00
3.5	2.777E+03	1.519E+03	6.067E+02	6.067E+02	6.067E+02	6.072E+02	6.072E+02	6.072E+02	4.183E+00
4.5	1.667E+03	9.185E+02	3.667E+02	3.667E+02	3.667E+02	3.671E+02	3.671E+02	3.671E+02	4.894E+00
7.5	5.326E+02	3.309E+02	1.320E+02	1.320E+02	1.320E+02	1.322E+02	1.322E+02	1.322E+02	6.001E+00
15.0	1.053E+02	8.050E+01	3.211E+01	3.211E+01	3.211E+01	3.217E+01	3.217E+01	3.217E+01	6.561E+00
25.0	3.679E+01	2.758E+01	1.100E+01	1.100E+01	1.100E+01	1.103E+01	1.103E+01	1.103E+01	6.654E+00
35.0	1.942E+01	1.336E+01	5.326E+00	5.326E+00	5.326E+00	5.348E+00	5.348E+00	5.348E+00	6.605E+00
45.0	1.213E+01	7.926E+00	3.161E+00	3.161E+00	3.161E+00	3.177E+00	3.177E+00	3.177E+00	6.527E+00
55.0	8.232E+00	5.164E+00	2.059E+00	2.059E+00	2.059E+00	2.072E+00	2.072E+00	2.072E+00	6.437E+00
65.0	5.837E+00	3.462E+00	1.380E+00	1.380E+00	1.380E+00	1.390E+00	1.390E+00	1.390E+00	6.338E+00
75.0	4.255E+00	2.334E+00	9.305E-01	9.305E-01	9.305E-01	9.390E-01	9.390E-01	9.390E-01	6.236E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	2.862E-06	2.434E-05	9.780E-06	1.301E-05
2.5	9.153E-07	7.613E-06	3.058E-06	4.069E-06
3.5	4.551E-07	3.760E-06	1.510E-06	2.009E-06
4.5	2.751E-07	2.273E-06	9.126E-07	1.215E-06
7.5	9.851E-08	8.188E-07	3.285E-07	4.392E-07
15.0	2.373E-08	1.991E-07	7.985E-08	1.096E-07
25.0	8.128E-09	6.912E-08	2.731E-08	3.993E-08
35.0	3.948E-09	3.295E-08	1.321E-08	2.119E-08
45.0	2.346E-09	1.953E-08	7.830E-09	1.401E-08
55.0	1.530E-09	1.271E-08	5.047E-09	1.033E-08
65.0	1.028E-09	8.513E-09	3.413E-09	8.043E-09
75.0	6.955E-10	5.738E-09	2.299E-09	6.510E-09

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE W DIRECTION, THETA EQUALS 270.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	2.788E-05	1.072E-04	4.298E-05	5.707E-05	1.790E+00	1.780E+00	1.180E+00	6.818E-01	8.313E-07	1.036E-05
2.5	1.587E-05	6.197E-05	2.485E-05	3.301E-05	1.084E+00	1.082E+00	8.613E-01	6.271E-01	1.246E-06	7.821E-06
3.5	9.558E-06	4.121E-05	1.653E-05	2.196E-05	7.495E-01	7.492E-01	6.539E-01	5.406E-01	1.568E-06	6.104E-06
4.5	6.267E-06	2.972E-05	1.192E-05	1.584E-05	5.657E-01	5.658E-01	5.188E-01	4.608E-01	1.813E-06	4.932E-06
7.5	2.476E-06	1.431E-05	5.737E-06	7.623E-06	3.149E-01	3.151E-01	3.056E-01	2.938E-01	2.223E-06	2.970E-06
15.0	6.705E-07	4.756E-06	1.907E-06	2.536E-06	1.417E-01	1.418E-01	1.411E-01	1.397E-01	2.491E-06	1.383E-06
25.0	2.646E-07	2.008E-06	8.056E-07	1.072E-06	7.878E-02	7.882E-02	7.904E-02	7.900E-02	2.537E-06	7.766E-07
35.0	1.446E-07	1.120E-06	4.495E-07	5.983E-07	5.333E-02	5.336E-02	5.360E-02	5.373E-02	2.524E-06	5.271E-07
45.0	9.475E-08	7.448E-07	2.988E-07	3.979E-07	3.971E-02	3.973E-02	3.993E-02	4.006E-02	2.498E-06	3.928E-07
55.0	6.621E-08	5.250E-07	2.106E-07	2.805E-07	3.122E-02	3.124E-02	3.140E-02	3.152E-02	2.467E-06	3.090E-07
65.0	4.697E-08	3.738E-07	1.500E-07	1.998E-07	2.546E-02	2.547E-02	2.561E-02	2.571E-02	2.434E-06	2.520E-07
75.0	3.318E-08	2.639E-07	1.059E-07	1.410E-07	2.129E-02	2.130E-02	2.141E-02	2.150E-02	2.401E-06	2.107E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.591E+04	2.368E+03	9.416E+02	9.416E+02	9.416E+02	9.430E+02	9.430E+02	9.430E+02	4.542E+00
2.5	8.947E+03	1.313E+03	5.220E+02	5.220E+02	5.220E+02	5.228E+02	5.228E+02	5.228E+02	7.074E+00
3.5	4.949E+03	8.418E+02	3.349E+02	3.349E+02	3.349E+02	3.355E+02	3.355E+02	3.355E+02	9.020E+00
4.5	2.941E+03	5.886E+02	2.342E+02	2.342E+02	2.342E+02	2.347E+02	2.347E+02	2.347E+02	1.040E+01
7.5	8.719E+02	2.625E+02	1.045E+02	1.045E+02	1.045E+02	1.047E+02	1.047E+02	1.047E+02	1.260E+01
15.0	1.360E+02	7.522E+01	2.996E+01	2.996E+01	2.996E+01	3.008E+01	3.008E+01	3.008E+01	1.385E+01
25.0	3.842E+01	2.736E+01	1.091E+01	1.091E+01	1.091E+01	1.097E+01	1.097E+01	1.097E+01	1.396E+01
35.0	1.824E+01	1.355E+01	5.400E+00	5.400E+00	5.400E+00	5.442E+00	5.442E+00	5.442E+00	1.383E+01
45.0	1.067E+01	8.152E+00	3.250E+00	3.250E+00	3.250E+00	3.281E+00	3.281E+00	3.281E+00	1.365E+01
55.0	6.900E+00	5.316E+00	2.119E+00	2.119E+00	2.119E+00	2.144E+00	2.144E+00	2.144E+00	1.344E+01
65.0	4.714E+00	3.558E+00	1.419E+00	1.419E+00	1.419E+00	1.439E+00	1.439E+00	1.439E+00	1.324E+01
75.0	3.332E+00	2.389E+00	9.526E-01	9.526E-01	9.526E-01	9.694E-01	9.694E-01	9.694E-01	1.303E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	8.150E-07	5.740E-06	2.301E-06	3.048E-06
2.5	4.536E-07	3.191E-06	1.279E-06	1.697E-06
3.5	2.838E-07	2.054E-06	8.232E-07	1.095E-06
4.5	1.937E-07	1.440E-06	5.772E-07	7.696E-07
7.5	8.239E-08	6.455E-07	2.586E-07	3.487E-07
15.0	2.254E-08	1.856E-07	7.437E-08	1.059E-07
25.0	8.088E-09	6.755E-08	2.706E-08	4.344E-08
35.0	3.992E-09	3.342E-08	1.339E-08	2.531E-08
45.0	2.394E-09	2.009E-08	8.051E-09	1.817E-08
55.0	1.561E-09	1.309E-08	5.246E-09	1.436E-08
65.0	1.045E-09	8.755E-09	3.510E-09	1.196E-08
75.0	7.025E-10	5.874E-09	2.355E-09	1.033E-08

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.991E-03	0.	0.	0.	2.089E-04	1.224E-04	4.279E-05	1.429E-05	7.175E-05	2.436E-05	1.800E-05	4.538E-06
NNE	0.	0.	0.	0.	4.062E-04	1.353E-04	1.897E-04	3.880E-05	8.077E-06	7.965E-05	8.620E-05	9.150E-06
NE	0.	0.	2.162E-03	0.	1.075E-03	4.553E-04	6.333E-04	1.965E-04	4.790E-06	1.159E-05	1.152E-04	2.930E-04
ENE	0.	0.	1.813E-03	0.	3.962E-04	1.789E-03	7.456E-04	3.147E-04	4.141E-05	9.547E-05	8.834E-05	0.
E	0.	0.	0.	0.	3.277E-03	7.486E-04	4.842E-04	1.188E-02	5.961E-04	3.604E-05	3.560E-05	3.275E-05
ESE	0.	0.	0.	2.417E-04	9.841E-04	2.227E-04	2.883E-04	1.383E-04	2.137E-04	8.913E-05	3.299E-06	1.717E-05
SE	0.	0.	2.129E-04	8.105E-05	3.641E-04	2.786E-05	6.039E-05	1.152E-04	8.544E-05	1.465E-05	5.047E-05	3.159E-04
SSE	0.	0.	7.377E-05	1.045E-04	5.896E-05	3.691E-05	1.438E-05	8.487E-06	4.814E-06	3.500E-06	1.868E-06	1.013E-05
S	0.	0.	0.	7.798E-05	4.024E-05	1.947E-04	8.550E-06	1.761E-05	1.259E-05	3.893E-07	8.794E-07	0.
SSW	0.	2.668E-04	2.602E-05	4.865E-05	2.798E-05	1.363E-04	6.142E-06	3.650E-05	2.326E-05	7.454E-06	2.221E-05	2.047E-04
SW	0.	0.	0.	3.428E-05	3.061E-04	1.158E-05	1.328E-03	6.070E-05	8.528E-06	1.951E-05	9.755E-06	1.548E-06
WSW	4.953E-04	1.104E-04	0.	0.	2.738E-04	8.198E-05	4.508E-03	1.627E-04	4.482E-05	7.798E-06	2.714E-06	2.112E-06
W	0.	0.	0.	0.	2.283E-04	7.483E-05	1.787E-04	5.602E-05	9.828E-05	7.334E-05	2.959E-06	2.347E-06
WNW	0.	0.	0.	0.	2.911E-05	5.672E-05	1.120E-04	7.906E-05	7.085E-06	6.635E-05	1.171E-06	9.752E-07
NW	0.	0.	0.	0.	5.050E-05	2.979E-05	2.236E-05	3.956E-05	2.796E-07	4.461E-05	1.053E-05	1.096E-06
NNW	7.120E-04	1.081E-04	0.	2.661E-05	1.121E-04	6.616E-05	3.959E-05	2.492E-05	2.508E-04	8.101E-05	3.958E-05	5.164E-05

TOTAL DOSE COMMITMENT IS 4.603E-02 PERSON-REM/YR

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.174E-02	0.	0.	0.	6.532E-03	3.845E-03	1.348E-03	4.510E-04	2.267E-03	7.701E-04	5.691E-04	1.834E-04
NNE	0.	0.	0.	0.	1.271E-02	4.250E-03	5.975E-03	1.224E-03	2.552E-04	2.518E-03	2.727E-03	2.895E-04
NE	0.	0.	6.744E-02	0.	3.362E-02	1.429E-02	1.994E-02	6.198E-03	1.513E-04	3.664E-04	3.643E-03	9.273E-03
ENE	0.	0.	5.652E-02	0.	1.239E-02	5.615E-02	2.348E-02	9.927E-03	1.308E-03	3.019E-03	2.796E-03	0.
E	0.	0.	0.	0.	1.025E-01	2.351E-02	1.525E-02	3.751E-01	1.885E-02	1.141E-03	1.127E-03	1.038E-03
ESE	0.	0.	0.	7.548E-03	3.081E-02	7.001E-03	9.090E-03	4.371E-03	6.762E-03	2.823E-03	1.046E-04	5.445E-04
SE	0.	0.	6.642E-03	2.531E-03	1.140E-02	8.757E-04	1.904E-03	3.641E-03	2.703E-03	4.638E-04	1.599E-03	1.001E-02
SSE	0.	0.	2.302E-03	3.263E-03	1.846E-03	1.161E-03	4.533E-04	2.680E-04	1.522E-04	1.107E-04	5.909E-05	3.203E-04
S	0.	0.	0.	2.432E-03	1.259E-03	6.120E-03	2.695E-04	5.561E-04	3.978E-04	1.231E-05	2.780E-05	0.
SSW	0.	8.290E-03	8.094E-04	1.516E-03	8.751E-04	4.286E-03	1.937E-04	1.153E-03	7.348E-04	2.355E-04	7.017E-04	6.460E-03
SW	0.	0.	0.	1.064E-03	9.546E-03	3.633E-04	4.180E-02	1.911E-03	2.685E-04	6.136E-04	3.066E-04	4.859E-05
WSW	1.535E-02	3.427E-03	0.	0.	8.558E-03	2.577E-03	1.421E-01	5.136E-03	1.416E-03	2.464E-04	8.569E-05	6.665E-05
W	0.	0.	0.	0.	7.121E-03	2.413E-03	5.632E-03	1.768E-03	3.103E-03	2.315E-03	9.336E-05	7.396E-05
WNW	0.	0.	0.	0.	9.052E-04	1.776E-03	3.520E-03	2.487E-03	2.229E-04	2.087E-03	3.679E-05	3.060E-05
NW	0.	0.	0.	0.	1.576E-03	9.347E-04	7.038E-04	1.247E-03	8.818E-06	1.407E-03	3.320E-04	3.451E-05
NNW	2.208E-02	3.357E-03	0.	8.292E-04	3.506E-03	2.079E-03	1.248E-03	7.867E-04	7.927E-03	2.562E-03	1.251E-03	1.632E-03

TOTAL DOSE COMMITMENT IS 1.446E+00 PERSON-REM/YR

TIME STEP NUMBER 3, AFTER 25 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL.   EXPOSED ORGAN IS AVG.LUNG

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.938E-02	0.	0.	0.	4.389E-03	2.641E-03	9.404E-04	3.155E-04	1.581E-03	5.315E-04	3.858E-04	9.459E-05
NNE	0.	0.	0.	0.	8.303E-03	2.875E-03	4.146E-03	8.623E-04	1.815E-04	1.799E-03	1.948E-03	2.058E-04
NE	0.	0.	4.199E-02	0.	2.164E-02	9.555E-03	1.372E-02	4.346E-03	1.075E-04	2.627E-04	2.625E-03	6.688E-03
ENE	0.	0.	3.493E-02	0.	7.945E-03	3.748E-02	1.617E-02	6.977E-03	9.332E-04	2.174E-03	2.025E-03	0.
E	0.	0.	0.	0.	6.594E-02	1.580E-02	1.060E-02	2.659E-01	1.354E-02	8.263E-04	8.196E-04	7.540E-04
ESE	0.	0.	0.	4.753E-03	2.001E-02	4.761E-03	6.392E-03	3.135E-03	4.915E-03	2.068E-03	7.685E-05	4.000E-04
SE	0.	0.	4.162E-03	1.609E-03	7.466E-03	5.991E-04	1.344E-03	2.617E-03	1.965E-03	3.389E-04	1.169E-03	7.290E-03
SSE	0.	0.	1.461E-03	2.103E-03	1.225E-03	8.013E-04	3.204E-04	1.910E-04	1.086E-04	7.862E-05	4.146E-05	2.204E-04
S	0.	0.	0.	1.609E-03	8.498E-04	4.247E-03	1.901E-04	3.929E-04	2.792E-04	8.520E-06	1.882E-05	0.
SSW	0.	5.516E-03	5.476E-04	1.031E-03	6.008E-04	2.988E-03	1.359E-04	8.031E-04	5.049E-04	1.584E-04	4.576E-04	4.036E-03
SW	0.	0.	0.	7.502E-04	6.774E-03	2.559E-04	2.852E-02	1.243E-03	1.659E-04	3.585E-04	1.682E-04	2.485E-05
WSW	1.016E-02	2.301E-03	0.	0.	5.851E-03	1.787E-03	9.918E-02	3.558E-03	9.672E-04	1.647E-04	5.554E-05	4.140E-05
W	0.	0.	0.	0.	4.940E-03	1.668E-03	3.880E-03	1.199E-03	2.058E-03	1.490E-03	5.763E-05	4.322E-05
WNW	0.	0.	0.	0.	6.363E-04	1.212E-03	2.324E-03	1.573E-03	1.348E-04	1.198E-03	1.986E-05	1.537E-05
NW	0.	0.	0.	0.	1.071E-03	6.381E-04	4.800E-04	8.392E-04	5.825E-06	9.053E-04	2.061E-04	2.042E-05
NNW	1.421E-02	2.211E-03	0.	5.501E-04	2.343E-03	1.420E-03	8.669E-04	5.488E-04	5.512E-03	1.761E-03	8.430E-04	1.065E-03

TOTAL DOSE COMMITMENT IS 9.806E-01 PERSON-REM/YR

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BRONCHI

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.143E-02	0.	0.	0.	1.195E-02	9.374E-03	4.109E-03	1.583E-03	8.514E-03	3.076E-03	2.457E-03	6.805E-04
NNE	0.	0.	0.	0.	8.976E-03	3.375E-03	5.445E-03	1.242E-03	2.748E-04	2.895E-03	3.434E-03	8.097E-04
NE	0.	0.	1.489E-02	0.	7.800E-03	4.054E-03	6.831E-03	2.433E-03	6.414E-05	1.676E-04	1.841E-03	5.308E-03
ENE	0.	0.	8.741E-03	0.	2.363E-03	1.429E-02	7.575E-03	3.766E-03	5.446E-04	1.367E-03	1.408E-03	0.
E	0.	0.	0.	0.	2.610E-02	8.985E-03	7.930E-03	2.365E-01	1.318E-02	8.701E-04	9.559E-04	1.004E-03
ESE	0.	0.	0.	2.035E-03	9.805E-03	3.025E-03	5.050E-03	2.872E-03	4.896E-03	2.222E-03	9.139E-05	5.422E-04
SE	0.	0.	2.644E-03	1.051E-03	5.536E-03	5.752E-04	1.605E-03	3.625E-03	2.961E-03	5.518E-04	2.112E-03	1.506E-02
SSE	0.	0.	2.875E-03	4.287E-03	2.808E-03	2.299E-03	1.106E-03	7.445E-04	4.518E-04	3.480E-04	2.006E-08	1.198E-03
S	0.	0.	0.	4.820E-03	2.849E-03	1.805E-02	9.937E-04	2.365E-03	1.815E-03	5.942E-05	1.444E-04	0.
SSW	0.	3.558E-02	3.386E-03	6.199E-03	3.621E-03	2.019E-02	1.053E-03	6.906E-03	4.574E-03	1.514E-03	4.752E-03	4.684E-02
SW	0.	0.	0.	4.459E-03	5.525E-02	3.271E-03	4.826E-01	2.444E-02	3.487E-03	7.908E-03	3.919E-03	6.157E-04
WSW	4.385E-02	9.408E-03	0.	0.	2.831E-02	1.086E-02	7.287E-01	2.965E-02	8.568E-03	1.551E-03	5.691E-04	4.732E-04
W	0.	0.	0.	0.	3.051E-02	1.319E-02	3.752E-02	1.320E-02	2.407E-02	1.852E-02	7.797E-04	6.520E-04
WNW	0.	0.	0.	0.	6.048E-03	1.657E-02	4.020E-02	3.106E-02	2.802E-03	2.610E-02	4.604E-04	3.848E-04
NW	0.	0.	0.	0.	5.672E-03	4.465E-03	4.152E-03	8.327E-03	6.160E-05	1.019E-02	2.517E-03	2.766E-04
NNW	3.359E-02	5.386E-03	0.	1.458E-03	7.006E-03	5.364E-03	4.030E-03	2.949E-03	3.193E-02	1.103E-02	5.874E-03	8.518E-03

TOTAL DOSE COMMITMENT IS 2.629E+00 PERSON-REM/YR

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS GROUND EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.754E-02	0.	0.	0.	2.995E-03	1.444E-03	4.239E-04	1.234E-04	5.514E-04	1.699E-04	1.153E-04	2.680E-05
NNE	0.	0.	0.	0.	5.841E-03	1.667E-03	2.040E-03	3.764E-04	7.180E-05	6.614E-04	6.794E-04	6.927E-05
NE	0.	0.	3.569E-02	0.	1.585E-02	5.826E-03	7.126E-03	2.003E-03	4.487E-05	1.016E-04	9.613E-04	2.358E-03
ENE	0.	0.	3.015E-02	0.	5.888E-03	2.298E-02	8.354E-03	3.164E-03	3.796E-04	8.135E-04	7.115E-04	0.
E	0.	0.	0.	0.	4.822E-02	9.390E-03	5.216E-03	1.135E-01	5.147E-03	2.872E-04	2.662E-04	2.327E-04
ESE	0.	0.	0.	3.800E-03	1.408E-02	2.682E-03	2.953E-03	1.250E-03	1.738E-03	6.667E-04	2.311E-05	1.142E-04
SE	0.	0.	3.452E-03	1.263E-03	5.157E-03	3.313E-04	6.104E-04	1.026E-03	6.826E-04	1.073E-04	3.451E-04	2.039E-03
SSE	0.	0.	1.180E-03	1.606E-03	8.202E-04	4.253E-04	1.393E-04	7.197E-05	3.644E-05	2.415E-05	1.193E-05	6.052E-05
S	0.	0.	0.	1.226E-03	5.673E-04	2.242E-03	8.130E-05	1.436E-04	9.001E-05	2.493E-06	5.105E-06	0.
SSW	0.	4.597E-03	4.296E-04	7.664E-04	3.903E-04	1.520E-03	5.564E-05	2.802E-04	1.550E-04	4.408E-05	1.179E-04	9.782E-04
SW	0.	0.	0.	5.719E-04	4.468E-03	1.279E-04	1.136E-02	4.245E-04	5.016E-05	9.897E-05	4.341E-05	6.103E-06
WSW	9.159E-03	1.942E-03	0.	0.	3.873E-03	9.302E-04	4.174E-02	1.282E-03	3.075E-04	4.764E-05	1.494E-05	1.053E-05
W	0.	0.	0.	0.	3.382E-03	8.842E-04	1.636E-03	4.259E-04	6.376E-04	4.154E-04	1.479E-05	1.037E-05
WNW	0.	0.	0.	0.	4.626E-04	6.953E-04	1.072E-03	6.146E-04	4.602E-05	3.677E-04	5.580E-06	3.997E-06
NW	0.	0.	0.	0.	7.526E-04	3.599E-04	2.226E-04	3.363E-04	2.070E-06	2.930E-04	6.198E-05	5.788E-06
NNW	1.319E-02	1.905E-03	0.	4.276E-04	1.619E-03	7.874E-04	3.901E-04	2.101E-04	1.852E-03	5.350E-04	2.363E-04	2.791E-04

TOTAL DOSE COMMITMENT IS 5.504E-01 PERSON-REM/YR

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS CLOUD EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.990E-04	0.	0.	0.	1.921E-04	1.602E-04	7.180E-05	2.786E-05	1.503E-04	5.435E-05	4.344E-05	1.203E-05
NNE	0.	0.	0.	0.	1.394E-04	5.648E-05	9.412E-05	2.175E-05	4.837E-06	5.107E-05	6.065E-05	7.241E-06
NE	0.	0.	1.565E-04	0.	1.162E-04	6.650E-05	1.169E-04	4.236E-05	1.125E-06	2.951E-06	3.248E-05	9.377E-05
ENE	0.	0.	8.498E-05	0.	3.516E-05	2.358E-04	1.301E-04	6.568E-05	9.560E-06	2.408E-05	2.485E-05	0.
E	0.	0.	0.	0.	3.897E-04	1.492E-04	1.367E-04	4.134E-03	2.318E-04	1.534E-05	1.688E-05	1.773E-05
ESE	0.	0.	0.	2.278E-05	1.432E-04	4.955E-05	8.646E-05	5.004E-05	8.594E-05	3.915E-05	1.613E-06	9.580E-06
SE	0.	0.	2.308E-05	1.181E-05	8.176E-05	9.519E-06	2.766E-05	6.338E-05	5.207E-05	9.732E-06	3.730E-05	2.661E-04
SSE	0.	0.	2.735E-05	5.140E-05	4.326E-05	3.891E-05	1.926E-05	1.308E-05	7.967E-06	6.146E-06	3.545E-06	2.119E-05
S	0.	0.	0.	5.985E-05	4.449E-05	3.070E-04	1.734E-05	4.161E-05	3.203E-05	1.050E-06	2.553E-06	0.
SSW	0.	2.771E-04	3.709E-05	8.115E-05	5.760E-05	3.457E-04	1.842E-05	1.216E-04	8.075E-05	2.676E-05	8.402E-05	8.283E-04
SW	0.	0.	0.	6.067E-05	8.923E-04	5.642E-05	8.475E-03	4.313E-04	6.161E-05	1.398E-04	6.930E-05	1.089E-05
WSW	2.803E-04	9.157E-05	0.	0.	4.582E-04	1.868E-04	1.277E-02	5.226E-04	1.513E-04	2.741E-05	1.006E-05	8.367E-06
W	0.	0.	0.	0.	5.013E-04	2.283E-04	6.592E-04	2.329E-04	4.253E-04	3.274E-04	1.379E-05	1.153E-05
WNW	0.	0.	0.	0.	9.984E-05	2.874E-04	7.072E-04	5.485E-04	4.953E-05	4.615E-04	8.142E-06	6.806E-06
NW	0.	0.	0.	0.	9.315E-05	7.723E-05	7.297E-05	1.470E-04	1.089E-06	1.801E-04	4.450E-05	4.891E-06
NNW	2.536E-04	5.803E-05	0.	2.107E-05	1.143E-04	9.242E-05	7.070E-05	5.199E-05	5.640E-04	1.950E-04	1.038E-04	1.506E-04

TOTAL DOSE COMMITMENT IS 4.331E-02 PERSON-REM/YR

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS VEG.ING. EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	5.086E-04	4.157E-04	3.581E-04	3.127E-04	1.113E-03	1.265E-03	7.958E-04	5.771E-04	4.654E-04	3.880E-04	3.244E-04	2.700E-04
NNE	9.825E-04	8.907E-04	7.717E-04	6.782E-04	2.444E-03	2.806E-03	1.804E-03	1.325E-03	1.073E-03	8.958E-04	7.476E-04	6.191E-04
NE	2.323E-03	2.703E-03	2.503E-03	2.256E-03	8.387E-03	9.881E-03	6.421E-03	4.721E-03	3.810E-03	3.168E-03	2.626E-03	2.153E-03
ENE	8.333E-03	7.253E-03	5.425E-03	4.377E-03	1.389E-02	1.436E-02	8.697E-03	6.144E-03	4.836E-03	3.962E-03	3.240E-03	2.613E-03
E	2.094E-02	7.619E-03	4.432E-03	3.067E-03	7.485E-03	5.860E-03	3.056E-03	2.022E-03	1.555E-03	1.258E-03	1.022E-03	8.201E-04
ESE	1.051E-02	2.552E-03	1.303E-03	8.816E-04	2.104E-03	1.667E-03	8.945E-04	6.031E-04	4.628E-04	3.731E-04	3.020E-04	2.416E-04
SE	2.961E-03	6.832E-04	4.002E-04	2.906E-04	7.866E-04	7.133E-04	4.037E-04	2.765E-04	2.141E-04	1.736E-04	1.406E-04	1.125E-04
SSE	1.084E-03	3.497E-04	2.093E-04	1.434E-04	3.475E-04	2.776E-04	1.490E-04	1.016E-04	7.862E-05	6.429E-05	5.318E-05	4.411E-05
S	6.155E-04	3.213E-04	2.221E-04	1.726E-04	5.184E-04	5.062E-04	2.925E-04	2.021E-04	1.581E-04	1.299E-04	1.074E-04	8.853E-05
SSW	4.255E-04	1.783E-04	1.271E-04	1.036E-04	3.320E-04	3.385E-04	2.000E-04	1.403E-04	1.111E-04	9.243E-05	7.772E-05	6.551E-05
SW	3.692E-04	2.198E-04	1.470E-04	1.117E-04	3.083E-04	2.640E-04	1.497E-04	1.085E-04	9.051E-05	8.041E-05	7.344E-05	6.842E-05
WSW	2.470E-04	2.220E-04	1.784E-04	1.491E-04	4.902E-04	5.058E-04	3.012E-04	2.131E-04	1.703E-04	1.423E-04	1.202E-04	1.020E-04
W	1.465E-04	1.358E-04	1.221E-04	1.100E-04	4.102E-04	4.756E-04	2.960E-04	2.131E-04	1.730E-04	1.464E-04	1.252E-04	1.076E-04
WNW	1.209E-04	8.194E-05	6.412E-05	5.218E-05	1.659E-04	1.721E-04	1.062E-04	7.801E-05	6.536E-05	5.722E-05	5.085E-05	4.567E-05
NW	1.380E-04	1.127E-04	9.369E-05	7.966E-05	2.703E-04	2.914E-04	1.812E-04	1.323E-04	1.081E-04	9.179E-05	7.848E-05	6.729E-05
NNW	2.617E-04	2.221E-04	1.919E-04	1.682E-04	6.045E-04	6.788E-04	4.130E-04	2.907E-04	2.306E-04	1.892E-04	1.551E-04	1.259E-04

TOTAL DOSE COMMITMENT IS 2.661E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 3. AFTER 25 YEARS　　　DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS VEG.ING.　　　EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.306E-03	5.166E-03	4.452E-03	3.888E-03	1.385E-02	1.579E-02	1.002E-02	7.352E-03	6.015E-03	5.103E-03	4.360E-03	3.729E-03
NNE	1.217E-02	1.105E-02	9.579E-03	8.421E-03	3.035E-02	3.489E-02	2.248E-02	1.656E-02	1.346E-02	1.128E-02	9.464E-03	7.892E-03
NE	2.884E-02	3.356E-02	3.108E-02	2.802E-02	1.042E-01	1.228E-01	7.983E-02	5.876E-02	4.748E-02	3.954E-02	3.285E-02	2.700E-02
ENE	1.035E-01	9.011E-02	6.740E-02	5.438E-02	1.726E-01	1.784E-01	1.081E-01	7.647E-02	6.028E-02	4.947E-02	4.054E-02	3.280E-02
E	2.602E-01	9.466E-02	5.506E-02	3.811E-02	9.300E-02	7.282E-02	3.803E-02	2.521E-02	1.943E-02	1.577E-02	1.286E-02	1.038E-02
ESE	1.306E-01	3.171E-02	1.619E-02	1.095E-02	2.614E-02	2.072E-02	1.113E-02	7.521E-03	5.787E-03	4.681E-03	3.805E-03	3.063E-03
SE	3.679E-02	8.489E-03	4.973E-03	3.610E-03	9.773E-03	8.870E-03	5.030E-03	3.458E-03	2.688E-03	2.192E-03	1.787E-03	1.443E-03
SSE	1.347E-02	4.594E-03	2.601E-03	1.782E-03	4.321E-03	3.461E-03	1.870E-03	1.288E-03	1.008E-03	8.358E-04	7.037E-04	5.969E-04
S	7.650E-03	3.995E-03	2.762E-03	2.147E-03	6.451E-03	6.324E-03	3.693E-03	2.592E-03	2.067E-03	1.738E-03	1.478E-03	1.263E-03
SSW	5.289E-03	2.219E-03	1.582E-03	1.289E-03	4.137E-03	4.245E-03	2.548E-03	1.827E-03	1.485E-03	1.273E-03	1.109E-03	9.766E-04
SW	4.594E-03	2.737E-03	1.831E-03	1.392E-03	3.852E-03	3.350E-03	1.975E-03	1.505E-03	1.324E-03	1.239E-03	1.192E-03	1.167E-03
WSW	3.073E-03	2.763E-03	2.221E-03	1.856E-03	6.108E-03	6.340E-03	3.833E-03	2.771E-03	2.270E-03	1.952E-03	1.707E-03	1.509E-03
W	1.826E-03	1.693E-03	1.522E-03	1.371E-03	5.118E-03	5.980E-03	3.797E-03	2.815E-03	2.362E-03	2.075E-03	1.854E-03	1.676E-03
WNW	1.504E-03	1.021E-03	7.994E-04	6.509E-04	2.075E-03	2.182E-03	1.392E-03	1.069E-03	9.382E-04	8.628E-04	8.086E-04	7.683E-04
NW	1.716E-03	1.403E-03	1.166E-03	9.918E-04	3.369E-03	3.656E-03	2.310E-03	1.726E-03	1.448E-03	1.267E-03	1.122E-03	1.003E-03
NNW	3.249E-03	2.761E-03	2.386E-03	2.092E-03	7.521E-03	8.476E-03	5.204E-03	3.713E-03	2.995E-03	2.507E-03	2.110E-03	1.773E-03

TOTAL DOSE COMMITMENT IS 3.320E+00 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.206E-05	3.440E-05	2.966E-05	2.591E-05	9.240E-05	1.054E-04	6.676E-05	4.889E-05	3.990E-05	3.374E-05	2.872E-05	2.445E-05
NNE	8.141E-05	7.388E-05	6.403E-05	5.629E-05	2.029E-04	2.332E-04	1.502E-04	1.106E-04	8.981E-05	7.523E-05	6.305E-05	5.251E-05
NE	1.928E-04	2.244E-04	2.070E-04	1.874E-04	6.967E-04	8.211E-04	5.339E-04	3.929E-04	3.174E-04	2.642E-04	2.194E-04	1.803E-04
ENE	6.923E-04	6.026E-04	4.508E-04	3.637E-04	1.154E-03	1.193E-03	7.232E-04	5.113E-04	4.029E-04	3.305E-04	2.708E-04	2.189E-04
E	1.741E-03	6.332E-04	3.683E-04	2.549E-04	6.220E-04	4.870E-04	2.543E-04	1.685E-04	1.298E-04	1.052E-04	8.578E-05	6.918E-05
ESE	8.735E-04	2.121E-04	1.083E-04	7.326E-05	1.748E-04	1.386E-04	7.441E-05	5.025E-05	3.864E-05	3.123E-05	2.536E-05	2.039E-05
SE	2.461E-04	5.676E-05	3.325E-05	2.414E-05	6.534E-05	5.929E-05	3.360E-05	2.308E-05	1.792E-05	1.460E-05	1.189E-05	9.583E-06
SSE	9.008E-05	3.071E-05	1.738E-05	1.191E-05	2.887E-05	2.311E-05	1.246E-05	8.565E-06	6.689E-06	5.533E-06	4.643E-06	3.922E-06
S	5.109E-05	2.665E-05	1.842E-05	1.432E-05	4.303E-05	4.217E-05	2.458E-05	1.720E-05	1.367E-05	1.144E-05	9.683E-06	8.224E-06
SSW	3.530E-05	1.477E-05	1.053E-05	8.580E-06	2.755E-05	2.826E-05	1.692E-05	1.208E-05	9.777E-06	8.336E-06	7.223E-06	6.314E-06
SW	3.058E-05	1.817E-05	1.214E-05	9.231E-06	2.555E-05	2.220E-05	1.301E-05	9.832E-06	8.577E-06	7.964E-06	7.601E-06	7.392E-06
WSW	2.044E-05	1.838E-05	1.477E-05	1.235E-05	4.068E-05	4.223E-05	2.547E-05	1.834E-05	1.496E-05	1.280E-05	1.113E-05	9.775E-06
W	1.206E-05	1.118E-05	1.007E-05	9.085E-06	3.402E-05	3.981E-05	2.520E-05	1.859E-05	1.551E-05	1.354E-05	1.201E-05	1.077E-05
WNW	9.979E-06	6.750E-06	5.285E-06	4.305E-06	1.375E-05	1.448E-05	9.192E-06	7.005E-06	6.103E-06	5.569E-06	5.176E-06	4.877E-06
NW	1.141E-05	9.315E-06	7.749E-06	6.594E-06	2.243E-05	2.435E-05	1.535E-05	1.142E-05	9.540E-06	8.300E-06	7.308E-06	6.485E-06
NNW	2.166E-05	1.839E-05	1.589E-05	1.394E-05	5.018E-05	5.657E-05	3.468E-05	2.469E-05	1.985E-05	1.656E-05	1.387E-05	1.158E-05

TOTAL DOSE COMMITMENT IS 2.218E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 3, AFTER 25 YEARS　　DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MEAT ING　　EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	5.489E-04	4.503E-04	3.884E-04	3.395E-04	1.212E-03	1.390E-03	8.926E-04	6.659E-04	5.552E-04	4.813E-04	4.221E-04	3.725E-04
NNE	1.062E-03	9.660E-04	8.378E-04	7.368E-04	2.657E-03	3.060E-03	1.977E-03	1.462E-03	1.194E-03	1.007E-03	8.507E-04	7.161E-04
NE	2.523E-03	2.938E-03	2.721E-03	2.454E-03	9.123E-03	1.076E-02	7.004E-03	5.163E-03	4.179E-03	3.488E-03	2.906E-03	2.398E-03
ENE	9.071E-03	7.895E-03	5.905E-03	4.764E-03	1.512E-02	1.563E-02	9.487E-03	6.719E-03	5.306E-03	4.365E-03	3.588E-03	2.915E-03
E	2.281E-02	8.296E-03	4.825E-03	3.339E-03	8.149E-03	6.385E-03	3.340E-03	2.220E-03	1.717E-03	1.399E-03	1.148E-03	9.335E-04
ESE	1.145E-02	2.779E-03	1.418E-03	9.598E-04	2.290E-03	1.817E-03	9.776E-04	6.623E-04	5.114E-04	4.155E-04	3.398E-04	2.757E-04
SE	3.225E-03	7.437E-04	4.356E-04	3.162E-04	8.561E-04	7.777E-04	4.423E-04	3.053E-04	2.387E-04	1.960E-04	1.613E-04	1.319E-04
SSE	1.180E-03	4.024E-04	2.278E-04	1.561E-04	3.785E-04	3.042E-04	1.658E-04	1.156E-04	9.192E-05	7.761E-05	6.678E-05	5.815E-05
S	6.695E-04	3.493E-04	2.414E-04	1.877E-04	5.647E-04	5.572E-04	3.300E-04	2.365E-04	1.932E-04	1.671E-04	1.468E-04	1.304E-04
SSW	4.626E-04	1.936E-04	1.380E-04	1.125E-04	3.622E-04	3.755E-04	2.301E-04	1.697E-04	1.425E-04	1.264E-04	1.146E-04	1.053E-04
SW	4.008E-04	2.383E-04	1.593E-04	1.212E-04	3.369E-04	3.002E-04	1.861E-04	1.506E-04	1.401E-04	1.377E-04	1.384E-04	1.409E-04
WSW	2.679E-04	2.409E-04	1.937E-04	1.620E-04	5.347E-04	5.607E-04	3.460E-04	2.572E-04	2.173E-04	1.933E-04	1.756E-04	1.618E-04
W	1.581E-04	1.466E-04	1.321E-04	1.192E-04	4.478E-04	5.311E-04	3.467E-04	2.667E-04	2.327E-04	2.130E-04	1.989E-04	1.883E-04
WNW	1.306E-04	8.846E-05	6.933E-05	5.654E-05	1.815E-04	1.956E-04	1.304E-04	1.056E-04	9.747E-05	9.406E-05	9.239E-05	9.181E-05
NW	1.490E-04	1.221E-04	1.016E-04	8.649E-05	2.949E-04	3.239E-04	2.093E-04	1.611E-04	1.395E-04	1.263E-04	1.161E-04	1.081E-04
NNW	2.832E-04	2.408E-04	2.082E-04	1.827E-04	6.584E-04	7.468E-04	4.644E-04	3.375E-04	2.781E-04	2.387E-04	2.071E-04	1.806E-04

TOTAL DOSE COMMITMENT IS 2.925E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.672E-05	2.995E-05	2.580E-05	2.253E-05	8.019E-05	9.086E-05	5.678E-05	4.076E-05	3.248E-05	2.667E-05	2.187E-05	1.773E-05
NNE	7.105E-05	6.429E-05	5.568E-05	4.893E-05	1.763E-04	2.022E-04	1.298E-04	9.509E-05	7.680E-05	6.390E-05	5.309E-05	4.371E-05
NE	1.675E-04	1.950E-04	1.805E-04	1.628E-04	6.051E-04	7.126E-04	4.628E-04	3.399E-04	2.740E-04	2.276E-04	1.883E-04	1.540E-04
ENE	6.009E-04	5.231E-04	3.913E-04	3.157E-04	1.002E-03	1.035E-03	6.268E-04	4.424E-04	3.479E-04	2.846E-04	2.323E-04	1.869E-04
E	1.511E-03	5.495E-04	3.196E-04	2.212E-04	5.398E-04	4.225E-04	2.201E-04	1.454E-04	1.115E-04	9.001E-05	7.287E-05	5.823E-05
ESE	7.580E-04	1.841E-04	9.396E-05	6.358E-05	1.517E-04	1.202E-04	6.441E-05	4.335E-05	3.319E-05	2.669E-05	2.152E-05	1.713E-05
SE	2.136E-04	4.927E-05	2.886E-05	2.095E-05	5.672E-05	5.140E-05	2.904E-05	1.984E-05	1.530E-05	1.236E-05	9.951E-06	7.899E-06
SSE	7.918E-05	2.665E-05	1.509E-05	1.034E-05	2.504E-05	1.996E-05	1.066E-05	7.211E-06	5.523E-06	4.462E-06	3.635E-06	2.954E-06
S	4.436E-05	2.315E-05	1.600E-05	1.243E-05	3.732E-05	3.632E-05	2.081E-05	1.419E-05	1.092E-05	8.795E-06	7.077E-06	5.627E-06
SSW	3.066E-05	1.284E-05	9.147E-06	7.452E-06	2.387E-05	2.421E-05	1.413E-05	9.721E-06	7.527E-06	6.088E-06	4.938E-06	3.971E-06
SW	2.658E-05	1.581E-05	1.056E-05	8.023E-06	2.211E-05	1.869E-05	1.026E-05	7.087E-06	5.601E-06	4.686E-06	4.004E-06	3.469E-06
WSW	1.777E-05	1.598E-05	1.284E-05	1.073E-05	3.525E-05	3.620E-05	2.130E-05	1.480E-05	1.156E-05	9.402E-06	7.677E-06	6.233E-06
W	1.052E-05	9.749E-06	8.770E-06	7.900E-06	2.946E-05	3.395E-05	2.078E-05	1.460E-05	1.149E-05	9.372E-06	7.649E-06	6.190E-06
WNW	8.701E-06	5.885E-06	4.603E-06	3.744E-06	1.189E-05	1.220E-05	7.323E-06	5.164E-06	4.129E-06	3.423E-06	2.850E-06	2.366E-06
NW	9.935E-06	8.106E-06	6.738E-06	5.730E-06	1.943E-05	2.084E-05	1.279E-05	9.157E-06	7.312E-06	6.034E-06	4.980E-06	4.081E-06
NNW	1.887E-05	1.600E-05	1.382E-05	1.211E-05	4.353E-05	4.875E-05	2.944E-05	2.049E-05	1.603E-05	1.291E-05	1.034E-05	8.115E-06

TOTAL DOSE COMMITMENT IS 1.912E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	3.749E-04	3.061E-04	2.637E-04	2.302E-04	8.195E-04	9.299E-04	5.836E-04	4.216E-04	3.384E-04	2.806E-04	2.329E-04	1.920E-04
NNE	7.246E-04	6.562E-04	5.683E-04	4.995E-04	1.800E-03	2.065E-03	1.327E-03	9.735E-04	7.877E-04	6.567E-04	5.471E-04	4.521E-04
NE	1.710E-03	1.990E-03	1.843E-03	1.661E-03	6.176E-03	7.275E-03	4.726E-03	3.473E-03	2.802E-03	2.328E-03	1.929E-03	1.580E-03
ENE	6.134E-03	5.339E-03	3.994E-03	3.222E-03	1.023E-02	1.057E-02	6.401E-03	4.520E-03	3.557E-03	2.912E-03	2.380E-03	1.917E-03
E	1.542E-02	5.609E-03	3.263E-03	2.258E-03	5.510E-03	4.313E-03	2.249E-03	1.487E-03	1.142E-03	9.231E-04	7.489E-04	6.002E-04
ESE	7.737E-03	1.879E-03	9.591E-04	6.490E-04	1.549E-03	1.227E-03	6.582E-04	4.434E-04	3.400E-04	2.738E-04	2.213E-04	1.767E-04
SE	2.180E-03	5.029E-04	2.946E-04	2.139E-04	5.791E-04	5.250E-04	2.969E-04	2.032E-04	1.571E-04	1.272E-04	1.028E-04	8.198E-05
SSE	7.981E-04	2.721E-04	1.541E-04	1.056E-04	2.558E-04	2.042E-04	1.094E-04	7.436E-05	5.731E-05	4.665E-05	3.837E-05	3.159E-05
S	4.531E-04	2.365E-04	1.635E-04	1.271E-04	3.815E-04	3.720E-04	2.143E-04	1.473E-04	1.145E-04	9.343E-05	7.647E-05	6.223E-05
SSW	3.132E-04	1.313E-04	9.355E-05	7.622E-05	2.442E-04	2.484E-04	1.461E-04	1.017E-04	7.991E-05	6.580E-05	5.462E-05	4.530E-05
SW	2.718E-04	1.618E-04	1.081E-04	8.217E-05	2.266E-04	1.931E-04	1.082E-04	7.702E-05	6.305E-05	5.489E-05	4.906E-05	4.468E-05
WSW	1.817E-04	1.634E-04	1.313E-04	1.097E-04	3.606E-04	3.713E-04	2.201E-04	1.547E-04	1.226E-04	1.014E-04	8.464E-05	7.073E-05
W	1.078E-04	9.993E-05	8.986E-05	8.092E-05	3.017E-04	3.489E-04	2.158E-04	1.539E-04	1.236E-04	1.032E-04	8.682E-05	7.310E-05
WNW	8.904E-05	6.031E-05	4.718E-05	3.838E-05	1.219E-04	1.259E-04	7.691E-05	5.565E-05	4.585E-05	3.939E-05	3.425E-05	3.001E-05
NW	1.016E-04	8.294E-05	6.895E-05	5.862E-05	1.988E-04	2.139E-04	1.323E-04	9.592E-05	7.771E-05	6.529E-05	5.512E-05	4.652E-05
NNW	1.928E-04	1.635E-04	1.413E-04	1.238E-04	4.449E-04	4.990E-04	3.028E-04	2.122E-04	1.674E-04	1.364E-04	1.109E-04	8.891E-05

TOTAL DOSE COMMITMENT IS 1.956E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

SUMMARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 3--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	4.603E-02	1.446E+00	9.806E-01	9.346E-02	4.236E-01	2.629E+00
GROUND	5.504E-01	5.504E-01	5.504E-01	5.504E-01	5.504E-01	5.504E-01
CLOUD	4.331E-02	4.331E-02	4.331E-02	4.331E-02	4.331E-02	4.331E-02
VEG.ING.	2.661E-01	3.320E+00	2.661E-01	3.414E-01	1.059E+00	2.661E-01
MEAT ING	2.218E-02	2.925E-01	2.218E-02	3.950E-02	1.189E-01	2.218E-02
MILK ING	1.912E-02	1.956E-01	1.912E-02	6.704E-03	2.143E-02	1.912E-02
RNPLUS50	0.	0.	0.	0.	0.	0.
TOTALS	9.472E-01	5.847E+00	1.882E+00	1.075E+00	2.217E+00	3.530E+00

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.	0.	0.	0.	0.	0.
GROUND	0.	0.	0.	0.	0.	0.
CLOUD	0.	0.	0.	0.	0.	0.
VEG.ING.	0.	0.	0.	0.	0.	0.
MEAT ING	0.	0.	0.	0.	0.	0.
MILK ING	0.	0.	0.	0.	0.	0.
RNPLUS50	5.493E-01	7.369E+00	1.206E-01	5.493E-01	5.493E-01	3.483E+00
TOTALS	5.493E-01	7.369E+00	1.206E-01	5.493E-01	5.493E-01	3.483E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	4.603E-02	1.446E+00	9.806E-01	9.346E-02	4.236E-01	2.629E+00
GROUND	5.504E-01	5.504E-01	5.504E-01	5.504E-01	5.504E-01	5.504E-01
CLOUD	4.331E-02	4.331E-02	4.331E-02	4.331E-02	4.331E-02	4.331E-02
VEG.ING.	2.661E-01	3.320E+00	2.661E-01	3.414E-01	1.059E+00	2.661E-01
MEAT ING	2.218E-02	2.925E-01	2.218E-02	3.950E-02	1.189E-01	2.218E-02
MILK ING	1.912E-02	1.956E-01	1.912E-02	6.704E-03	2.143E-02	1.912E-02
RNPLUS50	5.493E-01	7.369E+00	1.206E-01	5.493E-01	5.493E-01	3.483E+00
TOTALS	1.496E+00	1.322E+01	2.002E+00	1.624E+00	2.766E+00	7.014E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
1	NORTH BOUNDARY	1	6.148E-05	1.676E-07	5.499E-08	5.499E-08	6.148E+04	1.676E+02	5.499E+01	5.499E+01
1	NORTH BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
1	NORTH BOUNDARY	3	4.373E-05	3.830E-04	1.539E-04	2.058E-04	3.027E+02	1.653E+03	6.608E+02	6.608E+02
1	NORTH BOUNDARY	4	6.893E-05	5.882E-04	2.362E-04	3.136E-04	4.430E+03	2.210E+04	8.832E+03	8.832E+03
	CONCENTRATION TOTALS		1.741E-04	9.713E-04	3.901E-04	5.194E-04	6.622E+04	2.392E+04	9.548E+03	9.548E+03
2	NORTHEAST BOUNDARY	1	1.335E-05	3.625E-08	1.190E-08	1.190E-08	1.335E+04	3.625E+01	1.190E+01	1.190E+01
2	NORTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
2	NORTHEAST BOUNDARY	3	7.293E-04	6.408E-03	2.576E-03	3.448E-03	3.071E+03	2.630E+04	1.052E+04	1.052E+04
2	NORTHEAST BOUNDARY	4	1.224E-03	1.075E-02	4.321E-03	5.749E-03	4.433E+04	3.798E+05	1.519E+05	1.519E+05
	CONCENTRATION TOTALS		1.967E-03	1.716E-02	6.896E-03	9.197E-03	6.075E+04	4.062E+05	1.625E+05	1.625E+05
3	SOUTHEAST BOUNDARY	1	1.175E-06	3.146E-09	1.034E-09	1.034E-09	1.175E+03	3.146E+00	1.034E+00	1.034E+00
3	SOUTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
3	SOUTHEAST BOUNDARY	3	3.591E-05	3.155E-04	1.268E-04	1.697E-04	1.498E+02	1.294E+03	5.176E+02	5.176E+02
3	SOUTHEAST BOUNDARY	4	5.243E-05	4.604E-04	1.850E-04	2.461E-04	1.878E+03	1.625E+04	6.500E+03	6.500E+03
	CONCENTRATION TOTALS		8.951E-05	7.759E-04	3.118E-04	4.158E-04	3.203E+03	1.755E+04	7.018E+03	7.018E+03
4	SOUTHWEST BOUNDARY	1	5.561E-06	1.512E-08	4.965E-09	4.965E-09	5.561E+03	1.512E+01	4.965E+00	4.965E+00
4	SOUTHWEST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
4	SOUTHWEST BOUNDARY	3	1.656E-05	1.454E-04	5.843E-05	7.818E-05	7.030E+01	5.973E+02	2.389E+02	2.389E+02
4	SOUTHWEST BOUNDARY	4	2.257E-05	1.979E-04	7.952E-05	1.057E-04	8.264E+02	7.000E+03	2.799E+03	2.799E+03
	CONCENTRATION TOTALS		4.469E-05	3.434E-04	1.380E-04	1.839E-04	6.458E+03	7.612E+03	3.042E+03	3.042E+03
5	NEAREST RESIDENT	1	7.332E-05	1.963E-07	6.455E-08	6.455E-08	7.332E+04	1.963E+02	6.455E+01	6.455E+01
5	NEAREST RESIDENT	2	0.	0.	0.	0.	0.	0.	0.	0.
5	NEAREST RESIDENT	3	3.451E-05	3.001E-04	1.200E-04	1.587E-04	1.906E+02	1.263E+03	5.023E+02	5.023E+02
5	NEAREST RESIDENT	4	5.117E-05	4.392E-04	1.753E-04	2.299E-04	2.481E+03	1.595E+04	6.335E+03	6.335E+03
	CONCENTRATION TOTALS		1.590E-04	7.396E-04	2.953E-04	3.887E-04	7.599E+04	1.741E+04	6.902E+03	6.902E+03
6	ENV MONITOR STA A	1	3.212E-05	8.604E-08	2.829E-08	2.829E-08	3.212E+04	8.604E+01	2.829E+01	2.829E+01
6	ENV MONITOR STA A	2	0.	0.	0.	0.	0.	0.	0.	0.
6	ENV MONITOR STA A	3	4.372E-05	3.744E-04	1.481E-04	1.916E-04	2.268E+02	1.566E+03	6.166E+02	6.166E+02
6	ENV MONITOR STA A	4	6.580E-05	5.565E-04	2.194E-04	2.805E-04	2.949E+03	2.005E+04	7.870E+03	7.870E+03
	CONCENTRATION TOTALS		1.416E-04	9.310E-04	3.675E-04	4.722E-04	3.530E+04	2.170E+04	8.515E+03	8.515E+03
7	NEAREST DOWNWIND RES	1	3.742E-06	9.877E-09	3.253E-09	3.253E-09	3.742E+03	9.877E+00	3.253E+00	3.253E+00
7	NEAREST DOWNWIND RES	2	0.	0.	0.	0.	0.	0.	0.	0.
7	NEAREST DOWNWIND RES	3	5.783E-05	5.069E-04	2.035E-04	2.716E-04	2.582E+02	2.091E+03	8.352E+02	8.352E+02
7	NEAREST DOWNWIND RES	4	7.274E-05	6.352E-04	2.548E-04	3.376E-04	2.787E+03	2.255E+04	9.000E+03	9.000E+03
	CONCENTRATION TOTALS		1.343E-04	1.142E-03	4.583E-04	6.092E-04	6.788E+03	2.465E+04	9.839E+03	9.839E+03
8	NEAREST COMMUNITY	1	1.748E-07	4.656E-10	1.532E-10	1.532E-10	1.748E+02	4.656E-01	1.532E-01	1.532E-01
8	NEAREST COMMUNITY	2	0.	0.	0.	0.	0.	0.	0.	0.
8	NEAREST COMMUNITY	3	1.690E-06	1.483E-05	5.959E-06	7.965E-06	7.256E+00	6.099E+01	2.438E+01	2.438E+01
8	NEAREST COMMUNITY	4	1.534E-06	1.343E-05	5.387E-06	7.143E-06	5.647E+01	4.750E+02	1.897E+02	1.897E+02
	CONCENTRATION TOTALS		3.399E-06	2.826E-05	1.135E-05	1.511E-05	2.385E+02	5.364E+02	2.142E+02	2.142E+02

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS TS... 5.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
9	NEAREST DOWNWIND COM	1	5.365E-08	1.433E-10	4.712E-11	4.712E-11	5.365E+01	1.433E-01	4.712E-02	4.712E-02
9	NEAREST DOWNWIND COM	2	0.	0.	0.	0.	0.	0.	0.	0.
9	NEAREST DOWNWIND COM	3	1.586E-06	1.391E-05	5.583E-06	7.457E-06	6.862E+00	5.721E+01	2.286E+01	2.286E+01
9	NEAREST DOWNWIND COM	4	8.242E-07	7.199E-06	2.887E-06	3.823E-06	3.105E+01	2.552E+02	1.018E+02	1.018E+02
	CONCENTRATION TOTALS		2.463E-06	2.110E-05	8.470E-06	1.128E-05	9.156E+01	3.125E+02	1.247E+02	1.247E+02
10	NEAREST GRAZING AREA	1	3.127E-06	8.380E-09	2.755E-09	2.755E-09	3.127E+03	8.380E+00	2.755E+00	2.755E+00
10	NEAREST GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
10	NEAREST GRAZING AREA	3	8.054E-04	7.078E-03	2.845E-03	3.809E-03	3.308E+03	2.900E+04	1.160E+04	1.160E+04
10	NEAREST GRAZING AREA	4	1.666E-03	1.464E-02	5.883E-03	7.829E-03	5.892E+04	5.162E+05	2.065E+05	2.065E+05
	CONCENTRATION TOTALS		2.474E-03	2.172E-02	8.729E-03	1.164E-02	6.535E+04	5.452E+05	2.181E+05	2.181E+05
11	GALLUP	1	3.724E-08	9.928E-11	3.266E-11	3.266E-11	3.724E+01	9.928E-02	3.266E-02	3.266E-02
11	GALLUP	2	0.	0.	0.	0.	0.	0.	0.	0.
11	GALLUP	3	1.248E-07	1.094E-06	4.393E-07	5.867E-07	5.400E-01	4.502E+00	1.799E+00	1.799E+00
11	GALLUP	4	5.127E-08	4.478E-07	1.795E-07	2.375E-07	1.904E+00	1.585E+01	6.324E+00	6.324E+00
	CONCENTRATION TOTALS		2.133E-07	1.542E-06	6.188E-07	8.242E-07	3.968E+01	2.044E+01	8.155E+00	8.155E+00
12	SPRINGSTEAD TR. PARK	1	4.541E-07	1.221E-09	4.014E-10	4.014E-10	4.541E+02	1.221E+00	4.014E-01	4.014E-01
12	SPRINGSTEAD TR. PARK	2	0.	0.	0.	0.	0.	0.	0.	0.
12	SPRINGSTEAD TR. PARK	3	3.700E-07	3.246E-06	1.303E-06	1.741E-06	1.610E+00	1.336E+01	5.339E+00	5.339E+00
12	SPRINGSTEAD TR. PARK	4	3.694E-07	3.226E-06	1.294E-06	1.713E-06	1.391E+01	1.144E+02	4.563E+01	4.563E+01
	CONCENTRATION TOTALS		1.193E-06	6.474E-06	2.598E-06	3.455E-06	4.696E+02	1.289E+02	5.137E+01	5.137E+01
13	NAVAJO GRAZING AREA	1	2.269E-05	6.162E-08	2.023E-08	2.023E-08	2.269E+04	6.162E+01	2.023E+01	2.023E+01
13	NAVAJO GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
13	NAVAJO GRAZING AREA	3	8.350E-05	7.309E-04	2.933E-04	3.913E-04	4.695E+02	3.081E+03	1.230E+03	1.230E+03
13	NAVAJO GRAZING AREA	4	1.254E-04	1.082E-03	4.338E-04	5.738E-04	6.135E+03	3.933E+04	1.569E+04	1.569E+04
	CONCENTRATION TOTALS		2.316E-04	1.813E-03	7.271E-04	9.651E-04	2.929E+04	4.247E+04	1.694E+04	1.694E+04
14	NEXT NEAREST RESIDEN	1	3.396E-05	9.057E-08	2.980E-08	2.980E-08	3.396E+04	9.057E+01	2.980E+01	2.980E+01
14	NEXT NEAREST RESIDEN	2	0.	0.	0.	0.	0.	0.	0.	0.
14	NEXT NEAREST RESIDEN	3	2.141E-05	1.832E-04	7.237E-05	9.344E-05	9.800E+01	7.574E+02	2.978E+02	2.978E+02
14	NEXT NEAREST RESIDEN	4	3.365E-05	2.830E-04	1.107E-04	1.392E-04	1.306E+03	1.006E+04	3.917E+03	3.917E+03
	CONCENTRATION TOTALS		8.902E-05	4.662E-04	1.831E-04	2.327E-04	3.537E+04	1.091E+04	4.244E+03	4.244E+03

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR RADON AND RADON DAUGHTER CONCENTRATIONS

NO.	AIRBORNE CONCENTRATIONS, PCI/M3 RN-222	PO-218	PB-214	BI-214	PB-210	BI-210	PO-210	WL	GROUND CONCENTRATIONS, PCI/M2 PO-218	PB-214	BI-214	PB-210
1	7.854E+00	7.511E+00	2.436E+00	6.480E-01	2.607E-07	1.291E-10	1.867E-15	2.250E-05	5.949E+00	5.949E+00	5.949E+00	4.407E-01
2	1.460E+01	1.267E+01	3.006E+00	6.922E-01	2.890E-07	1.726E-10	3.309E-15	3.087E-05	1.003E+01	1.003E+01	1.003E+01	1.512E+00
3	1.919E+00	1.827E+00	7.087E-01	2.302E-01	1.178E-07	7.249E-11	1.293E-15	6.334E-06	1.447E+00	1.447E+00	1.447E+00	6.563E-01
4	5.446E+00	5.276E+00	2.203E+00	8.222E-01	5.675E-07	4.947E-10	1.283E-14	1.967E-05	4.179E+00	4.179E+00	4.179E+00	2.254E+00
5	4.596E+00	4.473E+00	1.916E+00	6.825E-01	3.984E-07	2.801E-10	5.724E-15	1.686E-05	3.542E+00	3.542E+00	3.542E+00	1.140E+00
6	4.220E+00	4.117E+00	1.896E+00	7.335E-01	4.811E-07	3.786E-10	8.659E-15	1.659E-05	3.261E+00	3.261E+00	3.261E+00	1.797E+00
7	1.042E+00	1.028E+00	7.601E-01	5.458E-01	1.105E-06	2.433E-09	1.485E-13	6.949E-06	8.144E-01	8.144E-01	8.144E-01	6.676E+00
8	6.571E-02	6.568E-02	5.959E-02	5.458E-02	3.116E-07	1.696E-09	2.398E-13	5.734E-07	5.202E-02	5.202E-02	5.202E-02	1.650E+00
9	5.056E-02	5.059E-02	5.049E-02	5.015E-02	1.912E-06	6.263E-08	5.150E-11	4.952E-07	4.007E-02	4.007E-02	4.007E-02	9.354E+00
10	3.080E+01	2.049E+01	2.828E+00	4.123E-01	9.482E-08	2.944E-11	2.346E-16	3.698E-05	1.623E+01	1.623E+01	1.623E+01	1.722E-01
11	7.137E-02	7.141E-02	7.156E-02	7.145E-02	2.216E-06	5.764E-08	3.740E-11	7.029E-07	5.656E-02	5.656E-02	5.656E-02	1.196E+01
12	1.710E-01	1.711E-01	1.672E-01	1.624E-01	1.620E-06	1.442E-08	3.260E-12	1.630E-06	1.355E-01	1.355E-01	1.355E-01	6.117E+00
13	5.881E+00	5.658E+00	2.341E+00	8.281E-01	4.977E-07	3.725E-10	8.364E-15	2.079E-05	4.481E+00	4.481E+00	4.481E+00	1.808E+00
14	2.156E+00	2.132E+00	1.312E+00	7.008E-01	7.427E-07	8.995E-10	3.081E-14	1.146E-05	1.689E+00	1.689E+00	1.689E+00	3.384E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	0.
INFANT	GROUND	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01
INFANT	CLOUD	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.37E-01	6.10E+00	6.37E-01	3.00E-01	9.16E-01	6.37E-01
INFANT	TOTALS	9.68E-01	9.19E+00	2.70E+00	7.11E-01	1.96E+00	8.76E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	0.
CHILD	GROUND	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01
CHILD	CLOUD	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08
CHILD	VEG.ING.	5.97E-01	7.13E+00	5.97E-01	8.05E-01	2.52E+00	5.97E-01
CHILD	MEAT ING	9.05E-02	1.14E+00	9.05E-02	1.71E-01	5.23E-01	9.05E-02
CHILD	MILK ING	5.76E-01	5.58E+00	5.76E-01	2.17E-01	7.05E-01	5.76E-01
CHILD	TOTALS	1.60E+00	1.69E+01	3.33E+00	1.60E+00	4.79E+00	1.50E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	0.
TEENAGER	GROUND	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01
TEENAGER	CLOUD	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08
TEENAGER	VEG.ING.	4.60E-01	5.76E+00	4.60E-01	5.99E-01	1.99E+00	4.60E-01
TEENAGER	MEAT ING	6.65E-02	8.66E-01	6.65E-02	1.24E-01	4.01E-01	6.65E-02
TEENAGER	MILK ING	3.36E-01	3.50E+00	3.36E-01	1.14E-01	3.92E-01	3.36E-01
TEENAGER	TOTALS	1.19E+00	1.32E+01	2.92E+00	1.25E+00	3.82E+00	1.10E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	0.
ADULT	GROUND	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01	2.40E-01
ADULT	CLOUD	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08	4.24E-08
ADULT	VEG.ING.	5.66E-01	7.19E+00	5.66E-01	6.56E-01	1.99E+00	5.66E-01
ADULT	MEAT ING	1.03E-01	1.36E+00	1.03E-01	1.70E-01	5.01E-01	1.03E-01
ADULT	MILK ING	1.62E-01	1.71E+00	1.62E-01	4.75E-02	1.48E-01	1.62E-01
ADULT	TOTALS	1.16E+00	1.34E+01	2.89E+00	1.29E+00	3.68E+00	1.07E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	4.91E+00
INFANT	GROUND	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00
INFANT	CLOUD	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.37E-01	6.10E+00	6.37E-01	3.00E-01	9.16E-01	6.37E-01
INFANT	TOTALS	2.69E+00	1.09E+01	4.42E+00	2.43E+00	3.67E+00	7.50E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	4.91E+00
CHILD	GROUND	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00
CHILD	CLOUD	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03
CHILD	VEG.ING.	5.97E-01	7.13E+00	5.97E-01	8.05E-01	2.52E+00	5.97E-01
CHILD	MEAT ING	9.05E-02	1.14E+00	9.05E-02	1.71E-01	5.23E-01	9.05E-02
CHILD	MILK ING	5.76E-01	5.58E+00	5.76E-01	2.17E-01	7.05E-01	5.76E-01
CHILD	TOTALS	3.31E+00	1.87E+01	5.04E+00	3.32E+00	6.51E+00	8.13E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	4.91E+00
TEENAGER	GROUND	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00
TEENAGER	CLOUD	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03
TEENAGER	VEG.ING.	4.60E-01	5.76E+00	4.60E-01	5.99E-01	1.99E+00	4.60E-01
TEENAGER	MEAT ING	6.65E-02	8.66E-01	6.65E-02	1.24E-01	4.01E-01	6.65E-02
TEENAGER	MILK ING	3.36E-01	3.50E+00	3.36E-01	1.14E-01	3.92E-01	3.36E-01
TEENAGER	TOTALS	2.91E+00	1.49E+01	4.64E+00	2.97E+00	5.54E+00	7.73E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	9.23E-02	2.85E+00	1.82E+00	1.72E-01	8.00E-01	4.91E+00
ADULT	GROUND	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00
ADULT	CLOUD	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03	9.58E-03
ADULT	VEG.ING.	5.66E-01	7.19E+00	5.66E-01	6.56E-01	1.99E+00	5.66E-01
ADULT	MEAT ING	1.03E-01	1.36E+00	1.03E-01	1.70E-01	5.01E-01	1.03E-01
ADULT	MILK ING	1.62E-01	1.71E+00	1.62E-01	4.75E-02	1.48E-01	1.62E-01
ADULT	TOTALS	2.88E+00	1.51E+01	4.61E+00	3.00E+00	5.40E+00	7.70E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	0.
INFANT	GROUND	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01
INFANT	CLOUD	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.14E+01	1.09E+02	1.14E+01	5.43E+00	1.64E+01	1.14E+01
INFANT	TOTALS	1.39E+01	1.60E+02	4.12E+01	9.25E+00	3.11E+01	1.23E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	0.
CHILD	GROUND	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01
CHILD	CLOUD	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07
CHILD	VEG.ING.	1.06E+01	1.27E+02	1.06E+01	1.46E+01	4.54E+01	1.06E+01
CHILD	MEAT ING	1.64E+00	2.06E+01	1.64E+00	3.09E+00	9.47E+00	1.64E+00
CHILD	MILK ING	1.04E+01	1.00E+02	1.04E+01	3.93E+00	1.26E+01	1.04E+01
CHILD	TOTALS	2.51E+01	2.98E+02	5.24E+01	2.54E+01	8.22E+01	2.35E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	0.
TEENAGER	GROUND	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01
TEENAGER	CLOUD	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07
TEENAGER	VEG.ING.	8.23E+00	1.03E+02	8.23E+00	1.09E+01	3.59E+01	8.23E+00
TEENAGER	MEAT ING	1.20E+00	1.56E+01	1.20E+00	2.24E+00	7.25E+00	1.20E+00
TEENAGER	MILK ING	6.06E+00	6.31E+01	6.06E+00	2.07E+00	7.03E+00	6.06E+00
TEENAGER	TOTALS	1.79E+01	2.32E+02	4.52E+01	1.90E+01	6.49E+01	1.63E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	0.
ADULT	GROUND	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01	8.22E-01
ADULT	CLOUD	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07	6.38E-07
ADULT	VEG.ING.	1.01E+01	1.29E+02	1.01E+01	1.19E+01	3.59E+01	1.01E+01
ADULT	MEAT ING	1.85E+00	2.46E+01	1.85E+00	3.09E+00	9.07E+00	1.85E+00
ADULT	MILK ING	2.92E+00	3.09E+01	2.92E+00	8.61E-01	2.65E+00	2.92E+00
ADULT	TOTALS	1.73E+01	2.34E+02	4.46E+01	1.97E+01	6.23E+01	1.57E+01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IPTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	9.13E+00
INFANT	GROUND	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01
INFANT	CLOUD	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.14E+01	1.09E+02	1.14E+01	5.43E+00	1.64E+01	1.14E+01
INFANT	TOTALS	4.29E+01	1.89E+02	7.02E+01	3.83E+01	6.01E+01	5.04E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	9.13E+00
CHILD	GROUND	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01
CHILD	CLOUD	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02
CHILD	VEG.ING.	1.06E+01	1.27E+02	1.06E+01	1.46E+01	4.54E+01	1.06E+01
CHILD	MEAT ING	1.64E+00	2.06E+01	1.64E+00	3.09E+00	9.47E+00	1.64E+00
CHILD	MILK ING	1.04E+01	1.00E+02	1.04E+01	3.93E+00	1.26E+01	1.04E+01
CHILD	TOTALS	5.41E+01	3.27E+02	8.14E+01	5.45E+01	1.11E+02	6.17E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	9.13E+00
TEENAGER	GROUND	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01
TEENAGER	CLOUD	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02
TEENAGER	VEG.ING.	8.23E+00	1.03E+02	8.23E+00	1.09E+01	3.59E+01	8.23E+00
TEENAGER	MEAT ING	1.20E+00	1.56E+01	1.20E+00	2.24E+00	7.25E+00	1.20E+00
TEENAGER	MILK ING	6.06E+00	6.31E+01	6.06E+00	2.07E+00	7.03E+00	6.06E+00
TEENAGER	TOTALS	4.70E+01	2.61E+02	7.43E+01	4.80E+01	9.39E+01	5.45E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.59E+00	4.94E+01	2.89E+01	3.00E+00	1.39E+01	9.13E+00
ADULT	GROUND	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01	2.99E+01
ADULT	CLOUD	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02
ADULT	VEG.ING.	1.01E+01	1.29E+02	1.01E+01	1.19E+01	3.59E+01	1.01E+01
ADULT	MEAT ING	1.85E+00	2.46E+01	1.85E+00	3.09E+00	9.07E+00	1.85E+00
ADULT	MILK ING	2.92E+00	3.09E+01	2.92E+00	8.61E-01	2.65E+00	2.92E+00
ADULT	TOTALS	4.64E+01	2.64E+02	7.37E+01	4.87E+01	9.14E+01	5.39E+01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	0.
INFANT	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
INFANT	CLOUD	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.95E-01	4.73E+00	4.95E-01	2.35E-01	7.08E-01	4.95E-01
INFANT	TOTALS	6.05E-01	7.04E+00	1.90E+00	4.10E-01	1.38E+00	5.32E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	0.
CHILD	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
CHILD	CLOUD	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08
CHILD	VEG.ING.	4.60E-01	5.47E+00	4.60E-01	6.31E-01	1.96E+00	4.60E-01
CHILD	MEAT ING	7.07E-02	8.88E-01	7.07E-02	1.33E-01	4.09E-01	7.07E-02
CHILD	MILK ING	4.49E-01	4.33E+00	4.49E-01	1.70E-01	5.46E-01	4.49E-01
CHILD	TOTALS	1.09E+00	1.30E+01	2.38E+00	1.11E+00	3.60E+00	1.02E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	0.
TEENAGER	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
TEENAGER	CLOUD	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08
TEENAGER	VEG.ING.	3.56E-01	4.44E+00	3.56E-01	4.70E-01	1.55E+00	3.56E-01
TEENAGER	MEAT ING	5.19E-02	6.76E-01	5.19E-02	9.67E-02	3.13E-01	5.19E-02
TEENAGER	MILK ING	2.62E-01	2.73E+00	2.62E-01	8.94E-02	3.04E-01	2.62E-01
TEENAGER	TOTALS	7.80E-01	1.02E+01	2.07E+00	8.31E-01	2.84E+00	7.07E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	0.
ADULT	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
ADULT	CLOUD	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08	2.89E-08
ADULT	VEG.ING.	4.38E-01	5.56E+00	4.38E-01	5.14E-01	1.55E+00	4.38E-01
ADULT	MEAT ING	8.01E-02	1.06E+00	8.01E-02	1.33E-01	3.92E-01	8.01E-02
ADULT	MILK ING	1.26E-01	1.34E+00	1.26E-01	3.72E-02	1.14E-01	1.26E-01
ADULT	TOTALS	7.55E-01	1.03E+01	2.05E+00	8.60E-01	2.73E+00	6.82E-01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	1.20E+00
INFANT	GROUND	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00
INFANT	CLOUD	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.95E-01	4.73E+00	4.95E-01	2.35E-01	7.08E-01	4.95E-01
INFANT	TOTALS	1.86E+00	8.30E+00	3.16E+00	1.67E+00	2.64E+00	2.99E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	1.20E+00
CHILD	GROUND	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00
CHILD	CLOUD	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03
CHILD	VEG.ING.	4.60E-01	5.47E+00	4.60E-01	6.31E-01	1.96E+00	4.60E-01
CHILD	MEAT ING	7.07E-02	8.88E-01	7.07E-02	1.33E-01	4.09E-01	7.07E-02
CHILD	MILK ING	4.49E-01	4.33E+00	4.49E-01	1.70E-01	5.46E-01	4.49E-01
CHILD	TOTALS	2.35E+00	1.43E+01	3.64E+00	2.37E+00	4.85E+00	3.47E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	1.20E+00
TEENAGER	GROUND	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00
TEENAGER	CLOUD	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03
TEENAGER	VEG.ING.	3.56E-01	4.44E+00	3.56E-01	4.70E-01	1.55E+00	3.56E-01
TEENAGER	MEAT ING	5.19E-02	6.76E-01	5.19E-02	9.67E-02	3.13E-01	5.19E-02
TEENAGER	MILK ING	2.62E-01	2.73E+00	2.62E-01	8.94E-02	3.04E-01	2.62E-01
TEENAGER	TOTALS	2.04E+00	1.14E+01	3.33E+00	2.09E+00	4.10E+00	3.16E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	7.31E-02	2.28E+00	1.37E+00	1.38E-01	6.39E-01	1.20E+00
ADULT	GROUND	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00
ADULT	CLOUD	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03	3.19E-03
ADULT	VEG.ING.	4.38E-01	5.56E+00	4.38E-01	5.14E-01	1.55E+00	4.38E-01
ADULT	MEAT ING	8.01E-02	1.06E+00	8.01E-02	1.33E-01	3.92E-01	8.01E-02
ADULT	MILK ING	1.26E-01	1.34E+00	1.26E-01	3.72E-02	1.14E-01	1.26E-01
ADULT	TOTALS	2.01E+00	1.15E+01	3.31E+00	2.12E+00	3.99E+00	3.14E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	0.
INFANT	GROUND	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02
INFANT	CLOUD	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.14E-01	2.05E+00	2.14E-01	1.01E-01	3.07E-01	2.14E-01
INFANT	TOTALS	2.78E-01	3.10E+00	8.75E-01	1.95E-01	6.24E-01	2.46E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	0.
CHILD	GROUND	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02
CHILD	CLOUD	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08
CHILD	VEG.ING.	1.99E-01	2.37E+00	1.99E-01	2.72E-01	8.50E-01	1.99E-01
CHILD	MEAT ING	3.06E-02	3.84E-01	3.06E-02	5.77E-02	1.77E-01	3.06E-02
CHILD	MILK ING	1.94E-01	1.88E+00	1.94E-01	7.34E-02	2.36E-01	1.94E-01
CHILD	TOTALS	4.88E-01	5.68E+00	1.08E+00	4.97E-01	1.58E+00	4.56E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	0.
TEENAGER	GROUND	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02
TEENAGER	CLOUD	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08
TEENAGER	VEG.ING.	1.54E-01	1.92E+00	1.54E-01	2.03E-01	6.71E-01	1.54E-01
TEENAGER	MEAT ING	2.24E-02	2.92E-01	2.24E-02	4.18E-02	1.35E-01	2.24E-02
TEENAGER	MILK ING	1.13E-01	1.18E+00	1.13E-01	3.86E-02	1.32E-01	1.13E-01
TEENAGER	TOTALS	3.54E-01	4.44E+00	9.51E-01	3.76E-01	1.26E+00	3.21E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	0.
ADULT	GROUND	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02	3.16E-02
ADULT	CLOUD	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08	1.33E-08
ADULT	VEG.ING.	1.90E-01	2.41E+00	1.90E-01	2.22E-01	6.71E-01	1.90E-01
ADULT	MEAT ING	3.46E-02	4.59E-01	3.46E-02	5.76E-02	1.69E-01	3.46E-02
ADULT	MILK ING	5.46E-02	5.77E-01	5.46E-02	1.61E-02	4.95E-02	5.46E-02
ADULT	TOTALS	3.43E-01	4.50E+00	9.40E-01	3.89E-01	1.21E+00	3.10E-01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, TRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	3.40E+00
INFANT	GROUND	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01
INFANT	CLOUD	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.14E-01	2.05E+00	2.14E-01	1.01E-01	3.07E-01	2.14E-01
INFANT	TOTALS	8.34E-01	3.65E+00	1.43E+00	7.50E-01	1.18E+00	4.20E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	3.40E+00
CHILD	GROUND	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01
CHILD	CLOUD	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
CHILD	VEG.ING.	1.99E-01	2.37E+00	1.99E-01	2.73E-01	8.50E-01	1.99E-01
CHILD	MEAT ING	3.06E-02	3.84E-01	3.06E-02	5.77E-02	1.77E-01	3.06E-02
CHILD	MILK ING	1.94E-01	1.88E+00	1.94E-01	7.34E-02	2.37E-01	1.94E-01
CHILD	TOTALS	1.04E+00	6.24E+00	1.64E+00	1.05E+00	2.14E+00	4.41E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	3.40E+00
TEENAGER	GROUND	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01
TEENAGER	CLOUD	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
TEENAGER	VEG.ING.	1.54E-01	1.92E+00	1.54E-01	2.03E-01	6.71E-01	1.54E-01
TEENAGER	MEAT ING	2.24E-02	2.92E-01	2.24E-02	4.18E-02	1.35E-01	2.24E-02
TEENAGER	MILK ING	1.13E-01	1.18E+00	1.13E-01	3.86E-02	1.32E-01	1.13E-01
TEENAGER	TOTALS	9.10E-01	5.00E+00	1.51E+00	9.32E-01	1.81E+00	4.28E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.27E-02	1.02E+00	6.29E-01	6.16E-02	2.86E-01	3.40E+00
ADULT	GROUND	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01	5.76E-01
ADULT	CLOUD	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
ADULT	VEG.ING.	1.90E-01	2.41E+00	1.90E-01	2.22E-01	6.71E-01	1.90E-01
ADULT	MEAT ING	3.46E-02	4.59E-01	3.46E-02	5.76E-02	1.69E-01	3.46E-02
ADULT	MILK ING	5.46E-02	5.77E-01	5.46E-02	1.61E-02	4.95E-02	5.46E-02
ADULT	TOTALS	8.99E-01	5.05E+00	1.50E+00	9.45E-01	1.76E+00	4.27E+00

TIME STEP NUMBER 3. AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM. Y= .5KM. Z= 48.8M. DIST= .5KM. IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	0.
INFANT	GROUND	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01
INFANT	CLOUD	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.74E-01	4.55E+00	4.74E-01	2.20E-01	6.79E-01	4.74E-01
INFANT	TOTALS	8.05E-01	7.00E+00	2.20E+00	6.11E-01	1.55E+00	7.33E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	0.
CHILD	GROUND	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01
CHILD	CLOUD	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08
CHILD	VEG.ING.	4.45E-01	5.32E+00	4.45E-01	5.92E-01	1.87E+00	4.45E-01
CHILD	MEAT ING	6.71E-02	8.43E-01	6.71E-02	1.25E-01	3.85E-01	6.71E-02
CHILD	MILK ING	4.29E-01	4.16E+00	4.29E-01	1.59E-01	5.21E-01	4.29E-01
CHILD	TOTALS	1.27E+00	1.28E+01	2.66E+00	1.27E+00	3.64E+00	1.20E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	0.
TEENAGER	GROUND	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01
TEENAGER	CLOUD	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08
TEENAGER	VEG.ING.	3.42E-01	4.28E+00	3.42E-01	4.41E-01	1.47E+00	3.42E-01
TEENAGER	MEAT ING	4.93E-02	6.41E-01	4.93E-02	9.08E-02	2.95E-01	4.93E-02
TEENAGER	MILK ING	2.50E-01	2.61E+00	2.50E-01	8.39E-02	2.90E-01	2.50E-01
TEENAGER	TOTALS	9.72E-01	9.98E+00	2.36E+00	1.01E+00	2.93E+00	9.01E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	0.
ADULT	GROUND	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01	2.59E-01
ADULT	CLOUD	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08	3.48E-08
ADULT	VEG.ING.	4.21E-01	5.35E+00	4.21E-01	4.83E-01	1.47E+00	4.21E-01
ADULT	MEAT ING	7.61E-02	1.01E+00	7.61E-02	1.25E-01	3.69E-01	7.61E-02
ADULT	MILK ING	1.20E-01	1.27E+00	1.20E-01	3.49E-02	1.09E-01	1.20E-01
ADULT	TOTALS	9.47E-01	1.01E+01	2.34E+00	1.03E+00	2.82E+00	8.76E-01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	2.87E+00
INFANT	GROUND	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
INFANT	CLOUD	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.74E-01	4.55E+00	4.74E-01	2.20E-01	6.79E-01	4.74E-01
INFANT	TOTALS	2.05E+00	8.24E+00	3.44E+00	1.85E+00	2.80E+00	4.85E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	2.87E+00
CHILD	GROUND	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
CHILD	CLOUD	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03
CHILD	VEG.ING.	4.45E-01	5.32E+00	4.45E-01	5.92E-01	1.87E+00	4.45E-01
CHILD	MEAT ING	6.71E-02	8.43E-01	6.71E-02	1.25E-01	3.85E-01	6.71E-02
CHILD	MILK ING	4.29E-01	4.16E+00	4.29E-01	1.59E-01	5.21E-01	4.29E-01
CHILD	TOTALS	2.51E+00	1.40E+01	3.91E+00	2.51E+00	4.89E+00	5.32E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	2.87E+00
TEENAGER	GROUND	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
TEENAGER	CLOUD	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03
TEENAGER	VEG.ING.	3.42E-01	4.28E+00	3.42E-01	4.41E-01	1.47E+00	3.42E-01
TEENAGER	MEAT ING	4.93E-02	6.41E-01	4.93E-02	9.08E-02	2.95E-01	4.93E-02
TEENAGER	MILK ING	2.50E-01	2.61E+00	2.50E-01	8.39E-02	2.90E-01	2.50E-01
TEENAGER	TOTALS	2.22E+00	1.12E+01	3.61E+00	2.25E+00	4.17E+00	5.02E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	7.11E-02	2.19E+00	1.46E+00	1.31E-01	6.14E-01	2.87E+00
ADULT	GROUND	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
ADULT	CLOUD	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03	9.18E-03
ADULT	VEG.ING.	4.21E-01	5.35E+00	4.21E-01	4.83E-01	1.47E+00	4.21E-01
ADULT	MEAT ING	7.61E-02	1.01E+00	7.61E-02	1.25E-01	3.69E-01	7.61E-02
ADULT	MILK ING	1.20E-01	1.27E+00	1.20E-01	3.49E-02	1.09E-01	1.20E-01
ADULT	TOTALS	2.19E+00	1.13E+01	3.58E+00	2.28E+00	4.07E+00	4.99E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	0.
INFANT	GROUND	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01
INFANT	CLOUD	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.88E-01	5.62E+00	5.88E-01	2.69E-01	8.20E-01	5.88E-01
INFANT	TOTALS	8.17E-01	8.49E+00	2.42E+00	5.74E-01	1.73E+00	7.29E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	0.
CHILD	GROUND	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01
CHILD	CLOUD	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08
CHILD	VEG.ING.	5.46E-01	6.48E+00	5.46E-01	7.23E-01	2.26E+00	5.46E-01
CHILD	MEAT ING	8.31E-02	1.04E+00	8.31E-02	1.53E-01	4.69E-01	8.31E-02
CHILD	MILK ING	5.33E-01	5.14E+00	5.33E-01	1.95E-01	6.31E-01	5.33E-01
CHILD	TOTALS	1.39E+00	1.55E+01	2.99E+00	1.38E+00	4.27E+00	1.30E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	0.
TEENAGER	GROUND	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01
TEENAGER	CLOUD	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08
TEENAGER	VEG.ING.	4.22E-01	5.26E+00	4.22E-01	5.38E-01	1.79E+00	4.22E-01
TEENAGER	MEAT ING	6.12E-02	7.92E-01	6.12E-02	1.11E-01	3.60E-01	6.12E-02
TEENAGER	MILK ING	3.11E-01	3.23E+00	3.11E-01	1.02E-01	3.51E-01	3.11E-01
TEENAGER	TOTALS	1.02E+00	1.22E+01	2.62E+00	1.06E+00	3.40E+00	9.36E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	0.
ADULT	GROUND	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01
ADULT	CLOUD	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08
ADULT	VEG.ING.	5.20E-01	6.59E+00	5.20E-01	5.90E-01	1.79E+00	5.20E-01
ADULT	MEAT ING	9.45E-02	1.25E+00	9.45E-02	1.53E-01	4.50E-01	9.45E-02
ADULT	MILK ING	1.50E-01	1.58E+00	1.50E-01	4.24E-02	1.32E-01	1.50E-01
ADULT	TOTALS	9.93E-01	1.23E+01	2.59E+00	1.09E+00	3.28E+00	9.06E-01

REGION=UNC MILL RUN 7
METSET=GALLUP, 76-80

CODE=MILDOS,REV0 (7/79)

TIME STEP NUMBER 3, AFTER 25 YEARS   DURATION IN YRS IS... 5.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	2.64E+00
INFANT	GROUND	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00
INFANT	CLOUD	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.88E-01	5.62E+00	5.88E-01	2.69E-01	8.20E-01	5.88E-01
INFANT	TOTALS	2.35E+00	1.00E+01	3.95E+00	2.11E+00	3.26E+00	4.90E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	2.64E+00
CHILD	GROUND	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00
CHILD	CLOUD	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03
CHILD	VEG.ING.	5.46E-01	6.48E+00	5.46E-01	7.23E-01	2.26E+00	5.46E-01
CHILD	MEAT ING	8.31E-02	1.04E+00	8.31E-02	1.53E-01	4.69E-01	8.31E-02
CHILD	MILK ING	5.33E-01	5.14E+00	5.33E-01	1.95E-01	6.31E-01	5.33E-01
CHILD	TOTALS	2.92E+00	1.71E+01	4.52E+00	2.91E+00	5.80E+00	5.47E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	2.64E+00
TEENAGER	GROUND	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00
TEENAGER	CLOUD	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03
TEENAGER	VEG.ING.	4.22E-01	5.26E+00	4.22E-01	5.38E-01	1.79E+00	4.22E-01
TEENAGER	MEAT ING	6.12E-02	7.92E-01	6.12E-02	1.11E-01	3.60E-01	6.12E-02
TEENAGER	MILK ING	3.11E-01	3.23E+00	3.11E-01	1.02E-01	3.51E-01	3.11E-01
TEENAGER	TOTALS	2.56E+00	1.37E+01	4.16E+00	2.59E+00	4.94E+00	5.11E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.78E-02	2.73E+00	1.69E+00	1.64E-01	7.64E-01	2.64E+00
ADULT	GROUND	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00	1.66E+00
ADULT	CLOUD	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03	9.64E-03
ADULT	VEG.ING.	5.20E-01	6.59E+00	5.20E-01	5.90E-01	1.79E+00	5.20E-01
ADULT	MEAT ING	9.45E-02	1.25E+00	9.45E-02	1.53E-01	4.50E-01	9.45E-02
ADULT	MILK ING	1.50E-01	1.59E+00	1.50E-01	4.26E-02	1.32E-01	1.50E-01
ADULT	TOTALS	2.53E+00	1.38E+01	4.13E+00	2.62E+00	4.81E+00	5.08E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	0.
INFANT	GROUND	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02
INFANT	CLOUD	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.90E-01	6.59E+00	6.90E-01	3.26E-01	9.84E-01	6.90E-01
INFANT	TOTALS	8.58E-01	1.01E+01	2.86E+00	5.92E-01	2.00E+00	7.49E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	0.
CHILD	GROUND	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02
CHILD	CLOUD	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08
CHILD	VEG.ING.	6.41E-01	7.62E+00	6.41E-01	8.76E-01	2.73E+00	6.41E-01
CHILD	MEAT ING	9.84E-02	1.24E+00	9.84E-02	1.85E-01	5.68E-01	9.84E-02
CHILD	MILK ING	6.25E-01	6.04E+00	6.25E-01	2.36E-01	7.59E-01	6.25E-01
CHILD	TOTALS	1.53E+00	1.84E+01	3.54E+00	1.56E+00	5.08E+00	1.42E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	0.
TEENAGER	GROUND	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02
TEENAGER	CLOUD	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08
TEENAGER	VEG.ING.	4.96E-01	6.19E+00	4.96E-01	6.52E-01	2.15E+00	4.96E-01
TEENAGER	MEAT ING	7.23E-02	9.41E-01	7.23E-02	1.34E-01	4.36E-01	7.23E-02
TEENAGER	MILK ING	3.65E-01	3.80E+00	3.65E-01	1.24E-01	4.23E-01	3.65E-01
TEENAGER	TOTALS	1.10E+00	1.44E+01	3.10E+00	1.18E+00	4.03E+00	9.93E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	0.
ADULT	GROUND	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02	5.93E-02
ADULT	CLOUD	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08	4.27E-08
ADULT	VEG.ING.	6.11E-01	7.76E+00	6.11E-01	7.14E-01	2.16E+00	6.11E-01
ADULT	MEAT ING	1.12E-01	1.48E+00	1.12E-01	1.85E-01	5.45E-01	1.12E-01
ADULT	MILK ING	1.76E-01	1.86E+00	1.76E-01	5.17E-02	1.59E-01	1.76E-01
ADULT	TOTALS	1.07E+00	1.46E+01	3.07E+00	1.22E+00	3.88E+00	9.57E-01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	6.51E-01
INFANT	GROUND	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00
INFANT	CLOUD	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	6.90E-01	6.59E+00	6.90E-01	3.26E-01	9.84E-01	6.90E-01
INFANT	TOTALS	2.62E+00	1.18E+01	4.63E+00	2.36E+00	3.77E+00	3.17E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	6.51E-01
CHILD	GROUND	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00
CHILD	CLOUD	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03
CHILD	VEG.ING.	6.41E-01	7.63E+00	6.41E-01	8.76E-01	2.73E+00	6.41E-01
CHILD	MEAT ING	9.85E-02	1.24E+00	9.85E-02	1.85E-01	5.69E-01	9.85E-02
CHILD	MILK ING	6.25E-01	6.04E+00	6.25E-01	2.36E-01	7.60E-01	6.25E-01
CHILD	TOTALS	3.30E+00	2.01E+01	5.30E+00	3.33E+00	6.84E+00	3.84E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	6.51E-01
TEENAGER	GROUND	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00
TEENAGER	CLOUD	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03
TEENAGER	VEG.ING.	4.96E-01	6.19E+00	4.96E-01	6.52E-01	2.16E+00	4.96E-01
TEENAGER	MEAT ING	7.23E-02	9.42E-01	7.23E-02	1.34E-01	4.36E-01	7.23E-02
TEENAGER	MILK ING	3.65E-01	3.80E+00	3.65E-01	1.24E-01	4.23E-01	3.65E-01
TEENAGER	TOTALS	2.87E+00	1.62E+01	4.87E+00	2.94E+00	5.80E+00	3.41E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.10E-01	3.42E+00	2.11E+00	2.07E-01	9.59E-01	6.51E-01
ADULT	GROUND	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00
ADULT	CLOUD	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03	6.27E-03
ADULT	VEG.ING.	6.11E-01	7.76E+00	6.11E-01	7.15E-01	2.16E+00	6.11E-01
ADULT	MEAT ING	1.12E-01	1.48E+00	1.12E-01	1.85E-01	5.45E-01	1.12E-01
ADULT	MILK ING	1.76E-01	1.86E+00	1.76E-01	5.17E-02	1.59E-01	1.76E-01
ADULT	TOTALS	2.83E+00	1.63E+01	4.83E+00	2.98E+00	5.64E+00	3.37E+00

TIME STEP NUMBER 3, AFTER 25 YEARS   DURATION IN YRS IS... 5.0

NUMBER 8 NAME=NEAREST COMMUNITY   X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, TRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.81E-03	8.81E-02	5.76E-02	5.32E-03	2.47E-02	0.
INFANT	GROUND	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03
INFANT	CLOUD	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.50E-02	1.44E-01	1.50E-02	7.12E-03	2.15E-02	1.50E-02
INFANT	TOTALS	1.94E-02	2.34E-01	7.43E-02	1.40E-02	4.78E-02	1.66E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.81E-03	8.81E-02	5.76E-02	5.32E-03	2.47E-02	0.
CHILD	GROUND	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03
CHILD	CLOUD	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09
CHILD	VEG.ING.	1.40E-02	1.67E-01	1.40E-02	1.91E-02	5.96E-02	1.40E-02
CHILD	MEAT ING	2.15E-03	2.70E-02	2.15E-03	4.05E-03	1.24E-02	2.15E-03
CHILD	MILK ING	1.36E-02	1.32E-01	1.36E-02	5.15E-03	1.66E-02	1.36E-02
CHILD	TOTALS	3.42E-02	4.15E-01	8.90E-02	3.52E-02	1.15E-01	3.14E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.81E-03	8.81E-02	5.76E-02	5.32E-03	2.47E-02	0.
TEENAGER	GROUND	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03
TEENAGER	CLOUD	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09
TEENAGER	VEG.ING.	1.08E-02	1.35E-01	1.08E-02	1.42E-02	4.71E-02	1.08E-02
TEENAGER	MEAT ING	1.58E-03	2.05E-02	1.58E-03	2.93E-03	9.51E-03	1.58E-03
TEENAGER	MILK ING	7.97E-03	8.29E-02	7.97E-03	2.71E-03	9.24E-03	7.97E-03
TEENAGER	TOTALS	2.48E-02	3.28E-01	7.96E-02	2.68E-02	9.21E-02	2.19E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.81E-03	8.81E-02	5.76E-02	5.32E-03	2.47E-02	0.
ADULT	GROUND	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03
ADULT	CLOUD	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09	1.07E-09
ADULT	VEG.ING.	1.33E-02	1.69E-01	1.33E-02	1.56E-02	4.71E-02	1.33E-02
ADULT	MEAT ING	2.44E-03	3.23E-02	2.44E-03	4.05E-03	1.19E-02	2.44E-03
ADULT	MILK ING	3.84E-03	4.06E-02	3.84E-03	1.13E-03	3.48E-03	3.84E-03
ADULT	TOTALS	2.40E-02	3.32E-01	7.88E-02	2.77E-02	8.88E-02	2.12E-02

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.82E-03	8.81E-02	5.77E-02	5.34E-03	2.48E-02	4.11E-02
INFANT	GROUND	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02
INFANT	CLOUD	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.51E-02	1.44E-01	1.51E-02	7.13E-03	2.15E-02	1.51E-02
INFANT	TOTALS	5.83E-02	2.73E-01	1.13E-01	5.29E-02	8.68E-02	9.66E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.82E-03	8.81E-02	5.77E-02	5.34E-03	2.48E-02	4.11E-02
CHILD	GROUND	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02
CHILD	CLOUD	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04
CHILD	VEG.ING.	1.40E-02	1.67E-01	1.40E-02	1.92E-02	5.97E-02	1.40E-02
CHILD	MEAT ING	2.15E-03	2.70E-02	2.15E-03	4.06E-03	1.24E-02	2.15E-03
CHILD	MILK ING	1.36E-02	1.32E-01	1.36E-02	5.16E-03	1.66E-02	1.36E-02
CHILD	TOTALS	7.31E-02	4.54E-01	1.28E-01	7.42E-02	1.54E-01	1.11E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.82E-03	8.81E-02	5.77E-02	5.34E-03	2.48E-02	4.11E-02
TEENAGER	GROUND	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02
TEENAGER	CLOUD	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04
TEENAGER	VEG.ING.	1.08E-02	1.35E-01	1.08E-02	1.43E-02	4.72E-02	1.08E-02
TEENAGER	MEAT ING	1.58E-03	2.06E-02	1.58E-03	2.94E-03	9.53E-03	1.58E-03
TEENAGER	MILK ING	7.97E-03	8.29E-02	7.97E-03	2.72E-03	9.25E-03	7.97E-03
TEENAGER	TOTALS	6.37E-02	3.67E-01	1.19E-01	6.57E-02	1.31E-01	1.02E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.82E-03	8.81E-02	5.77E-02	5.34E-03	2.48E-02	4.11E-02
ADULT	GROUND	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02	3.99E-02
ADULT	CLOUD	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04	6.05E-04
ADULT	VEG.ING.	1.33E-02	1.69E-01	1.33E-02	1.56E-02	4.72E-02	1.33E-02
ADULT	MEAT ING	2.44E-03	3.23E-02	2.44E-03	4.05E-03	1.19E-02	2.44E-03
ADULT	MILK ING	3.84E-03	4.06E-02	3.84E-03	1.13E-03	3.48E-03	3.84E-03
ADULT	TOTALS	6.29E-02	3.71E-01	1.18E-01	6.66E-02	1.28E-01	1.01E-01

TIME STEP NUMBER 3. AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 9 NAME:NEAREST DOWNWIND COM X= 31.8KM. Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION. MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.22E-03	7.01E-02	4.93E-02	4.23E-03	1.97E-02	0.
INFANT	GROUND	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04
INFANT	CLOUD	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.74E-03	8.35E-02	8.74E-03	4.13E-03	1.25E-02	8.74E-03
INFANT	TOTALS	1.17E-02	1.54E-01	5.88E-02	9.13E-03	3.29E-02	9.50E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.22E-03	7.01E-02	4.93E-02	4.23E-03	1.97E-02	0.
CHILD	GROUND	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04
CHILD	CLOUD	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10
CHILD	VEG.ING.	8.13E-03	9.66E-02	8.13E-03	1.11E-02	3.46E-02	8.13E-03
CHILD	MEAT ING	1.25E-03	1.57E-02	1.25E-03	2.35E-03	7.20E-03	1.25E-03
CHILD	MILK ING	7.92E-03	7.65E-02	7.92E-03	2.99E-03	9.63E-03	7.92E-03
CHILD	TOTALS	2.03E-02	2.60E-01	6.73E-02	2.14E-02	7.19E-02	1.81E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.22E-03	7.01E-02	4.93E-02	4.23E-03	1.97E-02	0.
TEENAGER	GROUND	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04
TEENAGER	CLOUD	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10
TEENAGER	VEG.ING.	6.28E-03	7.84E-02	6.28E-03	8.27E-03	2.73E-02	6.28E-03
TEENAGER	MEAT ING	9.16E-04	1.19E-02	9.16E-04	1.70E-03	5.52E-03	9.16E-04
TEENAGER	MILK ING	4.63E-03	4.81E-02	4.63E-03	1.57E-03	5.36E-03	4.63E-03
TEENAGER	TOTALS	1.48E-02	2.09E-01	6.19E-02	1.65E-02	5.86E-02	1.26E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.22E-03	7.01E-02	4.93E-02	4.23E-03	1.97E-02	0.
ADULT	GROUND	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04	7.68E-04
ADULT	CLOUD	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10	7.88E-10
ADULT	VEG.ING.	7.74E-03	9.83E-02	7.74E-03	9.05E-03	2.73E-02	7.74E-03
ADULT	MEAT ING	1.41E-03	1.87E-02	1.41E-03	2.35E-03	6.90E-03	1.41E-03
ADULT	MILK ING	2.23E-03	2.36E-02	2.23E-03	6.55E-04	2.02E-03	2.23E-03
ADULT	TOTALS	1.44E-02	2.11E-01	6.14E-02	1.71E-02	5.67E-02	1.21E-02

REGION=UNC MILL RUN 7 CODE=MILDOS,REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 143

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.24E-03	7.06E-02	4.94E-02	4.34E-03	2.01E-02	3.16E-02
INFANT	GROUND	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02
INFANT	CLOUD	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	8.75E-03	8.37E-02	8.75E-03	4.21E-03	1.27E-02	8.75E-03
INFANT	TOTALS	3.46E-02	1.78E-01	8.18E-02	3.22E-02	5.64E-02	6.40E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.24E-03	7.06E-02	4.94E-02	4.34E-03	2.01E-02	3.16E-02
CHILD	GROUND	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02
CHILD	CLOUD	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04
CHILD	VEG.ING.	8.16E-03	9.73E-02	8.16E-03	1.13E-02	3.52E-02	8.16E-03
CHILD	MEAT ING	1.25E-03	1.58E-02	1.25E-03	2.40E-03	7.34E-03	1.25E-03
CHILD	MILK ING	7.93E-03	7.67E-02	7.93E-03	3.05E-03	9.80E-03	7.93E-03
CHILD	TOTALS	4.32E-02	2.84E-01	9.04E-02	4.47E-02	9.60E-02	7.26E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.24E-03	7.06E-02	4.94E-02	4.34E-03	2.01E-02	3.16E-02
TEENAGER	GROUND	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02
TEENAGER	CLOUD	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04
TEENAGER	VEG.ING.	6.30E-03	7.88E-02	6.30E-03	8.41E-03	2.78E-02	6.30E-03
TEENAGER	MEAT ING	9.20E-04	1.20E-02	9.20E-04	1.74E-03	5.63E-03	9.20E-04
TEENAGER	MILK ING	4.63E-03	4.82E-02	4.63E-03	1.60E-03	5.45E-03	4.63E-03
TEENAGER	TOTALS	3.77E-02	2.33E-01	8.49E-02	3.97E-02	8.25E-02	6.71E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.24E-03	7.06E-02	4.94E-02	4.34E-03	2.01E-02	3.16E-02
ADULT	GROUND	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02	2.31E-02
ADULT	CLOUD	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04	5.50E-04
ADULT	VEG.ING.	7.76E-03	9.87E-02	7.76E-03	9.21E-03	2.78E-02	7.76E-03
ADULT	MEAT ING	1.42E-03	1.89E-02	1.42E-03	2.39E-03	7.03E-03	1.42E-03
ADULT	MILK ING	2.23E-03	2.36E-02	2.23E-03	6.68E-04	2.05E-03	2.23E-03
ADULT	TOTALS	3.73E-02	2.35E-01	8.44E-02	4.03E-02	8.05E-02	6.66E-02

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	0.
INFANT	GROUND	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00
INFANT	CLOUD	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.54E+01	1.47E+02	1.54E+01	7.31E+00	2.20E+01	1.54E+01
INFANT	TOTALS	1.84E+01	2.09E+02	5.07E+01	1.21E+01	4.02E+01	1.64E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	0.
CHILD	GROUND	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00
CHILD	CLOUD	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07
CHILD	VEG.ING.	1.43E+01	1.70E+02	1.43E+01	1.96E+01	6.11E+01	1.43E+01
CHILD	MEAT ING	2.20E+00	2.76E+01	2.20E+00	4.15E+00	1.27E+01	2.20E+00
CHILD	MILK ING	1.40E+01	1.35E+02	1.40E+01	5.29E+00	1.70E+01	1.40E+01
CHILD	TOTALS	3.35E+01	3.95E+02	6.57E+01	3.38E+01	1.09E+02	3.15E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	0.
TEENAGER	GROUND	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00
TEENAGER	CLOUD	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07
TEENAGER	VEG.ING.	1.11E+01	1.38E+02	1.11E+01	1.46E+01	4.83E+01	1.11E+01
TEENAGER	MEAT ING	1.62E+00	2.10E+01	1.62E+00	3.01E+00	9.76E+00	1.62E+00
TEENAGER	MILK ING	8.15E+00	8.48E+01	8.15E+00	2.78E+00	9.46E+00	8.15E+00
TEENAGER	TOTALS	2.39E+01	3.06E+02	5.61E+01	2.52E+01	8.56E+01	2.19E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	0.
ADULT	GROUND	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00
ADULT	CLOUD	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07	8.06E-07
ADULT	VEG.ING.	1.36E+01	1.73E+02	1.36E+01	1.60E+01	4.83E+01	1.36E+01
ADULT	MEAT ING	2.49E+00	3.30E+01	2.49E+00	4.15E+00	1.22E+01	2.49E+00
ADULT	MILK ING	3.93E+00	4.16E+01	3.93E+00	1.16E+00	3.56E+00	3.93E+00
ADULT	TOTALS	2.31E+01	3.10E+02	5.53E+01	2.61E+01	8.22E+01	2.11E+01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	1.92E+01
INFANT	GROUND	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01
INFANT	CLOUD	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.54E+01	1.47E+02	1.54E+01	7.31E+00	2.20E+01	1.54E+01
INFANT	TOTALS	5.74E+01	2.48E+02	8.97E+01	5.11E+01	7.92E+01	7.47E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	1.92E+01
CHILD	GROUND	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01
CHILD	CLOUD	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03
CHILD	VEG.ING.	1.43E+01	1.70E+02	1.43E+01	1.96E+01	6.11E+01	1.43E+01
CHILD	MEAT ING	2.20E+00	2.76E+01	2.20E+00	4.15E+00	1.27E+01	2.20E+00
CHILD	MILK ING	1.40E+01	1.35E+02	1.40E+01	5.29E+00	1.70E+01	1.40E+01
CHILD	TOTALS	7.25E+01	4.34E+02	1.05E+02	7.28E+01	1.48E+02	8.98E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	1.92E+01
TEENAGER	GROUND	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01
TEENAGER	CLOUD	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03
TEENAGER	VEG.ING.	1.11E+01	1.38E+02	1.11E+01	1.46E+01	4.83E+01	1.11E+01
TEENAGER	MEAT ING	1.62E+00	2.10E+01	1.62E+00	3.01E+00	9.76E+00	1.62E+00
TEENAGER	MILK ING	8.15E+00	8.48E+01	8.15E+00	2.78E+00	9.46E+00	8.15E+00
TEENAGER	TOTALS	6.29E+01	3.45E+02	9.51E+01	6.42E+01	1.25E+02	8.01E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.97E+00	6.10E+01	3.42E+01	3.70E+00	1.71E+01	1.92E+01
ADULT	GROUND	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01
ADULT	CLOUD	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03	7.93E-03
ADULT	VEG.ING.	1.36E+01	1.73E+02	1.36E+01	1.60E+01	4.83E+01	1.36E+01
ADULT	MEAT ING	2.49E+00	3.30E+01	2.49E+00	4.15E+00	1.22E+01	2.49E+00
ADULT	MILK ING	3.93E+00	4.16E+01	3.93E+00	1.16E+00	3.56E+00	3.93E+00
ADULT	TOTALS	6.21E+01	3.49E+02	9.43E+01	6.51E+01	1.21E+02	7.93E+01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.67E-04	5.26E-03	3.85E-03	3.16E-04	1.47E-03	0.
INFANT	GROUND	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04
INFANT	CLOUD	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.71E-04	5.47E-03	5.71E-04	2.69E-04	8.19E-04	5.71E-04
INFANT	TOTALS	8.91E-04	1.09E-02	4.58E-03	7.38E-04	2.45E-03	7.25E-04
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.67E-04	5.26E-03	3.85E-03	3.16E-04	1.47E-03	0.
CHILD	GROUND	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04
CHILD	CLOUD	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11
CHILD	VEG.ING.	5.33E-04	6.36E-03	5.33E-04	7.23E-04	2.26E-03	5.33E-04
CHILD	MEAT ING	8.14E-05	1.02E-03	8.14E-05	1.53E-04	4.70E-04	8.14E-05
CHILD	MILK ING	5.17E-04	5.01E-03	5.17E-04	1.95E-04	6.30E-04	5.17E-04
CHILD	TOTALS	1.45E-03	1.78E-02	5.14E-03	1.54E-03	4.99E-03	1.29E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.67E-04	5.26E-03	3.85E-03	3.16E-04	1.47E-03	0.
TEENAGER	GROUND	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04
TEENAGER	CLOUD	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11
TEENAGER	VEG.ING.	4.12E-04	5.14E-03	4.12E-04	5.39E-04	1.79E-03	4.12E-04
TEENAGER	MEAT ING	5.98E-05	7.78E-04	5.98E-05	1.11E-04	3.60E-04	5.98E-05
TEENAGER	MILK ING	3.02E-04	3.14E-03	3.02E-04	1.03E-04	3.51E-04	3.02E-04
TEENAGER	TOTALS	1.09E-03	1.45E-02	4.78E-03	1.22E-03	4.13E-03	9.26E-04
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.67E-04	5.26E-03	3.85E-03	3.16E-04	1.47E-03	0.
ADULT	GROUND	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04	1.53E-04
ADULT	CLOUD	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11	6.10E-11
ADULT	VEG.ING.	5.06E-04	6.44E-03	5.06E-04	5.90E-04	1.79E-03	5.06E-04
ADULT	MEAT ING	9.22E-05	1.22E-03	9.22E-05	1.53E-04	4.50E-04	9.22E-05
ADULT	MILK ING	1.45E-04	1.54E-03	1.45E-04	4.27E-05	1.32E-04	1.45E-04
ADULT	TOTALS	1.06E-03	1.46E-02	4.75E-03	1.25E-03	4.00E-03	8.97E-04

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.83E-04	5.77E-03	3.99E-03	4.47E-04	1.90E-03	4.46E-02
INFANT	GROUND	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03
INFANT	CLOUD	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	5.86E-04	5.73E-03	5.86E-04	3.65E-04	1.08E-03	5.86E-04
INFANT	TOTALS	3.20E-03	1.39E-02	7.00E-03	3.24E-03	5.41E-03	4.76E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.83E-04	5.77E-03	3.99E-03	4.47E-04	1.90E-03	4.46E-02
CHILD	GROUND	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03
CHILD	CLOUD	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04
CHILD	VEG.ING.	5.72E-04	7.14E-03	5.72E-04	9.57E-04	2.97E-03	5.72E-04
CHILD	MEAT ING	9.05E-05	1.20E-03	9.05E-05	2.07E-04	6.34E-04	9.05E-05
CHILD	MILK ING	5.29E-04	5.24E-03	5.29E-04	2.64E-04	8.40E-04	5.29E-04
CHILD	TOTALS	3.80E-03	2.18E-02	7.61E-03	4.30E-03	8.77E-03	4.82E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.83E-04	5.77E-03	3.99E-03	4.47E-04	1.90E-03	4.46E-02
TEENAGER	GROUND	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03
TEENAGER	CLOUD	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04
TEENAGER	VEG.ING.	4.33E-04	5.63E-03	4.33E-04	7.08E-04	2.33E-03	4.33E-04
TEENAGER	MEAT ING	6.47E-05	8.90E-04	6.47E-05	1.50E-04	4.85E-04	6.47E-05
TEENAGER	MILK ING	3.07E-04	3.25E-03	3.07E-04	1.39E-04	4.68E-04	3.07E-04
TEENAGER	TOTALS	3.41E-03	1.80E-02	7.22E-03	3.87E-03	7.61E-03	4.78E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.83E-04	5.77E-03	3.99E-03	4.47E-04	1.90E-03	4.46E-02
ADULT	GROUND	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03	1.64E-03
ADULT	CLOUD	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04	7.83E-04
ADULT	VEG.ING.	5.29E-04	7.00E-03	5.29E-04	7.74E-04	2.32E-03	5.29E-04
ADULT	MEAT ING	9.89E-05	1.39E-03	9.89E-05	2.07E-04	6.06E-04	9.89E-05
ADULT	MILK ING	1.47E-04	1.59E-03	1.47E-04	5.78E-05	1.76E-04	1.47E-04
ADULT	TOTALS	3.38E-03	1.82E-02	7.19E-03	3.91E-03	7.43E-03	4.78E-02

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	6.46E-04	2.01E-02	1.38E-02	1.21E-03	5.63E-03	0.
INFANT	GROUND	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03
INFANT	CLOUD	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.61E-03	3.46E-02	3.61E-03	1.69E-03	5.19E-03	3.61E-03
INFANT	TOTALS	5.89E-03	5.63E-02	1.90E-02	4.53E-03	1.25E-02	5.24E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	6.46E-04	2.01E-02	1.38E-02	1.21E-03	5.63E-03	0.
CHILD	GROUND	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03
CHILD	CLOUD	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10
CHILD	VEG.ING.	3.38E-03	4.04E-02	3.38E-03	4.55E-03	1.43E-02	3.38E-03
CHILD	MEAT ING	5.12E-04	6.44E-03	5.12E-04	9.62E-04	2.95E-03	5.12E-04
CHILD	MILK ING	3.26E-03	3.16E-02	3.26E-03	1.22E-03	3.98E-03	3.26E-03
CHILD	TOTALS	9.43E-03	1.00E-01	2.26E-02	9.57E-03	2.85E-02	8.79E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	6.46E-04	2.01E-02	1.38E-02	1.21E-03	5.63E-03	0.
TEENAGER	GROUND	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03
TEENAGER	CLOUD	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10
TEENAGER	VEG.ING.	2.60E-03	3.26E-02	2.60E-03	3.38E-03	1.13E-02	2.60E-03
TEENAGER	MEAT ING	3.76E-04	4.90E-03	3.76E-04	6.97E-04	2.26E-03	3.76E-04
TEENAGER	MILK ING	1.90E-03	1.98E-02	1.90E-03	6.45E-04	2.22E-03	1.90E-03
TEENAGER	TOTALS	7.16E-03	7.90E-02	2.03E-02	7.57E-03	2.30E-02	6.51E-03
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	6.46E-04	2.01E-02	1.38E-02	1.21E-03	5.63E-03	0.
ADULT	GROUND	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03
ADULT	CLOUD	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10	2.86E-10
ADULT	VEG.ING.	3.20E-03	4.07E-02	3.20E-03	3.71E-03	1.13E-02	3.20E-03
ADULT	MEAT ING	5.80E-04	7.69E-03	5.80E-04	9.62E-04	2.83E-03	5.80E-04
ADULT	MILK ING	9.16E-04	9.70E-03	9.16E-04	2.68E-04	8.35E-04	9.16E-04
ADULT	TOTALS	6.97E-03	7.98E-02	2.01E-02	7.78E-03	2.22E-02	6.33E-03

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	6.58E-04	2.05E-02	1.39E-02	1.30E-03	5.94E-03	1.07E-01
INFANT	GROUND	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
INFANT	CLOUD	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.62E-03	3.47E-02	3.62E-03	1.75E-03	5.36E-03	3.62E-03
INFANT	TOTALS	1.69E-02	6.79E-02	3.02E-02	1.57E-02	2.39E-02	1.23E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	6.58E-04	2.05E-02	1.39E-02	1.30E-03	5.94E-03	1.07E-01
CHILD	GROUND	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
CHILD	CLOUD	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03
CHILD	VEG.ING.	3.40E-03	4.09E-02	3.40E-03	4.70E-03	1.48E-02	3.40E-03
CHILD	MEAT ING	5.18E-04	6.56E-03	5.18E-04	9.98E-04	3.06E-03	5.18E-04
CHILD	MILK ING	3.27E-03	3.18E-02	3.27E-03	1.27E-03	4.12E-03	3.27E-03
CHILD	TOTALS	2.05E-02	1.12E-01	3.37E-02	2.09E-02	4.05E-02	1.27E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	6.58E-04	2.05E-02	1.39E-02	1.30E-03	5.94E-03	1.07E-01
TEENAGER	GROUND	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
TEENAGER	CLOUD	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03
TEENAGER	VEG.ING.	2.62E-03	3.29E-02	2.62E-03	3.50E-03	1.16E-02	2.62E-03
TEENAGER	MEAT ING	3.79E-04	4.97E-03	3.79E-04	7.23E-04	2.34E-03	3.79E-04
TEENAGER	MILK ING	1.91E-03	1.99E-02	1.91E-03	6.68E-04	2.29E-03	1.91E-03
TEENAGER	TOTALS	1.82E-02	9.08E-02	3.14E-02	1.88E-02	3.49E-02	1.24E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	6.58E-04	2.05E-02	1.39E-02	1.30E-03	5.94E-03	1.07E-01
ADULT	GROUND	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
ADULT	CLOUD	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03	1.79E-03
ADULT	VEG.ING.	3.21E-03	4.11E-02	3.21E-03	3.83E-03	1.16E-02	3.21E-03
ADULT	MEAT ING	5.85E-04	7.79E-03	5.85E-04	9.97E-04	2.93E-03	5.85E-04
ADULT	MILK ING	9.17E-04	9.73E-03	9.17E-04	2.78E-04	8.63E-04	9.17E-04
ADULT	TOTALS	1.80E-02	9.17E-02	3.13E-02	1.90E-02	3.40E-02	1.24E-01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	0.
INFANT	GROUND	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01
INFANT	CLOUD	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.16E+00	1.11E+01	1.16E+00	5.49E-01	1.66E+00	1.16E+00
INFANT	TOTALS	1.49E+00	1.66E+01	4.54E+00	1.03E+00	3.31E+00	1.32E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	0.
CHILD	GROUND	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01
CHILD	CLOUD	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08
CHILD	VEG.ING.	1.08E+00	1.29E+01	1.08E+00	1.47E+00	4.59E+00	1.08E+00
CHILD	MEAT ING	1.66E-01	2.08E+00	1.66E-01	3.12E-01	9.56E-01	1.66E-01
CHILD	MILK ING	1.05E+00	1.02E+01	1.05E+00	3.97E-01	1.28E+00	1.05E+00
CHILD	TOTALS	2.63E+00	3.06E+01	5.68E+00	2.66E+00	8.48E+00	2.46E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	0.
TEENAGER	GROUND	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01
TEENAGER	CLOUD	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08
TEENAGER	VEG.ING.	8.37E-01	1.05E+01	8.37E-01	1.10E+00	3.63E+00	8.37E-01
TEENAGER	MEAT ING	1.22E-01	1.59E+00	1.22E-01	2.26E-01	7.33E-01	1.22E-01
TEENAGER	MILK ING	6.15E-01	6.40E+00	6.15E-01	2.09E-01	7.12E-01	6.15E-01
TEENAGER	TOTALS	1.90E+00	2.39E+01	4.95E+00	2.01E+00	6.72E+00	1.73E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	0.
ADULT	GROUND	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01	1.56E-01
ADULT	CLOUD	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08	6.96E-08
ADULT	VEG.ING.	1.03E+00	1.31E+01	1.03E+00	1.20E+00	3.63E+00	1.03E+00
ADULT	MEAT ING	1.88E-01	2.49E+00	1.88E-01	3.12E-01	9.16E-01	1.88E-01
ADULT	MILK ING	2.97E-01	3.14E+00	2.97E-01	8.69E-02	2.68E-01	2.97E-01
ADULT	TOTALS	1.84E+00	2.42E+01	4.89E+00	2.08E+00	6.46E+00	1.67E+00

TIME STEP NUMBER 3, AFTER 25 YEARS. DURATION IN YRS IS... 5.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	3.68E+00
INFANT	GROUND	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
INFANT	CLOUD	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.16E+00	1.11E+01	1.16E+00	5.49E-01	1.66E+00	1.16E+00
INFANT	TOTALS	4.53E+00	1.96E+01	7.58E+00	4.07E+00	6.35E+00	8.03E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	3.68E+00
CHILD	GROUND	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
CHILD	CLOUD	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02
CHILD	VEG.ING.	1.08E+00	1.29E+01	1.08E+00	1.47E+00	4.59E+00	1.08E+00
CHILD	MEAT ING	1.66E-01	2.08E+00	1.66E-01	3.12E-01	9.56E-01	1.66E-01
CHILD	MILK ING	1.05E+00	1.02E+01	1.05E+00	3.97E-01	1.28E+00	1.05E+00
CHILD	TOTALS	5.67E+00	3.37E+01	8.72E+00	5.70E+00	1.15E+01	9.17E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	3.68E+00
TEENAGER	GROUND	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
TEENAGER	CLOUD	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02
TEENAGER	VEG.ING.	8.37E-01	1.05E+01	8.37E-01	1.10E+00	3.63E+00	8.37E-01
TEENAGER	MEAT ING	1.22E-01	1.59E+00	1.22E-01	2.26E-01	7.33E-01	1.22E-01
TEENAGER	MILK ING	6.15E-01	6.40E+00	6.15E-01	2.09E-01	7.12E-01	6.15E-01
TEENAGER	TOTALS	4.94E+00	2.69E+01	7.99E+00	5.05E+00	9.76E+00	8.45E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.71E-01	5.31E+00	3.22E+00	3.22E-01	1.49E+00	3.68E+00
ADULT	GROUND	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
ADULT	CLOUD	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02
ADULT	VEG.ING.	1.03E+00	1.31E+01	1.03E+00	1.20E+00	3.63E+00	1.03E+00
ADULT	MEAT ING	1.88E-01	2.49E+00	1.88E-01	3.12E-01	9.17E-01	1.88E-01
ADULT	MILK ING	2.97E-01	3.14E+00	2.97E-01	8.69E-02	2.68E-01	2.97E-01
ADULT	TOTALS	4.88E+00	2.72E+01	7.93E+00	5.12E+00	9.50E+00	8.39E+00

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	0.
INFANT	GROUND	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01
INFANT	CLOUD	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.97E-01	2.84E+00	2.97E-01	1.33E-01	4.11E-01	2.97E-01
INFANT	TOTALS	4.66E-01	4.33E+00	1.30E+00	3.40E-01	9.17E-01	4.21E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	0.
CHILD	GROUND	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01
CHILD	CLOUD	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08
CHILD	VEG.ING.	2.76E-01	3.27E+00	2.76E-01	3.58E-01	1.13E+00	2.76E-01
CHILD	MEAT ING	4.17E-02	5.19E-01	4.17E-02	7.59E-02	2.33E-01	4.17E-02
CHILD	MILK ING	2.68E-01	2.59E+00	2.68E-01	9.65E-02	3.15E-01	2.68E-01
CHILD	TOTALS	7.55E-01	7.88E+00	1.59E+00	7.37E-01	2.18E+00	7.10E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	0.
TEENAGER	GROUND	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01
TEENAGER	CLOUD	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08
TEENAGER	VEG.ING.	2.13E-01	2.65E+00	2.13E-01	2.67E-01	8.91E-01	2.13E-01
TEENAGER	MEAT ING	3.07E-02	3.97E-01	3.07E-02	5.50E-02	1.79E-01	3.07E-02
TEENAGER	MILK ING	1.57E-01	1.63E+00	1.57E-01	5.08E-02	1.75E-01	1.57E-01
TEENAGER	TOTALS	5.69E-01	6.17E+00	1.40E+00	5.79E-01	1.75E+00	5.25E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	0.
ADULT	GROUND	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01	1.25E-01
ADULT	CLOUD	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08	2.06E-08
ADULT	VEG.ING.	2.62E-01	3.32E+00	2.62E-01	2.93E-01	8.92E-01	2.62E-01
ADULT	MEAT ING	4.74E-02	6.24E-01	4.74E-02	7.58E-02	2.23E-01	4.74E-02
ADULT	MILK ING	7.54E-02	7.97E-01	7.54E-02	2.11E-02	6.60E-02	7.54E-02
ADULT	TOTALS	5.54E-01	6.23E+00	1.38E+00	5.96E-01	1.69E+00	5.10E-01

TIME STEP NUMBER 3, AFTER 25 YEARS DURATION IN YRS IS... 5.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	1.35E+00
INFANT	GROUND	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01
INFANT	CLOUD	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.97E-01	2.84E+00	2.97E-01	1.33E-01	4.11E-01	2.97E-01
INFANT	TOTALS	1.23E+00	5.09E+00	2.06E+00	1.11E+00	1.68E+00	2.54E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	1.35E+00
CHILD	GROUND	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01
CHILD	CLOUD	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03
CHILD	VEG.ING.	2.76E-01	3.27E+00	2.76E-01	3.59E-01	1.13E+00	2.76E-01
CHILD	MEAT ING	4.17E-02	5.20E-01	4.17E-02	7.59E-02	2.33E-01	4.17E-02
CHILD	MILK ING	2.68E-01	2.59E+00	2.68E-01	9.65E-02	3.15E-01	2.68E-01
CHILD	TOTALS	1.52E+00	8.65E+00	2.35E+00	1.50E+00	2.95E+00	2.83E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	1.35E+00
TEENAGER	GROUND	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01
TEENAGER	CLOUD	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03
TEENAGER	VEG.ING.	2.13E-01	2.65E+00	2.13E-01	2.67E-01	8.92E-01	2.13E-01
TEENAGER	MEAT ING	3.07E-02	3.97E-01	3.07E-02	5.50E-02	1.79E-01	3.07E-02
TEENAGER	MILK ING	1.57E-01	1.63E+00	1.57E-01	5.08E-02	1.75E-01	1.57E-01
TEENAGER	TOTALS	1.34E+00	6.94E+00	2.17E+00	1.35E+00	2.52E+00	2.64E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.41E-02	1.37E+00	8.75E-01	8.16E-02	3.82E-01	1.35E+00
ADULT	GROUND	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01
ADULT	CLOUD	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03	8.52E-03
ADULT	VEG.ING.	2.62E-01	3.32E+00	2.62E-01	2.93E-01	8.92E-01	2.62E-01
ADULT	MEAT ING	4.74E-02	6.24E-01	4.74E-02	7.58E-02	2.23E-01	4.74E-02
ADULT	MILK ING	7.54E-02	7.97E-01	7.54E-02	2.11E-02	6.60E-02	7.54E-02
ADULT	TOTALS	1.32E+00	7.00E+00	2.15E+00	1.36E+00	2.46E+00	2.62E+00

ERROR SUMMARY

ERROR	TIMES
0115	2983

MILDOS COMPUTER RUN
WITH YELLOWCAKE DRYER,
YELLOWCAKE PACKAGING STACKS,
AND ORE PILES ONLY

R OF SOURCES= 3

NO.	KM X	KM Y	M Z	KM2 AREA	U-238	TH-230	CI/YEAR RA-226	PB-210	RN-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	.16	.02	2.28	.0030	2.09E-03	1.42E-03	5.72E-04	7.68E-04	1.36E+02	2007	3	0.	ORE PILES + DUST
2	0.00	0.00	18.59	.0000	7.30E-02	1.83E-04	6.10E-05	5.04E-06	0.	1001	1	3.14E+00	YELLOWCAKE DRYER
3	.01	0.00	17.37	.0000	3.83E-03	2.26E-05	7.03E-06	6.88E-07	0.	1002	1	2.06E+00	YELLOWCAKE PKGING

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	5.33E+01	4.68E+02	1.88E+02	2.53E+02
2	6.88E+02	4.68E+02	1.88E+02	2.53E+02
3	4.00E+01	3.14E+02	1.17E+02	1.30E+02

PARTICLE SIZES AND FRACTIONAL DISTRIBUTION

SET	1.0	1.0	5.0	35.0	PDEN
1	1.000	0.000	0.000	0.000	8.900
2	0.000	1.000	0.000	0.000	2.400
3	0.000	0.000	.300	.700	2.400

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 2 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 15.00YRS	TSTEP 3 0.00YRS	TSTEP 4 0.00YRS	TSTEP 5 0.00YRS	TSTEP 6 0.00YRS	TSTEP 7 0.00YRS	TSTEP 8 0.00YRS	TSTEP 9 0.00YRS	TSTEP10 0.00YRS
1	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
2	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
3	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 2 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 15.00YRS	TSTEP 3 0.00YRS	TSTEP 4 0.00YRS	TSTEP 5 0.00YRS	TSTEP 6 0.00YRS	TSTEP 7 0.00YRS	TSTEP 8 0.00YRS	TSTEP 9 0.00YRS	TSTEP10 0.00YRS
1	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
2	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.
3	1.000E+00	1.000E+00	0.	0.	0.	0.	0.	0.	0.	0.

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS= .37596, .20068, .22603, .14370, .04116, .01246

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	.0678	.0565	.0678	.0226	.0678	.0973	.0452	.0226	.0747	.0452	.0792	.2262	.1357	.1018	.0452	.0565	1.2121
5.5	.0411	.0342	.0411	.0137	.0411	.0479	.0274	.0137	.0342	.0274	.0479	.1370	.0822	.0616	.0274	.0342	.7121
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	.1089	.0907	.1089	.0363	.1089	.1452	.0726	.0363	.1089	.0726	.1271	.3632	.2179	.1634	.0726	.0907	1.9242
STABILITY CLASS 2																	
1.5	.4677	.1720	.3783	.2408	.2408	.0826	.1582	.1720	.2477	.2407	.3027	.5984	.6466	.2958	.3990	.1926	4.8359
5.5	.2123	.0753	.1575	.1096	.1096	.0411	.0685	.0753	.1233	.0890	.1507	.2671	.3014	.1370	.1781	.0753	2.1711
10.0	.0822	.0548	.0753	.0753	.0753	.0274	.0411	.0342	.0959	.1027	.1986	.2466	.2260	.1233	.0822	.0822	1.6231
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	.7622	.3021	.6111	.4257	.4257	.1511	.2678	.2815	.4669	.4324	.6520	1.1121	1.1740	.5561	.6593	.3501	8.6301
STABILITY CLASS 3																	
1.5	.0989	.0973	.1300	.1329	.0594	.0226	.0170	.0226	.0707	.0848	.1482	.2233	.2132	.1103	.0537	.0424	1.5273
5.5	.2397	.2123	.3151	.3219	.1438	.0548	.0411	.0548	.1712	.2055	.3356	.5411	.4932	.2671	.1301	.1027	3.6300
10.0	.2466	.1507	.1644	.3767	.2055	.0548	.0753	.0890	.2740	.3836	.6575	.9726	.6027	.3288	.1301	.0959	4.8082
15.5	.0205	.0205	.0274	.0205	.0205	.0068	.0137	.0068	.0753	.1712	.4110	.4521	.3151	.1096	.0479	.0068	1.7257
21.5	0.0000	0.0000	.0068	.0068	0.0000	0.0000	.0068	0.0000	.0274	.0342	.1849	.2466	.0548	.0205	.0068	.0068	.6024
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	.0274	.0753	.0411	.0068	0.0000	0.0000	0.0000	.1506
ALL	.6057	.4808	.6437	.8588	.4292	.1390	.1539	.1732	.6186	.9067	1.8125	2.4768	1.6858	.8363	.3686	.2546	12.4442
STABILITY CLASS 4																	
1.5	.1143	.0831	.1143	.1181	.0914	.0533	.0381	.0838	.1715	.1631	.2240	.2286	.1410	.0762	.0381	.0419	1.7808
5.5	.2055	.1301	.2055	.2123	.1644	.0959	.0685	.1507	.3082	.2740	.3836	.4110	.2534	.1370	.0685	.0753	3.1439
10.0	.4178	.3493	.3356	.5890	.4658	.1433	.1507	.3288	1.0137	1.2877	2.0137	1.8151	.9658	.3425	.2466	.1507	10.6166
15.5	.3425	.2603	.2397	.3356	.2945	.0822	.1370	.3082	.7055	1.0959	2.9384	3.2466	1.5479	.6233	.3630	.1233	12.6439
21.5	.0205	.0205	.0068	.0479	.0685	.0068	.0274	.0753	.1027	.2808	.8630	1.2945	.4452	.1644	.0548	.0342	3.5133
28.0	.0137	.0068	0.0000	.0068	.0068	.0068	.0068	.0205	.0342	.0685	.3288	.4452	.1164	.0205	.0137	0.0000	1.0955
ALL	1.1143	.8501	.9019	1.3097	1.0914	.3888	.4285	.9673	2.3358	3.1700	6.7515	7.4410	3.4697	1.3639	.7847	.4254	32.7940
STABILITY CLASS 5																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5.5	.1027	.1918	.1849	.1575	.2123	.1575	.2329	.1918	.4247	.3014	.3425	.4041	.1918	.0822	.0685	.0137	3.2603
10.0	.3082	.2397	.2055	.2055	.1781	.0890	.0753	.1712	.7808	.7740	.9932	.7671	.3562	.2055	.1096	.0959	5.5548
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	.4109	.4315	.3904	.3630	.3904	.2465	.3082	.3630	1.2055	1.0754	1.3357	1.1712	.5480	.2877	.1781	.1096	8.8151
STABILITY CLASS 6																	
1.5	1.3542	1.3870	2.7412	2.0902	2.9577	1.7393	1.4268	1.7777	3.2127	1.7064	2.2272	2.8385	1.5830	.4687	.3385	.3906	28.2397
5.5	.3562	.3562	.7123	.5411	.7260	.4315	.3493	.4589	.7671	.4315	.5685	.7466	.3904	.1233	.0890	.1027	7.1506
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.7104	1.7432	3.4535	2.6313	3.6837	2.1708	1.7761	2.2366	3.9798	2.1379	2.7957	3.5851	1.9734	.5920	.4275	.4933	35.3903
ALL	4.7124	3.8984	6.1095	5.6248	6.1293	3.2414	3.0071	4.0579	8.7155	7.7950	13.4745	16.1490	9.0688	3.7994	2.4908	1.7237	99.9979

INDIVIDUAL RECEPTOR LOCATION DATA, 14 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	NORTH BOUNDARY	0.00	.08	6.10	.08	10
2	NORTHEAST BOUNDARY	1.15	.08	-3.05	1.15	10
3	SOUTHEAST BOUNDARY	1.15	-1.38	36.58	1.80	10
4	SOUTHWEST BOUNDARY	-.46	-1.38	-6.10	1.45	10
5	NEAREST RESIDENT	.06	.52	48.77	.52	10
6	ENV MONITOR STA A	.18	.70	47.24	.72	10
7	NEAREST DOWNWIND RES	2.57	1.99	18.29	3.25	10
8	NEAREST COMMUNITY	5.37	-5.21	1.22	7.48	10
9	NEAREST DOWNWIND COM	31.81	3.98	-18.29	32.06	10
10	NEAREST GRAZING AREA	.31	-.61	-18.29	.69	10
11	GALLUP	-20.45	-14.77	0.00	25.22	10
12	SPRINGSTEAD TR. PARK	-6.28	-7.66	-48.77	9.91	10
13	NAVAJO GRAZING AREA	.71	.71	0.00	1.00	10
14	NEXT NEAREST RESIDEN	-.08	1.30	12.19	1.30	10

MISCELLANEOUS INPUTTABLE PARAMETER VALUES

DM	TSTART	FFORT	FHAYT	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
650.00	1981.00	1.00	0.00	1.00	0.00	207.00	134.00	109.00	2.50

IPACT EQUALS 2, 0, 0.

JC EQUALS 1, 0, 1, 1, 0, 1, 1, 1, 1, 0

TIME STEP DATA....

	STEP NAMES	LENGTH, YRS	IFTODO
1	AFTER 5 YEARS	5.00	1
2	AFTER 20 YEARS	15.00	1

XRHO EQUALS 1.5, 2.5, 3.5, 4.5, 7.5, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0, 75.0.

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	57	0	0	0	0	0	0	0	0	0	0	28	0	0	0	39
2.0- 3.0	0	0	0	0	0	0	0	0	0	33	0	11	0	0	0	11
3.0- 4.0	0	0	28	11	0	0	17	11	0	6	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	11	11	28	17	17	11	0	0	0	0	6
5.0-10.0	54	50	40	9	137	142	138	49	22	23	264	155	155	50	54	54
10.0-20.0	94	50	50	136	136	136	39	127	361	362	37	149	149	314	100	96
20.0-30.0	74	159	157	136	241	464	211	129	38	38	10072	19044	762	1377	170	132
30.0-40.0	42	56	84	102	11082	407	723	137	137	388	762	1176	396	1576	503	143
40.0-50.0	303	17	3	20	841	948	800	116	143	356	147	464	970	191	5	2073
50.0-60.0	139	230	10	64	71	552	190	116	6	153	426	108	949	2263	1051	909
60.0-70.0	136	336	135	81	96	28	895	83	18	596	260	49	49	49	319	593
70.0-80.0	45	48	467	0	121	200	7667	596	0	7082	49	49	49	49	42	1029
1.0-80.0	944	946	974	559	12725	2888	10691	1392	742	9054	12028	21233	3479	5869	2244	5085

TOTAL 1-80 KM POPULATION IS 90853 PERSONS

INHALATION DOSE CONVERSION FACTORS, MR/YR PER PCI/M3

SIZE= 1.0UM, RHO=8.9	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	9.82E+00	1.12E+01	1.37E+02	3.58E+01	4.66E+00	0.	5.95E-01
BONE	1.66E+02	1.81E+02	4.90E+03	3.58E+02	1.45E+02	0.	2.43E+00
AVG.LUNG	1.07E+03	1.21E+03	2.37E+03	4.88E+03	5.69E+02	0.	3.13E+02
LIVER	0.	0.	2.82E+02	4.47E-02	3.69E+01	0.	5.34E+00
KIDNEY	3.78E+01	4.30E+01	1.37E+03	1.26E+00	1.21E+02	0.	1.79E+01

SIZE= 1.0UM, RHO=2.4	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	4.32E+00	4.92E+00	1.66E+02	3.09E+01	4.36E+00	0.	4.71E-01
BONE	7.92E+01	7.95E+01	5.95E+03	3.09E+02	1.35E+02	0.	1.92E+00
AVG.LUNG	1.58E+02	1.80E+02	3.22E+03	6.61E+03	7.72E+02	0.	4.20E+02
LIVER	0.	0.	3.43E+02	3.87E-02	3.45E+01	0.	4.22E+00
KIDNEY	1.66E+01	1.89E+01	1.67E+03	1.09E+00	1.13E+02	0.	1.42E+01

SIZE= 5.0UM, RHO=2.4	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	1.16E+00	1.32E+00	1.01E+02	4.00E+01	4.84E+00	0.	7.10E-01
BONE	1.96E+01	2.10E+01	3.60E+03	4.00E+02	1.50E+02	0.	2.89E+00
AVG.LUNG	1.24E+03	1.42E+03	1.38E+03	2.94E+03	3.30E+02	0.	1.88E+02
LIVER	0.	0.	2.07E+02	4.97E-02	3.83E+01	0.	6.36E+00
KIDNEY	4.47E+00	5.10E+00	1.00E+03	1.41E+00	1.25E+02	0.	2.13E+01

SIZE=35.0UM, RHO=2.4	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY	7.92E-01	9.02E-01	5.77E+01	3.90E+01	4.43E+00	0.	7.28E-01
BONE	1.34E+01	1.46E+01	2.07E+03	3.90E+02	1.38E+02	0.	2.96E+00
AVG.LUNG	3.33E+02	3.80E+02	3.71E+02	7.64E+02	8.70E+01	0.	5.75E+01
LIVER	0.	0.	1.19E+02	4.85E-02	3.51E+01	0.	6.52E+00
KIDNEY	3.05E+00	3.47E+00	5.73E+02	1.38E+00	1.15E+02	0.	2.19E+01

SIZE= .3UM, RHO=1.0	U-238	U-234	TH-230	RA-226	PB-210	BI-210	PO-210
WH.BODY					7.46E+00	0.	1.29E+00
BONE					2.32E+02	0.	5.24E+00
AVG.LUNG					6.27E+01	0.	2.66E+02
LIVER					5.91E+01	0.	1.15E+01
KIDNEY					1.93E+02	0.	3.87E+01

EXTERNAL WHOLE BODY DOSE CONVERSION FACTORS

	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214
GROUND, MR/YR PER PCI/M2	3.70E-06	6.12E-07	9.47E-07	2.27E-06	5.03E-08	1.10E-08	3.16E-05	1.85E-04
CLOUD, MR/YR PER PCI/M3	1.23E-04	3.59E-06	4.90E-05	1.43E-05	2.83E-06	6.34E-07	1.67E-03	1.16E-02
WORKING LEVEL CONCENTRATION FACTORS, WL PER PCI/M3			....	....	....	1.03E-06	5.07E-06	3.73E-06

INGESTION DOSE CONVERSION FACTORS, MR PER PCI INGESTED

AGE GROUP	TISSUE	U-238	U-234	TH-234	TH-230	RA-226	PB-210	BI-210	PO-210
INFANT	WH.BODY	3.33E-04	3.80E-04	2.00E-08	1.06E-04	1.07E-02	2.38E-03	3.58E-07	7.41E-04
INFANT	BONE	4.47E-03	4.88E-03	6.92E-07	3.80E-03	9.44E-02	5.28E-02	4.16E-06	3.10E-03
INFANT	LIVER	0.	0.	3.77E-08	1.90E-04	4.76E-05	1.42E-02	2.68E-05	5.93E-03
INFANT	KIDNEY	9.28E-04	1.06E-03	1.39E-07	9.12E-04	8.71E-04	4.33E-02	2.08E-04	1.26E-02
CHILD	WH.BODY	1.94E-04	2.21E-04	9.88E-09	9.91E-05	9.87E-03	2.09E-03	1.69E-07	3.67E-04
CHILD	BONE	3.27E-03	3.57E-03	3.42E-07	3.55E-03	8.76E-02	4.75E-02	1.97E-06	1.52E-03
CHILD	LIVER	0.	0.	1.51E-08	1.78E-04	1.84E-05	1.22E-02	1.02E-05	2.43E-03
CHILD	KIDNEY	5.24E-04	5.98E-04	8.01E-08	8.67E-04	4.88E-04	3.67E-02	1.15E-04	7.56E-03
TEENAGE	WH.BODY	6.49E-05	7.39E-05	3.31E-09	6.00E-05	5.00E-03	7.01E-04	5.66E-08	1.23E-04
TEENAGE	BONE	1.09E-03	1.19E-03	1.14E-07	2.16E-03	4.90E-02	1.81E-02	6.59E-07	5.09E-04
TEENAGE	LIVER	0.	0.	6.68E-09	1.23E-04	8.13E-06	5.44E-03	4.51E-06	1.07E-03
TEENAGE	KIDNEY	2.50E-04	2.85E-04	3.81E-08	5.99E-04	2.32E-04	1.72E-02	5.48E-05	3.60E-03
ADULT	WH.BODY	4.54E-05	5.17E-05	2.13E-09	5.70E-05	4.60E-03	5.44E-04	3.96E-08	8.59E-05
ADULT	BONE	7.67E-04	8.36E-04	8.01E-08	2.06E-03	4.60E-02	1.53E-02	4.61E-07	3.56E-04
ADULT	LIVER	0.	0.	4.71E-09	1.17E-04	5.74E-06	4.37E-03	3.18E-06	7.56E-04
ADULT	KIDNEY	1.75E-04	1.99E-04	2.67E-08	5.65E-04	1.63E-04	1.23E-02	3.83E-05	2.52E-03

ENVIRONMENTAL CONCENTRATION FACTORS

CONCENTRATION FACTOR	FOOD TYPE	U-238	TH-230	RA-226	PB-210
BIV, DIMENSIONLESS	FD.ABG.	2.50E-03	4.20E-03	1.40E-02	4.00E-03
BIV, DIMENSIONLESS	POTATO	2.50E-03	4.20E-03	3.00E-03	4.00E-03
BIV, DIMENSIONLESS	BELOW G.	2.50E-03	4.20E-03	1.40E-02	4.00E-03
BIV, DIMENSIONLESS	FORAGE	2.50E-03	4.20E-03	1.80E-02	2.80E-02
BIV, DIMENSIONLESS	ST. FEED	2.50E-03	4.20E-03	8.20E-02	3.60E-02
FMI, PCI/KG PER PCI/DAY	MEAT	3.40E-04	2.00E-04	5.10E-04	7.10E-04
FMI, PCI/L PER PCI/DAY	MILK	6.10E-04	5.00E-06	5.90E-04	1.20E-04
FRACTION IN FD PORTION	FD.ABG.	1.00E+00	1.00E+00	1.00E+00	1.00E+00
FRACTION IN FD PORTION	POTATO	1.00E-01	1.00E-01	1.00E-01	1.00E-01
FRACTION IN FD PORTION	BELOW G.	1.00E-01	1.00E-01	1.00E-01	1.00E-01
FRACTION IN FD PORTION	FORAGE	1.00E+00	1.00E+00	1.00E+00	1.00E+00
FRACTION IN FD PORTION	ST. FEED	1.00E+00	1.00E+00	1.00E+00	1.00E+00

TIME STEP DEPENDENT VARIABLES

NO.	TIME STEP NAME	PAJUST	GFACT U-238	GFACT TH-230	GFACT RA-226	GFACT PB-210	TFACT U-238	TFACT TH-230	TFACT RA-226	TFACT PB-210
1	AFTER 5 YEARS	1.320E+00	1.525E+08	1.525E+08	1.523E+08	1.413E+08	1.622E+00	1.622E+00	1.622E+00	1.619E+00
2	AFTER 20 YEARS	1.900E+00	4.274E+08	4.274E+08	4.261E+08	3.444E+08	1.625E+00	1.625E+00	1.625E+00	1.621E+00

XPFACT=2.640E+02 GPFACT(4)=1.707E+09 1.707E+09 1.679E+09 6.943E+08 TPFACT(4)=1.638E+00 1.638E+00 1.638E+00 1.624E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE N DIRECTION, THETA EQUALS 0.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.000E-03	2.055E-05	7.103E-06	2.787E-06	1.706E+01	1.672E+01	8.676E+00	3.790E+00	2.876E-06	7.535E-05
2.5	3.307E-03	1.066E-05	3.657E-06	1.222E-06	7.740E+00	7.686E+00	5.456E+00	3.489E+00	5.127E-06	4.859E-05
3.5	1.830E-03	5.892E-06	2.022E-06	6.814E-07	4.688E+00	4.676E+00	3.819E+00	2.941E+00	6.828E-06	3.515E-05
4.5	1.098E-03	3.565E-06	1.227E-06	4.336E-07	3.266E+00	3.268E+00	2.864E+00	2.438E+00	8.049E-06	2.697E-05
7.5	3.339E-04	1.155E-06	4.014E-07	1.694E-07	1.627E+00	1.628E+00	1.547E+00	1.464E+00	9.974E-06	1.498E-05
15.0	5.765E-05	2.332E-07	8.289E-08	4.740E-08	6.801E-01	6.805E-01	6.724E-01	6.604E-01	1.113E-05	6.573E-06
25.0	1.801E-05	8.108E-08	2.919E-08	1.920E-08	3.703E-01	3.706E-01	3.706E-01	3.689E-01	1.133E-05	3.636E-06
35.0	8.992E-06	4.240E-08	1.534E-08	1.061E-08	2.486E-01	2.487E-01	2.496E-01	2.497E-01	1.127E-05	2.453E-06
45.0	5.414E-06	2.663E-08	9.679E-09	6.978E-09	1.842E-01	1.843E-01	1.851E-01	1.855E-01	1.114E-05	1.820E-06
55.0	3.570E-06	1.817E-08	6.630E-09	4.933E-09	1.443E-01	1.444E-01	1.451E-01	1.456E-01	1.099E-05	1.428E-06
65.0	2.466E-06	1.281E-08	4.681E-09	3.543E-09	1.173E-01	1.173E-01	1.179E-01	1.184E-01	1.082E-05	1.160E-06
75.0	1.752E-06	9.149E-09	3.346E-09	2.545E-09	9.771E-02	9.777E-02	9.829E-02	9.866E-02	1.065E-05	9.670E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	5.665E+03	3.752E+01	1.398E+01	1.398E+01	1.398E+01	2.723E+01	2.723E+01	2.723E+01	1.219E+00
2.5	3.118E+03	1.723E+01	6.330E+00	6.330E+00	6.330E+00	1.242E+01	1.242E+01	1.242E+01	2.174E+00
3.5	1.725E+03	9.400E+00	3.450E+00	3.450E+00	3.450E+00	7.154E+00	7.154E+00	7.154E+00	2.895E+00
4.5	1.031E+03	5.754E+00	2.117E+00	2.117E+00	2.117E+00	4.702E+00	4.702E+00	4.702E+00	3.413E+00
7.5	3.150E+02	1.983E+00	7.375E-01	7.375E-01	7.375E-01	2.027E+00	2.027E+00	2.027E+00	4.229E+00
15.0	5.450E+01	4.430E-01	1.677E-01	1.677E-01	1.677E-01	7.067E-01	7.067E-01	7.067E-01	4.718E+00
25.0	1.703E+01	1.541E-01	5.869E-02	5.869E-02	5.869E-02	3.522E-01	3.522E-01	3.522E-01	4.803E+00
35.0	8.505E+00	7.747E-02	2.952E-02	2.952E-02	2.952E-02	2.265E-01	2.265E-01	2.265E-01	4.776E+00
45.0	5.119E+00	4.703E-02	1.792E-02	1.792E-02	1.792E-02	1.639E-01	1.639E-01	1.639E-01	4.723E+00
55.0	3.375E+00	3.122E-02	1.190E-02	1.190E-02	1.190E-02	1.263E-01	1.263E-01	1.263E-01	4.658E+00
65.0	2.331E+00	2.144E-02	8.173E-03	8.173E-03	8.173E-03	1.011E-01	1.011E-01	1.011E-01	4.588E+00
75.0	1.656E+00	1.495E-02	5.694E-03	5.694E-03	5.694E-03	8.313E-02	8.313E-02	8.313E-02	4.516E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	6.029E-05	3.994E-07	1.089E-07	1.009E-07
2.5	3.318E-05	1.834E-07	6.744E-08	6.897E-08
3.5	1.836E-05	1.000E-07	3.675E-08	4.945E-08
4.5	1.098E-05	6.124E-08	2.255E-08	4.227E-08
7.5	3.353E-06	2.111E-08	7.857E-09	3.676E-08
15.0	5.800E-07	4.714E-09	1.787E-09	3.514E-08
25.0	1.813E-07	1.640E-09	6.252E-10	3.463E-08
35.0	9.051E-08	8.245E-10	3.144E-10	3.412E-08
45.0	5.448E-08	5.005E-10	1.910E-10	3.361E-08
55.0	3.592E-08	3.322E-10	1.268E-10	3.309E-08
65.0	2.481E-08	2.282E-10	8.707E-11	3.256E-08
75.0	1.762E-08	1.591E-10	6.066E-11	3.202E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE ENE DIRECTION, THETA EQUALS 67.5 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.765E-03	7.022E-05	2.693E-05	2.858E-05	2.184E+01	2.076E+01	9.634E+00	3.862E+00	2.605E-06	8.465E-05
2.5	3.525E-03	2.873E-05	1.088E-05	1.069E-05	8.715E+00	8.524E+00	5.629E+00	3.448E+00	4.718E-06	5.018E-05
3.5	1.959E-03	1.553E-05	5.872E-06	5.710E-06	5.003E+00	4.949E+00	3.813E+00	2.855E+00	6.286E-06	3.598E-05
4.5	1.191E-03	9.669E-06	3.663E-06	3.599E-06	3.383E+00	3.364E+00	2.809E+00	2.338E+00	7.396E-06	2.643E-05
7.5	3.950E-04	3.687E-06	1.409E-06	1.454E-06	1.652E+00	1.651E+00	1.514E+00	1.408E+00	9.284E-06	1.463E-05
15.0	8.484E-05	1.001E-06	3.866E-07	4.252E-07	6.742E-01	6.746E-01	6.549E-01	6.344E-01	1.037E-05	6.382E-06
25.0	3.150E-05	4.017E-07	1.556E-07	1.740E-07	3.611E-01	3.613E-01	3.584E-01	3.536E-01	1.049E-05	3.508E-06
35.0	1.717E-05	2.216E-07	8.585E-08	9.626E-08	2.399E-01	2.401E-01	2.399E-01	2.387E-01	1.038E-05	2.354E-06
45.0	1.105E-05	1.455E-07	5.642E-08	6.351E-08	1.769E-01	1.770E-01	1.774E-01	1.772E-01	1.024E-05	1.743E-06
55.0	7.690E-06	1.029E-07	3.992E-08	4.508E-08	1.381E-01	1.382E-01	1.387E-01	1.389E-01	1.008E-05	1.364E-06
65.0	5.535E-06	7.413E-08	2.876E-08	3.249E-08	1.118E-01	1.119E-01	1.124E-01	1.127E-01	9.915E-06	1.105E-06
75.0	4.057E-06	5.355E-08	2.077E-08	2.339E-08	9.280E-02	9.286E-02	9.332E-02	9.360E-02	9.745E-06	9.179E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	6.692E+03	2.943E+02	1.170E+02	1.170E+02	1.170E+02	1.334E+02	1.334E+02	1.334E+02	1.104E+00
2.5	3.432E+03	1.080E+02	4.274E+01	4.274E+01	4.274E+01	4.949E+01	4.949E+01	4.949E+01	2.000E+00
3.5	1.902E+03	5.628E+01	2.226E+01	2.226E+01	2.226E+01	2.618E+01	2.618E+01	2.618E+01	2.665E+00
4.5	1.157E+03	3.457E+01	1.367E+01	1.367E+01	1.367E+01	1.634E+01	1.634E+01	1.634E+01	3.136E+00
7.5	3.852E+02	1.303E+01	5.165E+00	5.165E+00	5.165E+00	6.472E+00	6.472E+00	6.472E+00	3.936E+00
15.0	8.328E+01	3.364E+00	1.336E+00	1.336E+00	1.336E+00	1.870E+00	1.870E+00	1.870E+00	4.395E+00
25.0	3.086E+01	1.235E+00	4.903E-01	4.903E-01	4.903E-01	7.764E-01	7.764E-01	7.764E-01	4.448E+00
35.0	1.675E+01	6.280E-01	2.492E-01	2.492E-01	2.492E-01	4.393E-01	4.393E-01	4.393E-01	4.401E+00
45.0	1.075E+01	3.853E-01	1.528E-01	1.528E-01	1.528E-01	2.930E-01	2.930E-01	2.930E-01	4.340E+00
55.0	7.463E+00	2.583E-01	1.024E-01	1.024E-01	1.024E-01	2.119E-01	2.119E-01	2.119E-01	4.274E+00
65.0	5.361E+00	1.784E-01	7.065E-02	7.065E-02	7.065E-02	1.593E-01	1.593E-01	1.593E-01	4.204E+00
75.0	3.921E+00	1.245E-01	4.930E-02	4.930E-02	4.930E-02	1.229E-01	1.229E-01	1.229E-01	4.132E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	7.122E-05	3.133E-06	1.246E-06	1.603E-06
2.5	3.652E-05	1.149E-06	4.553E-07	5.853E-07
3.5	2.024E-05	5.990E-07	2.371E-07	3.150E-07
4.5	1.231E-05	3.679E-07	1.457E-07	2.043E-07
7.5	4.100E-06	1.387E-07	5.502E-08	9.725E-08
15.0	8.863E-07	3.580E-08	1.423E-08	4.924E-08
25.0	3.284E-07	1.314E-08	5.223E-09	3.813E-08
35.0	1.782E-07	6.683E-09	2.654E-09	3.451E-08
45.0	1.144E-07	4.101E-09	1.628E-09	3.277E-08
55.0	7.942E-08	2.749E-09	1.091E-09	3.162E-08
65.0	5.705E-08	1.898E-09	7.527E-10	3.069E-08
75.0	4.173E-08	1.326E-09	5.253E-10	2.989E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE E DIRECTION, THETA EQUALS 90.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	3.862E-03	2.715E-05	1.017E-05	9.329E-06	1.177E+01	1.126E+01	5.277E+00	2.119E+00	1.432E-06	4.626E-05
2.5	1.983E-03	1.167E-05	4.315E-06	3.584E-06	4.809E+00	4.721E+00	3.149E+00	1.953E+00	2.647E-06	2.804E-05
3.5	1.098E-03	6.359E-06	2.349E-06	1.934E-06	2.790E+00	2.767E+00	2.153E+00	1.615E+00	3.558E-06	1.979E-05
4.5	6.658E-04	3.948E-06	1.462E-06	1.224E-06	1.897E+00	1.889E+00	1.593E+00	1.330E+00	4.205E-06	1.498E-05
7.5	2.219E-04	1.467E-06	5.480E-07	4.901E-07	9.240E-01	9.237E-01	8.542E-01	7.977E-01	5.266E-06	8.258E-06
15.0	4.880E-05	3.856E-07	1.458E-07	1.417E-07	3.767E-01	3.769E-01	3.677E-01	3.574E-01	5.869E-06	3.585E-06
25.0	1.870E-05	1.540E-07	5.840E-08	5.767E-08	2.020E-01	2.021E-01	2.010E-01	1.987E-01	5.939E-06	1.968E-06
35.0	1.039E-05	8.529E-08	3.233E-08	3.188E-08	1.346E-01	1.347E-01	1.348E-01	1.343E-01	5.890E-06	1.323E-06
45.0	6.746E-06	5.597E-08	2.123E-08	2.101E-08	9.941E-02	9.947E-02	9.977E-02	9.977E-02	5.816E-06	9.804E-07
55.0	4.723E-06	3.954E-08	1.501E-08	1.490E-08	7.771E-02	7.776E-02	7.808E-02	7.922E-02	5.731E-06	7.677E-07
65.0	3.428E-06	2.854E-08	1.083E-08	1.073E-08	6.296E-02	6.299E-02	6.329E-02	6.347E-02	5.639E-06	6.225E-07
75.0	2.543E-06	2.071E-08	7.847E-09	7.711E-09	5.229E-02	5.233E-02	5.259E-02	5.276E-02	5.544E-06	5.173E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	3.735E+03	9.811E+01	3.870E+01	3.870E+01	3.870E+01	4.762E+01	4.762E+01	4.762E+01	6.072E-01
2.5	1.902E+03	3.724E+01	1.460E+01	1.460E+01	1.460E+01	1.834E+01	1.834E+01	1.834E+01	1.122E+00
3.5	1.051E+03	1.960E+01	7.675E+00	7.675E+00	7.675E+00	9.866E+00	9.866E+00	9.866E+00	1.509E+00
4.5	6.379E+02	1.206E+01	4.726E+00	4.726E+00	4.726E+00	6.222E+00	6.222E+00	6.222E+00	1.783E+00
7.5	2.131E+02	4.471E+00	1.756E+00	1.756E+00	1.756E+00	2.488E+00	2.488E+00	2.488E+00	2.233E+00
15.0	4.698E+01	1.129E+00	4.449E-01	4.449E-01	4.449E-01	7.434E-01	7.434E-01	7.434E-01	2.488E+00
25.0	1.796E+01	4.106E-01	1.616E-01	1.616E-01	1.616E-01	3.217E-01	3.217E-01	3.217E-01	2.518E+00
35.0	9.947E+00	2.086E-01	8.193E-02	8.193E-02	8.193E-02	1.886E-01	1.886E-01	1.886E-01	2.497E+00
45.0	6.449E+00	1.278E-01	5.011E-02	5.011E-02	5.011E-02	1.289E-01	1.289E-01	1.289E-01	2.466E+00
55.0	4.509E+00	8.551E-02	3.350E-02	3.350E-02	3.350E-02	9.509E-02	9.509E-02	9.509E-02	2.430E+00
65.0	3.269E+00	5.901E-02	2.309E-02	2.309E-02	2.309E-02	7.298E-02	7.298E-02	7.298E-02	2.391E+00
75.0	2.421E+00	4.121E-02	1.610E-02	1.610E-02	1.610E-02	5.754E-02	5.754E-02	5.754E-02	2.351E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	3.975E-05	1.044E-06	4.123E-07	5.137E-07
2.5	2.025E-05	3.963E-07	1.555E-07	1.944E-07
3.5	1.119E-05	2.086E-07	8.177E-08	1.081E-07
4.5	6.789E-06	1.284E-07	5.034E-08	7.273E-08
7.5	2.268E-06	4.758E-08	1.871E-08	3.843E-08
15.0	5.000E-07	1.202E-08	4.739E-09	2.342E-08
25.0	1.911E-07	4.370E-09	1.721E-09	1.992E-08
35.0	1.059E-07	2.220E-09	8.728E-10	1.872E-08
45.0	6.863E-08	1.360E-09	5.339E-10	1.809E-08
55.0	4.799E-08	9.100E-10	3.569E-10	1.762E-08
65.0	3.479E-08	6.280E-10	2.460E-10	1.721E-08
75.0	2.576E-08	4.386E-10	1.715E-10	1.684E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE S DIRECTION, THETA EQUALS 180.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	2.788E-03	9.133E-06	3.133E-06	1.074E-06	8.340E+00	8.175E+00	4.303E+00	1.920E+00	1.505E-06	3.740E-05
2.5	1.485E-03	4.638E-06	1.582E-06	4.684E-07	3.620E+00	3.596E+00	2.560E+00	1.649E+00	2.469E-06	2.284E-05
3.5	8.197E-04	2.556E-06	8.721E-07	2.599E-07	2.143E+00	2.138E+00	1.746E+00	1.348E+00	3.170E-06	1.608E-05
4.5	4.917E-04	1.547E-06	5.289E-07	1.647E-07	1.471E+00	1.469E+00	1.289E+00	1.098E+00	3.659E-06	1.214E-05
7.5	1.557E-04	5.106E-07	1.760E-07	6.382E-08	7.185E-01	7.188E-01	6.827E-01	6.459E-01	4.419E-06	6.611E-06
15.0	3.022E-05	1.088E-07	3.805E-08	1.757E-08	2.935E-01	2.937E-01	2.902E-01	2.849E-01	4.807E-06	2.836E-06
25.0	1.058E-05	3.983E-08	1.401E-08	7.052E-09	1.602E-01	1.603E-01	1.603E-01	1.596E-01	4.900E-06	1.573E-06
35.0	5.629E-06	2.142E-08	7.544E-09	3.869E-09	1.077E-01	1.077E-01	1.081E-01	1.081E-01	4.874E-06	1.062E-06
45.0	3.532E-06	1.363E-08	4.811E-09	2.531E-09	7.980E-02	7.985E-02	8.022E-02	8.041E-02	4.820E-06	7.889E-07
55.0	2.406E-06	9.389E-09	3.318E-09	1.779E-09	6.256E-02	6.260E-02	6.291E-02	6.311E-02	4.755E-06	6.188E-07
65.0	1.713E-06	6.692E-09	2.365E-09	1.269E-09	5.082E-02	5.085E-02	5.112E-02	5.130E-02	4.683E-06	5.029E-07
75.0	1.256E-06	4.856E-09	1.714E-09	9.035E-10	4.234E-02	4.237E-02	4.259E-02	4.275E-02	4.607E-06	4.190E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	2.630E+03	1.518E+01	5.591E+00	5.591E+00	5.591E+00	1.207E+01	1.207E+01	1.207E+01	6.382E-01
2.5	1.399E+03	6.943E+00	2.523E+00	2.523E+00	2.523E+00	5.371E+00	5.371E+00	5.371E+00	1.047E+00
3.5	7.723E+02	3.776E+00	1.371E+00	1.371E+00	1.371E+00	3.064E+00	3.064E+00	3.064E+00	1.344E+00
4.5	4.632E+02	2.304E+00	8.381E-01	8.381E-01	8.381E-01	2.002E+00	2.002E+00	2.002E+00	1.551E+00
7.5	1.468E+02	7.933E-01	2.911E-01	2.911E-01	2.911E-01	8.604E-01	8.604E-01	8.604E-01	1.873E+00
15.0	2.850E+01	1.778E-01	6.604E-02	6.604E-02	6.604E-02	2.986E-01	2.986E-01	2.986E-01	2.038E+00
25.0	9.978E+00	6.265E-02	2.328E-02	2.328E-02	2.328E-02	1.503E-01	1.503E-01	1.503E-01	2.077E+00
35.0	5.306E+00	3.185E-02	1.179E-02	1.179E-02	1.179E-02	9.711E-02	9.711E-02	9.711E-02	2.066E+00
45.0	3.329E+00	1.946E-02	7.188E-03	7.188E-03	7.188E-03	7.043E-02	7.043E-02	7.043E-02	2.044E+00
55.0	2.267E+00	1.298E-02	4.785E-03	4.785E-03	4.785E-03	5.436E-02	5.436E-02	5.436E-02	2.016E+00
65.0	1.614E+00	8.973E-03	3.298E-03	3.298E-03	3.298E-03	4.358E-02	4.358E-02	4.358E-02	1.985E+00
75.0	1.183E+00	6.311E-03	2.311E-03	2.311E-03	2.311E-03	3.587E-02	3.587E-02	3.587E-02	1.953E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	2.799E-05	1.616E-07	5.957E-08	5.308E-08
2.5	1.489E-05	7.389E-08	2.688E-08	2.691E-08
3.5	8.219E-06	4.018E-08	1.460E-08	1.999E-08
4.5	4.930E-06	2.452E-08	8.929E-09	1.750E-08
7.5	1.562E-06	8.443E-09	3.101E-09	1.569E-08
15.0	3.034E-07	1.892E-09	7.036E-10	1.503E-08
25.0	1.062E-07	6.667E-10	2.480E-10	1.491E-08
35.0	5.647E-08	3.390E-10	1.256E-10	1.473E-08
45.0	3.542E-08	2.071E-10	7.657E-11	1.452E-08
55.0	2.412E-08	1.382E-10	5.098E-11	1.431E-08
65.0	1.718E-08	9.549E-11	3.514E-11	1.408E-08
75.0	1.259E-08	6.717E-11	2.462E-11	1.344E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

CONCENTRATION DATA FOR THE W DIRECTION, THETA EQUALS 270.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	4.925E-03	1.496E-05	5.059E-06	1.243E-06	1.390E+01	1.376E+01	7.898E+00	3.818E+00	3.368E-06	6.845E-05
2.5	2.772E-03	8.111E-06	2.732E-06	5.759E-07	6.468E+00	6.449E+00	4.845E+00	3.264E+00	5.314E-06	4.338E-05
3.5	1.529E-03	4.470E-06	1.507E-06	3.247E-07	4.021E+00	4.018E+00	3.410E+00	2.710E+00	6.807E-06	3.154E-05
4.5	9.056E-04	2.666E-06	9.008E-07	2.052E-07	2.838E+00	2.838E+00	2.564E+00	2.229E+00	7.846E-06	2.423E-05
7.5	2.652E-04	8.103E-07	2.759E-07	7.712E-08	1.439E+00	1.439E+00	1.391E+00	1.332E+00	9.460E-06	1.350E-05
15.0	4.008E-05	1.381E-07	4.798E-08	2.005E-08	6.046E-01	6.050E-01	6.020E-01	5.956E-01	1.033E-05	5.897E-06
25.0	1.110E-05	4.235E-08	1.493E-08	7.732E-09	3.277E-01	3.279E-01	3.287E-01	3.285E-01	1.038E-05	3.230E-06
35.0	5.251E-06	2.101E-08	7.452E-09	4.173E-09	2.195E-01	2.196E-01	2.206E-01	2.211E-01	1.026E-05	2.169E-06
45.0	3.062E-06	1.276E-08	4.552E-09	2.709E-09	1.623E-01	1.624E-01	1.632E-01	1.638E-01	1.012E-05	1.606E-06
55.0	1.980E-06	8.518E-09	3.050E-09	1.894E-09	1.271E-01	1.272E-01	1.278E-01	1.283E-01	9.960E-06	1.258E-06
65.0	1.355E-06	5.922E-09	2.124E-09	1.345E-09	1.032E-01	1.033E-01	1.038E-01	1.042E-01	9.799E-06	1.021E-06
75.0	9.627E-07	4.200E-09	1.506E-09	9.517E-10	8.601E-02	8.607E-02	8.652E-02	8.686E-02	9.639E-06	8.513E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	4.637E+03	2.071E+01	7.421E+00	7.421E+00	7.421E+00	1.832E+01	1.832E+01	1.832E+01	1.428E+00
2.5	2.609E+03	1.030E+01	3.639E+00	3.639E+00	3.639E+00	8.747E+00	8.747E+00	8.747E+00	2.253E+00
3.5	1.439E+03	5.665E+00	2.003E+00	2.003E+00	2.003E+00	5.186E+00	5.186E+00	5.186E+00	2.886E+00
4.5	8.523E+02	3.426E+00	1.216E+00	1.216E+00	1.216E+00	3.463E+00	3.463E+00	3.463E+00	3.326E+00
7.5	2.497E+02	1.109E+00	3.985E-01	3.985E-01	3.985E-01	1.538E+00	1.538E+00	1.538E+00	4.011E+00
15.0	3.778E+01	2.145E-01	7.907E-02	7.907E-02	7.907E-02	5.582E-01	5.582E-01	5.582E-01	4.381E+00
25.0	1.047E+01	6.763E-02	2.519E-02	2.519E-02	2.519E-02	2.849E-01	2.849E-01	2.849E-01	4.401E+00
35.0	4.952E+00	3.250E-02	1.212E-02	1.212E-02	1.212E-02	1.861E-01	1.861E-01	1.861E-01	4.352E+00
45.0	2.887E+00	1.916E-02	7.149E-03	7.149E-03	7.149E-03	1.358E-01	1.358E-01	1.358E-01	4.289E+00
55.0	1.867E+00	1.244E-02	4.643E-03	4.643E-03	4.643E-03	1.054E-01	1.054E-01	1.054E-01	4.223E+00
65.0	1.278E+00	8.400E-03	3.132E-03	3.132E-03	3.132E-03	8.493E-02	8.493E-02	8.493E-02	4.155E+00
75.0	9.073E-01	5.777E-03	2.149E-03	2.149E-03	2.149E-03	7.032E-02	7.032E-02	7.032E-02	4.087E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	4.935E-05	2.204E-07	7.906E-08	6.068E-08
2.5	2.776E-05	1.096E-07	3.877E-08	3.704E-08
3.5	1.531E-05	6.029E-08	2.134E-08	3.206E-08
4.5	9.071E-06	3.647E-08	1.295E-08	3.087E-08
7.5	2.657E-06	1.180E-08	4.245E-09	3.114E-08
15.0	4.021E-07	2.283E-09	8.424E-10	3.168E-08
25.0	1.114E-07	7.197E-10	2.684E-10	3.138E-08
35.0	5.271E-08	3.459E-10	1.291E-10	3.091E-08
45.0	3.073E-08	2.039E-10	7.616E-11	3.042E-08
55.0	1.987E-08	1.324E-10	4.946E-11	2.992E-08
65.0	1.360E-08	8.939E-11	3.337E-11	2.943E-08
75.0	9.656E-09	6.149E-11	2.249E-11	2.894E-08

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.345E-03	0.	0.	0.	3.912E-04	1.244E-04	3.498E-05	1.168E-05	6.061E-05	2.212E-05	1.823E-05	5.281E-06
NNE	0.	0.	0.	0.	2.462E-04	5.286E-05	6.488E-05	1.333E-05	2.826E-06	2.924E-05	3.438E-05	4.097E-06
NE	0.	0.	9.744E-04	0.	2.878E-04	8.162E-05	1.016E-04	3.183E-05	7.933E-07	2.010E-06	2.157E-05	6.115E-05
ENE	0.	0.	4.697E-04	0.	7.843E-05	2.654E-04	1.057E-04	4.680E-05	6.445E-06	1.578E-05	1.599E-05	0.
E	0.	0.	0.	0.	6.650E-04	1.507E-04	1.091E-04	3.002E-03	1.606E-04	1.037E-05	1.124E-05	1.173E-05
ESE	0.	0.	0.	5.632E-05	2.579E-04	6.260E-05	9.124E-05	4.786E-05	7.747E-05	3.388E-05	1.350E-06	7.818E-06
SE	0.	0.	2.831E-05	3.891E-05	1.741E-04	1.275E-05	2.974E-05	6.102E-05	4.674E-05	8.302E-06	3.063E-05	2.127E-04
SSE	0.	0.	5.969E-05	9.171E-05	5.286E-05	3.014E-05	1.240E-05	7.925E-06	4.746E-06	3.654E-06	2.119E-06	1.279E-05
S	0.	0.	0.	1.798E-04	7.423E-05	2.474E-04	1.003E-05	2.157E-05	1.601E-05	5.235E-07	1.293E-06	0.
SSW	0.	1.015E-03	1.021E-04	1.731E-04	7.250E-05	2.120E-04	8.097E-06	4.888E-05	3.221E-05	1.098E-05	3.594E-05	3.731E-04
SW	0.	0.	0.	2.046E-04	1.471E-03	3.502E-05	3.316E-03	1.503E-04	2.136E-05	5.050E-05	2.664E-05	4.501E-06
WSW	2.300E-03	4.962E-04	0.	0.	7.015E-04	1.200E-04	5.483E-03	2.021E-04	5.822E-05	1.092E-05	4.221E-06	3.728E-06
W	0.	0.	0.	0.	8.923E-04	1.397E-04	2.409E-04	7.508E-05	1.372E-04	1.110E-04	5.014E-06	4.541E-06
WNW	0.	0.	0.	0.	1.655E-04	1.656E-04	2.397E-04	1.640E-04	1.485E-05	1.463E-04	2.794E-06	2.551E-06
NW	0.	0.	0.	0.	1.537E-04	4.801E-05	2.790E-05	4.895E-05	3.570E-07	6.121E-05	1.610E-05	1.908E-06
NNW	2.583E-03	4.062E-04	0.	7.296E-05	1.976E-04	6.020E-05	2.837E-05	1.811E-05	1.919E-04	6.834E-05	3.838E-05	5.949E-05

TOTAL DOSE COMMITMENT IS 4.066E-02 PERSON-REM/YR

REGION=UNC MILL RUN 8
METSET=GALLUP, 76-80

CODE=MILDOS.REV0 (7/79)

DATE= 15/12/81
PAGE NO. 13

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.240E-01	0.	0.	0.	6.660E-03	2.216E-03	6.818E-04	2.482E-04	1.385E-03	5.368E-04	4.649E-04	1.402E-04
NNE	0.	0.	0.	0.	4.214E-03	9.343E-04	1.214E-03	2.644E-04	5.924E-05	6.455E-04	7.966E-04	9.930E-05
NE	0.	0.	1.670E-02	0.	4.986E-03	1.460E-03	1.904E-03	6.257E-04	1.633E-05	4.324E-05	4.843E-04	1.433E-03
ENE	0.	0.	8.068E-03	0.	1.363E-03	4.772E-03	1.997E-03	9.283E-04	1.340E-04	3.427E-04	3.623E-04	0.
E	0.	0.	0.	0.	1.144E-02	2.672E-03	2.028E-03	5.848E-02	3.274E-03	2.210E-04	2.499E-04	2.717E-04
ESE	0.	0.	0.	9.598E-04	4.420E-03	1.096E-03	1.650E-03	8.966E-04	1.505E-03	6.830E-04	2.824E-05	1.699E-04
SE	0.	0.	1.667E-03	6.607E-04	2.973E-03	2.222E-04	5.358E-04	1.141E-03	9.076E-04	1.676E-04	6.436E-04	4.649E-03
SSE	0.	0.	1.009E-03	1.552E-03	9.003E-04	5.290E-04	2.298E-04	1.552E-04	9.795E-05	7.922E-05	4.810E-05	3.028E-04
S	0.	0.	0.	3.037E-03	1.263E-03	4.363E-03	1.894E-04	4.355E-04	3.438E-04	1.188E-05	3.079E-05	0.
SSW	0.	1.711E-02	1.722E-03	2.924E-03	1.233E-03	3.764E-03	1.566E-04	1.027E-03	7.262E-04	2.626E-04	9.031E-04	9.762E-03
SW	0.	0.	0.	3.454E-03	2.501E-02	6.275E-04	6.622E-02	3.308E-03	5.077E-04	1.273E-03	7.824E-04	1.229E-04
WSW	3.878E-02	8.365E-03	0.	0.	1.194E-02	2.143E-03	1.076E-01	4.331E-03	1.340E-03	2.662E-04	1.078E-04	9.881E-05
W	0.	0.	0.	0.	1.519E-02	2.522E-03	4.911E-03	1.701E-03	3.361E-03	2.879E-03	1.357E-04	1.268E-04
WNW	0.	0.	0.	0.	2.817E-03	2.996E-03	4.942E-03	3.780E-03	3.715E-04	3.879E-03	7.715E-05	7.255E-05
NW	0.	0.	0.	0.	2.617E-03	8.641E-04	5.631E-04	1.095E-03	8.647E-06	1.575E-03	4.333E-04	5.310E-05
NNW	4.360E-02	6.854E-03	0.	1.233E-03	3.368E-03	1.083E-03	5.699E-04	4.018E-04	4.603E-03	1.740E-03	1.023E-03	1.642E-03

TOTAL DOSE COMMITMENT IS 7.473E-01 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL.   EXPOSED ORGAN IS AVG.LUNG

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.837E-01	0.	0.	0.	4.135E-02	1.249E-02	3.109E-03	8.963E-04	3.977E-03	1.235E-03	8.627E-04	2.112E-04
NNE	0.	0.	0.	0.	2.595E-02	5.375E-03	6.144E-03	1.159E-03	2.235E-04	2.088E-03	2.193E-03	2.307E-04
NE	0.	0.	1.027E-01	0.	3.005E-02	8.242E-03	9.679E-03	2.831E-03	6.548E-05	1.530E-04	1.497E-03	3.826E-03
ENE	0.	0.	4.943E-02	0.	8.171E-03	2.665E-02	9.970E-03	4.109E-03	5.235E-04	1.179E-03	1.088E-03	0.
E	0.	0.	0.	0.	6.981E-02	1.530E-02	1.045E-02	2.689E-01	1.337E-02	7.978E-04	7.920E-04	7.507E-04
ESE	0.	0.	0.	5.964E-03	2.716E-02	6.443E-03	9.030E-03	4.522E-03	6.948E-03	2.867E-03	1.070E-04	5.760E-04
SE	0.	0.	1.045E-02	4.131E-03	1.839E-02	1.316E-03	2.950E-03	5.770E-03	4.184E-03	6.988E-04	2.405E-03	1.544E-02
SSE	0.	0.	6.359E-03	9.758E-03	5.587E-03	3.079E-03	1.184E-03	6.990E-04	3.839E-04	2.692E-04	1.411E-04	7.651E-04
S	0.	0.	0.	1.915E-02	7.854E-03	2.511E-02	9.335E-04	1.810E-03	1.202E-03	3.490E-05	7.603E-05	0.
SSW	0.	1.084E-01	1.089E-02	1.845E-02	7.667E-03	2.134E-02	7.270E-04	3.828E-03	2.178E-03	6.379E-04	1.789E-03	1.590E-02
SW	0.	0.	0.	2.182E-02	1.556E-01	3.484E-03	2.830E-01	1.070E-02	1.262E-03	2.482E-03	1.096E-03	1.563E-04
WSW	2.456E-01	5.298E-02	0.	0.	7.418E-02	1.201E-02	4.814E-01	1.523E-02	3.749E-03	6.009E-04	1.985E-04	1.501E-04
W	0.	0.	0.	0.	9.426E-02	1.378E-02	1.988E-02	5.024E-03	7.429E-03	4.904E-03	1.825E-04	1.379E-04
WNW	0.	0.	0.	0.	1.749E-02	1.628E-02	1.940E-02	1.050E-02	7.500E-04	5.884E-03	9.089E-05	6.848E-05
NW	0.	0.	0.	0.	1.624E-02	4.752E-03	2.343E-03	3.374E-03	2.001E-05	2.794E-03	6.031E-04	5.933E-05
NNW	2.756E-01	4.336E-02	0.	7.770E-03	2.087E-02	5.969E-03	2.405E-03	1.273E-03	1.110E-02	3.256E-03	1.511E-03	1.945E-03

TOTAL DOSE COMMITMENT IS 3.924E+00 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BRONCHI

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.079E-01	0.	0.	0.	5.491E-02	3.996E-02	1.713E-02	6.525E-03	3.487E-02	1.254E-02	9.967E-03	2.746E-03
NNE	0.	0.	0.	0.	3.032E-02	1.223E-02	2.103E-02	4.955E-03	1.113E-03	1.179E-02	1.397E-02	1.659E-03
NE	0.	0.	6.904E-02	0.	3.222E-02	1.657E-02	2.792E-02	9.957E-03	2.626E-04	6.844E-04	7.480E-03	2.147E-02
ENE	0.	0.	3.440E-02	0.	9.291E-03	5.731E-02	3.069E-02	1.530E-02	2.211E-03	5.526E-03	5.661E-03	0.
E	0.	0.	0.	0.	7.912E-02	3.202E-02	3.043E-02	9.325E-01	5.225E-02	3.448E-03	3.777E-03	3.955E-03
ESE	0.	0.	0.	4.229E-03	2.624E-02	1.028E-02	1.890E-02	1.107E-02	1.907E-02	8.688E-03	3.571E-04	2.118E-03
SE	0.	0.	6.930E-03	3.015E-03	1.814E-02	2.094E-03	6.158E-03	1.415E-02	1.160E-02	2.160E-03	8.257E-03	5.884E-02
SSE	0.	0.	5.957E-03	9.635E-03	7.288E-03	6.989E-03	3.868E-03	2.757E-03	1.730E-03	1.356E-03	7.875E-04	4.708E-03
S	0.	0.	0.	1.563E-02	9.879E-03	6.622E-02	3.805E-03	9.218E-03	7.133E-03	2.346E-04	5.718E-04	0.
SSW	0.	8.240E-02	8.610E-03	1.643E-02	1.050E-02	6.590E-02	3.779E-03	2.594E-02	1.764E-02	5.946E-03	1.883E-02	1.865E-01
SW	0.	0.	0.	1.822E-02	2.195E-01	1.294E-02	1.924E+00	9.782E-02	1.399E-02	3.177E-02	1.576E-02	2.477E-03
WSW	1.908E-01	3.395E-02	0.	0.	9.978E-02	4.058E-02	2.819E+00	1.167E-01	3.410E-02	6.216E-03	2.290E-03	1.908E-03
W	0.	0.	0.	0.	1.394E-01	5.631E-02	1.561E-01	5.432E-02	9.841E-02	7.538E-02	3.161E-03	2.634E-03
WNW	0.	0.	0.	0.	2.639E-02	7.029E-02	1.664E-01	1.273E-01	1.140E-02	1.057E-01	1.858E-03	1.549E-03
NW	0.	0.	0.	0.	2.352E-02	1.870E-02	1.718E-02	3.393E-02	2.490E-04	4.094E-02	1.009E-02	1.107E-03
NNW	2.309E-01	2.924E-02	0.	6.667E-03	2.972E-02	2.256E-02	1.677E-02	1.210E-02	1.293E-01	4.430E-02	2.343E-02	3.384E-02

TOTAL DOSE COMMITMENT IS 1.070E+01 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS GROUND EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.266E-03	0.	0.	0.	7.207E-05	2.840E-05	9.188E-06	3.171E-06	1.631E-05	5.788E-06	4.598E-06	1.278E-06
NNE	0.	0.	0.	0.	5.088E-05	1.260E-05	1.658E-05	3.443E-06	7.234E-07	7.347E-06	8.426E-06	9.755E-07
NE	0.	0.	2.311E-04	0.	7.454E-05	2.400E-05	3.068E-05	9.416E-06	2.279E-07	5.591E-07	5.789E-06	1.580E-05
ENE	0.	0.	1.163E-04	0.	2.124E-05	8.187E-05	3.308E-05	1.416E-05	1.878E-06	4.419E-06	4.291E-06	0.
E	0.	0.	0.	0.	1.515E-04	3.844E-05	2.836E-05	7.655E-04	3.998E-05	2.516E-06	2.649E-06	2.679E-06
ESE	0.	0.	0.	1.149E-05	5.469E-05	1.411E-05	2.059E-05	1.065E-05	1.702E-05	7.342E-06	2.878E-07	1.637E-06
SE	0.	0.	1.836E-05	7.351E-06	3.423E-05	2.662E-06	6.288E-06	1.287E-05	9.810E-06	1.730E-06	6.320E-06	4.331E-05
SSE	0.	0.	1.058E-05	1.633E-05	9.826E-06	6.236E-06	2.741E-06	1.778E-06	1.063E-06	8.093E-07	4.617E-07	2.731E-06
S	0.	0.	0.	3.023E-05	1.334E-05	5.215E-05	2.329E-06	5.133E-06	3.804E-06	1.226E-07	2.960E-07	0.
SSW	0.	1.670E-04	1.686E-05	2.905E-05	1.305E-05	4.626E-05	2.019E-06	1.262E-05	8.283E-06	2.760E-06	8.750E-06	8.755E-05
SW	0.	0.	0.	3.337E-05	2.600E-04	7.896E-06	8.899E-04	4.191E-05	5.874E-06	1.340E-05	6.756E-06	1.088E-06
WSW	3.838E-04	8.026E-05	0.	0.	1.260E-04	2.701E-05	1.429E-03	5.434E-05	1.545E-05	2.808E-06	1.043E-06	8.831E-07
W	0.	0.	0.	0.	1.622E-04	3.332E-05	6.950E-05	2.240E-05	3.991E-05	3.080E-05	1.317E-06	1.127E-06
WNW	0.	0.	0.	0.	2.977E-05	3.965E-05	7.067E-05	5.026E-05	4.438E-06	4.158E-05	7.482E-07	6.431E-07
NW	0.	0.	0.	0.	2.792E-05	1.136E-05	7.901E-06	1.438E-05	1.030E-07	1.696E-05	4.240E-06	4.760E-07
NNW	4.472E-04	6.758E-05	0.	1.250E-05	3.700E-05	1.460E-05	8.136E-06	5.351E-06	5.552E-05	1.895E-05	1.011E-05	1.486E-05

TOTAL DOSE COMMITMENT IS 8.798E-03 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS

DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS CLOUD

EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	2.752E-03	0.	0.	0.	8.720E-04	6.813E-04	2.991E-04	1.148E-04	6.155E-04	2.215E-04	1.762E-04	4.859E-05
NNE	0.	0.	0.	0.	4.610E-04	2.035E-04	3.630E-04	8.670E-05	1.958E-05	2.080E-04	2.467E-04	2.933E-05
NE	0.	0.	7.082E-04	0.	4.775E-04	2.713E-04	4.775E-04	1.733E-04	4.607E-06	1.205E-05	1.320E-04	3.793E-04
ENE	0.	0.	3.585E-04	0.	1.401E-04	9.487E-04	5.275E-04	2.668E-04	3.882E-05	9.733E-05	9.989E-05	0.
E	0.	0.	0.	0.	1.207E-03	5.342E-04	5.252E-04	1.631E-02	9.188E-04	6.080E-05	6.670E-05	6.988E-05
ESE	0.	0.	0.	5.127E-05	3.884E-04	1.688E-04	3.240E-04	1.930E-04	3.348E-04	1.531E-04	6.303E-06	3.742E-05
SE	0.	0.	7.313E-05	3.767E-05	2.743E-04	3.479E-05	1.062E-04	2.475E-04	2.841E-04	3.810E-05	1.458E-04	1.040E-03
SSE	0.	0.	6.621E-05	1.264E-04	1.147E-04	1.187E-04	6.740E-05	4.847E-05	3.051E-05	2.394E-05	1.392E-05	8.323E-05
S	0.	0.	0.	2.089E-04	1.567E-04	1.129E-03	6.645E-05	1.622E-04	1.259E-04	4.145E-06	1.011E-05	0.
SSW	0.	7.251E-04	1.004E-04	2.226E-04	1.678E-04	1.128E-03	6.612E-05	4.569E-04	3.115E-04	1.051E-04	3.328E-04	3.298E-03
SW	0.	0.	0.	2.534E-04	3.570E-03	2.236E-04	3.380E-02	1.726E-03	2.471E-04	5.617E-04	2.787E-04	4.381E-05
WSW	1.014E-03	3.111E-04	0.	0.	1.607E-03	6.969E-04	4.939E-02	2.058E-03	6.022E-04	1.099E-04	4.050E-05	3.374E-05
W	0.	0.	0.	0.	2.274E-03	9.731E-04	2.741E-03	9.585E-04	1.739E-03	1.333E-03	5.589E-05	4.658E-05
WNW	0.	0.	0.	0.	4.318E-04	1.218E-03	2.926E-03	2.248E-03	2.015E-04	1.869E-03	3.286E-05	2.739E-05
NW	0.	0.	0.	0.	3.818E-04	3.229E-04	3.017E-04	5.988E-04	4.401E-06	7.238E-04	1.784E-04	1.957E-05
NNW	1.120E-03	2.574E-04	0.	9.110E-05	4.791E-04	3.880E-04	2.941E-04	2.133E-04	2.284E-03	7.830E-04	4.143E-04	5.984E-04

TOTAL DOSE COMMITMENT IS 1.706E-01 PERSON-REM/YR

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS VEG.ING.   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	8.268E-05	7.462E-05	5.792E-05	4.490E-05	1.200E-04	1.072E-04	8.672E-05	9.082E-05	1.005E-04	1.119E-04	1.237E-04	1.355E-04
NNE	6.288E-05	5.246E-05	4.068E-05	3.204E-05	9.189E-05	9.091E-05	7.003E-05	6.717E-05	6.951E-05	7.350E-05	7.797E-05	8.264E-05
NE	1.176E-04	9.160E-05	7.062E-05	5.608E-05	1.669E-04	1.717E-04	1.265E-04	1.142E-04	1.128E-04	1.149E-04	1.179E-04	1.214E-04
ENE	1.589E-04	1.184E-04	9.001E-05	7.070E-05	2.101E-04	2.143E-04	1.575E-04	1.424E-04	1.410E-04	1.440E-04	1.483E-04	1.532E-04
E	7.248E-05	5.642E-05	4.319E-05	3.396E-05	9.951E-05	1.021E-04	7.845E-05	7.372E-05	7.475E-05	7.764E-05	8.106E-05	8.474E-05
ESE	2.496E-05	1.911E-05	1.467E-05	1.163E-05	3.524E-05	3.831E-05	2.971E-05	2.740E-05	2.712E-05	2.755E-05	2.820E-05	2.899E-05
SE	1.552E-05	1.224E-05	9.452E-06	7.481E-06	2.282E-05	2.545E-05	2.028E-05	1.903E-05	1.902E-05	1.945E-05	2.005E-05	2.074E-05
SSE	1.289E-05	1.068E-05	8.200E-06	6.386E-06	1.805E-05	1.802E-05	1.480E-05	1.485E-05	1.572E-05	1.686E-05	1.810E-05	1.936E-05
S	3.783E-05	3.316E-05	2.568E-05	1.996E-05	5.499E-05	5.241E-05	4.299E-05	4.412E-05	4.776E-05	5.220E-05	5.688E-05	6.163E-05
SSW	3.506E-05	3.163E-05	2.455E-05	1.903E-05	5.097E-05	4.570E-05	3.745E-05	3.941E-05	4.364E-05	4.857E-05	5.370E-05	5.886E-05
SW	6.217E-05	5.737E-05	4.440E-05	3.412E-05	8.837E-05	7.530E-05	6.334E-05	6.947E-05	7.916E-05	8.984E-05	1.008E-04	1.116E-04
WSW	5.114E-05	4.640E-05	3.595E-05	2.776E-05	7.329E-05	6.442E-05	5.318E-05	5.683E-05	6.368E-05	7.143E-05	7.938E-05	8.730E-05
W	6.525E-05	6.079E-05	4.712E-05	3.621E-05	9.321E-05	7.809E-05	6.534E-05	7.211E-05	8.271E-05	9.432E-05	1.061E-04	1.179E-04
WNW	3.725E-05	3.491E-05	2.703E-05	2.073E-05	5.293E-05	4.385E-05	3.692E-05	4.117E-05	4.752E-05	5.445E-05	6.150E-05	6.851E-05
NW	3.206E-05	2.974E-05	2.306E-05	1.776E-05	4.615E-05	3.971E-05	3.306E-05	3.596E-05	4.082E-05	4.625E-05	5.184E-05	5.744E-05
NNW	4.231E-05	3.877E-05	3.009E-05	2.324E-05	6.112E-05	5.319E-05	4.339E-05	4.630E-05	5.203E-05	5.858E-05	6.532E-05	7.205E-05

TOTAL DOSE COMMITMENT IS 1.175E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS VEG.ING.   EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.327E-03	1.203E-03	9.357E-04	7.269E-04	1.966E-03	1.881E-03	1.671E-03	1.850E-03	2.114E-03	2.401E-03	2.690E-03	2.977E-03
NNE	9.791E-04	8.258E-04	6.419E-04	5.062E-04	1.460E-03	1.509E-03	1.253E-03	1.275E-03	1.375E-03	1.498E-03	1.626E-03	1.754E-03
NE	1.753E-03	1.388E-03	1.078E-03	8.529E-04	2.543E-03	2.698E-03	2.122E-03	2.037E-03	2.108E-03	2.226E-03	2.355E-03	2.486E-03
ENE	2.338E-03	1.781E-03	1.360E-03	1.073E-03	3.184E-03	3.357E-03	2.646E-03	2.549E-03	2.646E-03	2.804E-03	2.975E-03	3.151E-03
E	1.101E-03	8.712E-04	6.692E-04	5.269E-04	1.552E-03	1.658E-03	1.367E-03	1.362E-03	1.441E-03	1.546E-03	1.656E-03	1.768E-03
ESE	3.828E-04	2.967E-04	2.285E-04	1.815E-04	5.534E-04	6.232E-04	5.125E-04	4.972E-04	5.122E-04	5.370E-04	5.646E-04	5.933E-04
SE	2.429E-04	1.931E-04	1.494E-04	1.184E-04	3.637E-04	4.211E-04	3.556E-04	3.504E-04	3.640E-04	3.839E-04	4.058E-04	4.288E-04
SSE	2.045E-04	1.711E-04	1.319E-04	1.030E-04	2.946E-04	3.099E-04	2.738E-04	2.891E-04	3.171E-04	3.489E-04	3.815E-04	4.140E-04
S	6.092E-04	5.360E-04	4.159E-04	3.239E-04	9.029E-04	9.140E-04	8.135E-04	8.801E-04	9.853E-04	1.101E-03	1.220E-03	1.337E-03
SSW	5.665E-04	5.128E-04	3.987E-04	3.097E-04	8.406E-04	8.082E-04	7.251E-04	8.045E-04	9.188E-04	1.043E-03	1.168E-03	1.292E-03
SW	1.009E-03	9.334E-04	7.238E-04	5.576E-04	1.467E-03	1.361E-03	1.263E-03	1.454E-03	1.700E-03	1.958E-03	2.218E-03	2.473E-03
WSW	8.263E-04	7.520E-04	5.836E-04	4.517E-04	1.209E-03	1.146E-03	1.040E-03	1.170E-03	1.349E-03	1.540E-03	1.732E-03	1.921E-03
W	1.056E-03	9.866E-04	7.662E-04	5.902E-04	1.543E-03	1.412E-03	1.310E-03	1.519E-03	1.785E-03	2.065E-03	2.344E-03	2.619E-03
WNW	6.039E-04	5.677E-04	4.405E-04	3.387E-04	8.793E-04	8.000E-04	7.480E-04	8.743E-04	1.033E-03	1.199E-03	1.364E-03	1.527E-03
NW	5.185E-04	4.823E-04	3.748E-04	2.892E-04	7.627E-04	7.144E-04	6.578E-04	7.528E-04	8.775E-04	1.010E-03	1.143E-03	1.275E-03
NNW	6.798E-04	6.256E-04	4.863E-04	3.764E-04	1.002E-03	9.431E-04	8.515E-04	9.597E-04	1.110E-03	1.272E-03	1.434E-03	1.594E-03

TOTAL DOSE COMMITMENT IS 2.169E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.423E-06	3.955E-06	3.080E-06	2.406E-06	6.722E-06	7.243E-06	7.148E-06	8.314E-06	9.753E-06	1.125E-05	1.274E-05	1.419E-05
NNE	3.644E-06	2.967E-06	2.301E-06	1.825E-06	5.418E-06	6.031E-06	5.326E-06	5.627E-06	6.222E-06	6.898E-06	7.583E-06	8.261E-06
NE	7.533E-06	5.671E-06	4.360E-06	3.482E-06	1.066E-05	1.187E-05	9.558E-06	9.300E-06	9.735E-06	1.038E-05	1.106E-05	1.176E-05
ENE	1.047E-05	7.462E-06	5.634E-06	4.455E-06	1.360E-05	1.502E-05	1.205E-05	1.172E-05	1.228E-05	1.311E-05	1.401E-05	1.492E-05
E	4.454E-06	3.346E-06	2.552E-06	2.017E-06	6.094E-06	6.867E-06	5.865E-06	5.991E-06	6.468E-06	7.046E-06	7.642E-06	8.237E-06
ESE	1.500E-06	1.117E-06	8.544E-07	6.800E-07	2.105E-06	2.458E-06	2.088E-06	2.087E-06	2.207E-06	2.365E-06	2.530E-06	2.698E-06
SE	8.873E-07	6.885E-07	5.317E-07	4.232E-07	1.323E-06	1.599E-06	1.413E-06	1.449E-06	1.554E-06	1.681E-06	1.814E-06	1.947E-06
SSE	7.124E-07	5.773E-07	4.430E-07	3.469E-07	1.014E-06	1.156E-06	1.110E-06	1.234E-06	1.400E-06	1.576E-06	1.752E-06	1.925E-06
S	2.007E-06	1.747E-06	1.358E-06	1.063E-06	3.048E-06	3.419E-06	3.356E-06	3.832E-06	4.429E-06	5.054E-06	5.677E-06	6.287E-06
SSW	1.842E-06	1.656E-06	1.290E-06	1.008E-06	2.821E-06	3.051E-06	3.058E-06	3.579E-06	4.208E-06	4.858E-06	5.505E-06	6.137E-06
SW	3.225E-06	2.970E-06	2.308E-06	1.788E-06	4.851E-06	5.176E-06	5.438E-06	6.590E-06	7.899E-06	9.230E-06	1.054E-05	1.183E-05
WSW	2.688E-06	2.428E-06	1.889E-06	1.470E-06	4.062E-06	4.379E-06	4.444E-06	5.259E-06	6.223E-06	7.213E-06	8.192E-06	9.146E-06
W	3.413E-06	3.169E-06	2.469E-06	1.914E-06	5.183E-06	5.491E-06	5.743E-06	6.971E-06	8.371E-06	9.796E-06	1.120E-05	1.257E-05
WNW	1.939E-06	1.811E-06	1.408E-06	1.089E-06	2.926E-06	3.104E-06	3.292E-06	4.031E-06	4.863E-06	5.706E-06	6.538E-06	7.350E-06
NW	1.679E-06	1.553E-06	1.210E-06	9.397E-07	2.565E-06	2.771E-06	2.870E-06	3.443E-06	4.106E-06	4.785E-06	5.459E-06	6.118E-06
NNW	2.257E-06	2.054E-06	1.601E-06	1.248E-06	3.446E-06	3.709E-06	3.729E-06	4.393E-06	5.195E-06	6.024E-06	6.846E-06	7.648E-06

TOTAL DOSE COMMITMENT IS 9.268E-04 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.014E-05	6.316E-05	4.937E-05	3.878E-05	1.114E-04	1.354E-04	1.487E-04	1.814E-04	2.178E-04	2.546E-04	2.907E-04	3.259E-04
NNE	5.574E-05	4.599E-05	3.582E-05	2.850E-05	8.611E-05	1.043E-04	1.021E-04	1.150E-04	1.321E-04	1.501E-04	1.679E-04	1.853E-04
NE	1.103E-04	8.438E-05	6.514E-05	5.213E-05	1.613E-04	1.912E-04	1.696E-04	1.776E-04	1.953E-04	2.156E-04	2.360E-04	2.561E-04
ENE	1.515E-04	1.102E-04	8.368E-05	6.637E-05	2.048E-04	2.415E-04	2.143E-04	2.247E-04	2.475E-04	2.736E-04	3.000E-04	3.261E-04
E	6.638E-05	5.073E-05	3.889E-05	3.085E-05	9.466E-05	1.152E-04	1.089E-04	1.191E-04	1.341E-04	1.504E-04	1.666E-04	1.824E-04
ESE	2.258E-05	1.704E-05	1.310E-05	1.046E-05	3.290E-05	4.112E-05	3.820E-05	4.072E-05	4.496E-05	4.966E-05	5.438E-05	5.902E-05
SE	1.365E-05	1.069E-05	8.288E-06	6.619E-06	2.106E-05	2.735E-05	2.641E-05	2.877E-05	3.212E-05	3.574E-05	3.937E-05	4.296E-05
SSE	1.114E-05	9.149E-06	7.066E-06	5.568E-06	1.672E-05	2.097E-05	2.218E-05	2.597E-05	3.034E-05	3.481E-05	3.922E-05	4.350E-05
S	3.195E-05	2.799E-05	2.184E-05	1.719E-05	5.066E-05	6.336E-05	6.873E-05	8.235E-05	9.769E-05	1.132E-04	1.285E-04	1.434E-04
SSW	2.948E-05	2.663E-05	2.084E-05	1.638E-05	4.726E-05	5.764E-05	6.402E-05	7.833E-05	9.414E-05	1.101E-04	1.257E-04	1.410E-04
SW	5.190E-05	4.801E-05	3.747E-05	2.920E-05	8.210E-05	1.007E-04	1.169E-04	1.470E-04	1.791E-04	2.112E-04	2.426E-04	2.731E-04
WSW	4.300E-05	3.905E-05	3.050E-05	2.388E-05	6.806E-05	8.343E-05	9.384E-05	1.158E-04	1.398E-04	1.639E-04	1.875E-04	2.103E-04
W	5.472E-05	5.106E-05	3.994E-05	3.116E-05	8.742E-05	1.068E-04	1.239E-04	1.559E-04	1.903E-04	2.246E-04	2.582E-04	2.907E-04
WNW	3.117E-05	2.926E-05	2.285E-05	1.778E-05	4.961E-05	6.109E-05	7.166E-05	9.073E-05	1.110E-04	1.313E-04	1.511E-04	1.703E-04
NW	2.691E-05	2.500E-05	1.956E-05	1.528E-05	4.313E-05	5.356E-05	6.150E-05	7.668E-05	9.308E-05	1.095E-04	1.257E-04	1.414E-04
NNW	3.585E-05	3.283E-05	2.569E-05	2.013E-05	5.727E-05	7.035E-05	7.886E-05	9.704E-05	1.171E-04	1.373E-04	1.571E-04	1.764E-04

TOTAL DOSE COMMITMENT IS 1.842E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	8.217E-06	7.440E-06	5.760E-06	4.441E-06	1.150E-05	8.569E-06	5.119E-06	4.185E-06	3.848E-06	3.722E-06	3.687E-06	3.705E-06
NNE	6.028E-06	5.083E-06	3.937E-06	3.086E-06	8.625E-06	7.627E-06	4.886E-06	3.920E-06	3.469E-06	3.201E-06	3.005E-06	2.854E-06
NE	1.070E-05	8.490E-06	6.550E-06	5.180E-06	1.508E-05	1.429E-05	9.273E-06	7.324E-06	6.373E-06	5.762E-06	5.268E-06	4.850E-06
ENE	1.423E-05	1.088E-05	8.287E-06	6.506E-06	1.883E-05	1.765E-05	1.138E-05	8.973E-06	7.807E-06	7.070E-06	6.484E-06	5.995E-06
E	6.747E-06	5.346E-06	4.095E-06	3.207E-06	9.176E-06	8.568E-06	5.683E-06	4.606E-06	4.077E-06	3.742E-06	3.481E-06	3.269E-06
ESE	2.351E-06	1.923E-06	1.401E-06	1.107E-06	3.296E-06	3.339E-06	2.312E-06	1.888E-06	1.661E-06	1.507E-06	1.383E-06	1.279E-06
SE	1.497E-06	1.190E-06	9.175E-07	7.232E-07	2.164E-06	2.236E-06	1.575E-06	1.298E-06	1.144E-06	1.038E-06	9.546E-07	8.863E-07
SSE	1.262E-06	1.055E-06	8.096E-07	6.275E-07	1.727E-06	1.525E-06	1.025E-06	8.565E-07	7.755E-07	7.275E-07	6.947E-07	6.717E-07
S	3.774E-06	3.314E-06	2.560E-06	1.979E-06	5.294E-06	4.338E-06	2.781E-06	2.308E-06	2.105E-06	2.000E-06	1.942E-06	1.912E-06
SSW	3.510E-06	3.170E-06	2.452E-06	1.889E-06	4.900E-06	3.677E-06	2.233E-06	1.842E-06	1.697E-06	1.643E-06	1.629E-06	1.640E-06
SW	6.258E-06	5.776E-06	4.456E-06	3.405E-06	8.514E-06	5.815E-06	3.386E-06	2.842E-06	2.697E-06	2.692E-06	2.752E-06	2.847E-06
WSW	5.120E-06	4.650E-06	3.591E-06	2.757E-06	7.041E-06	5.078E-06	3.033E-06	2.524E-06	2.363E-06	2.323E-06	2.333E-06	2.373E-06
W	6.546E-06	6.102E-06	4.713E-06	3.599E-06	8.920E-06	5.895E-06	3.329E-06	2.784E-06	2.663E-06	2.686E-06	2.771E-06	2.890E-06
WNW	3.744E-06	3.511E-06	2.710E-06	2.066E-06	5.076E-06	3.267E-06	1.809E-06	1.512E-06	1.454E-06	1.477E-06	1.538E-06	1.619E-06
NW	3.214E-06	2.983E-06	2.306E-06	1.764E-06	4.422E-06	3.031E-06	1.738E-06	1.437E-06	1.352E-06	1.345E-06	1.373E-06	1.422E-06
NNW	4.209E-06	3.866E-06	2.991E-06	2.296E-06	5.826E-06	4.101E-06	2.352E-06	1.919E-06	1.788E-06	1.762E-06	1.781E-06	1.824E-06

TOTAL DOSE COMMITMENT IS 7.649E-04 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.246E-04	1.179E-04	9.133E-05	7.041E-05	1.822E-04	1.374E-04	8.539E-05	7.297E-05	6.979E-05	6.983E-05	7.124E-05	7.340E-05
NNE	9.142E-05	7.814E-05	6.063E-05	4.749E-05	1.322E-04	1.170E-04	7.682E-05	6.362E-05	5.808E-05	5.523E-05	5.342E-05	5.224E-05
NE	1.527E-04	1.240E-04	9.595E-05	7.577E-05	2.187E-04	2.063E-04	1.367E-04	1.112E-04	9.965E-05	9.277E-05	8.744E-05	8.311E-05
ENE	1.990E-04	1.571E-04	1.203E-04	9.443E-05	2.709E-04	2.527E-04	1.670E-04	1.361E-04	1.223E-04	1.142E-04	1.082E-04	1.034E-04
E	9.893E-05	8.013E-05	6.159E-05	4.821E-05	1.373E-04	1.284E-04	8.748E-05	7.314E-05	6.666E-05	6.292E-05	6.021E-05	5.816E-05
ESE	3.493E-05	2.754E-05	2.122E-05	1.678E-05	4.991E-05	5.090E-05	3.604E-05	3.015E-05	2.711E-05	2.514E-05	2.360E-05	2.235E-05
SE	2.286E-05	1.834E-05	1.416E-05	1.116E-05	3.337E-05	3.477E-05	2.501E-05	2.108E-05	1.898E-05	1.760E-05	1.655E-05	1.572E-05
SSE	1.961E-05	1.658E-05	1.276E-05	9.898E-06	2.728E-05	2.436E-05	1.680E-05	1.445E-05	1.345E-05	1.295E-05	1.268E-05	1.256E-05
S	5.973E-05	5.265E-05	4.070E-05	3.147E-05	8.423E-05	6.986E-05	4.624E-05	3.971E-05	3.738E-05	3.659E-05	3.648E-05	3.679E-05
SSW	5.579E-05	5.052E-05	3.910E-05	3.013E-05	7.824E-05	5.960E-05	3.764E-05	3.236E-05	3.094E-05	3.092E-05	3.152E-05	3.247E-05
SW	9.998E-05	9.246E-05	7.138E-05	5.456E-05	1.368E-04	9.549E-05	5.846E-05	5.150E-05	5.084E-05	5.237E-05	5.447E-05	5.788E-05
WSW	8.136E-05	7.411E-05	5.726E-05	4.397E-05	1.124E-04	8.239E-05	5.137E-05	4.469E-05	4.347E-05	4.409E-05	4.548E-05	4.727E-05
W	1.042E-04	9.740E-05	7.526E-05	5.749E-05	1.427E-04	9.624E-05	5.744E-05	5.073E-05	5.064E-05	5.276E-05	5.581E-05	5.931E-05
WNW	5.973E-05	5.617E-05	4.338E-05	3.309E-05	8.151E-05	5.372E-05	3.158E-05	2.796E-05	2.807E-05	2.946E-05	3.141E-05	3.364E-05
NW	5.113E-05	4.758E-05	3.679E-05	2.816E-05	7.066E-05	4.934E-05	2.977E-05	2.595E-05	2.549E-05	2.622E-05	2.750E-05	2.908E-05
NNW	6.644E-05	6.129E-05	4.743E-05	3.640E-05	9.228E-05	6.581E-05	3.962E-05	3.409E-05	3.319E-05	3.389E-05	3.524E-05	3.695E-05

TOTAL DOSE COMMITMENT IS 1.229E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 1, AFTER 5 YEARS　　DURATION IN YRS IS... 5.0

SUMMARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	4.066E-02	7.473E-01	3.924E+00	3.451E-02	2.522E-01	1.070E+01
GROUND	8.798E-03	8.798E-03	8.798E-03	8.798E-03	8.798E-03	8.798E-03
CLOUD	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01
VEG.ING.	1.175E-02	2.168E-01	1.175E-02	3.669E-02	1.290E-01	1.175E-02
MEAT ING	9.268E-04	1.842E-02	9.268E-04	4.190E-03	1.343E-02	9.268E-04
MILK ING	7.649E-04	1.229E-02	7.649E-04	7.141E-04	3.985E-03	7.649E-04
RNPLUS50	0.	0.	0.	0.	0.	0.
TOTALS	2.335E-01	1.174E+00	4.117E+00	2.555E-01	5.780E-01	1.090E+01

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.	0.	0.	0.	0.	0.
GROUND	0.	0.	0.	0.	0.	0.
CLOUD	0.	0.	0.	0.	0.	0.
VEG.ING.	0.	0.	0.	0.	0.	0.
MEAT ING	0.	0.	0.	0.	0.	0.
MILK ING	0.	0.	0.	0.	0.	0.
RNPLUS50	1.472E+00	1.975E+01	3.231E-01	1.472E+00	1.472E+00	9.335E+00
TOTALS	1.472E+00	1.975E+01	3.231E-01	1.472E+00	1.472E+00	9.335E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	4.066E-02	7.473E-01	3.924E+00	3.451E-02	2.522E-01	1.070E+01
GROUND	8.798E-03	8.798E-03	8.798E-03	8.798E-03	8.798E-03	8.798E-03
CLOUD	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01
VEG.ING.	1.175E-02	2.168E-01	1.175E-02	3.669E-02	1.290E-01	1.175E-02
MEAT ING	9.268E-04	1.842E-02	9.268E-04	4.190E-03	1.343E-02	9.268E-04
MILK ING	7.649E-04	1.229E-02	7.649E-04	7.141E-04	3.985E-03	7.649E-04
RNPLUS50	1.472E+00	1.975E+01	3.231E-01	1.472E+00	1.472E+00	9.335E+00
TOTALS	1.706E+00	2.092E+01	4.440E+00	1.728E+00	2.050E+00	2.023E+01

REGION=UNC MILL RUN 8
METSET=GALLUP, 76-80

CODE=MILDOS,REV0 (7/79)

DATE= 15/12/81
PAGE NO. 25

TIME STEP NUMBER 1, AFTER 5 YEARS

DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
1	NORTH BOUNDARY	1	1.940E-02	5.286E-05	1.746E-05	1.474E-06	1.822E+04	4.967E+01	1.639E+01	1.639E+01
1	NORTH BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
1	NORTH BOUNDARY	3	3.913E-05	2.664E-05	1.071E-05	1.435E-05	3.677E+01	2.503E+01	1.005E+01	1.005E+01
1	NORTH BOUNDARY	4	7.413E-05	5.047E-05	2.029E-05	2.718E-05	6.144E+02	4.183E+02	1.680E+02	1.680E+02
	CONCENTRATION TOTALS		1.951E-02	1.300E-04	4.845E-05	4.301E-05	1.888E+04	4.930E+02	1.944E+02	1.944E+02
2	NORTHEAST BOUNDARY	1	4.212E-03	1.144E-05	3.778E-06	3.187E-07	3.958E+03	1.075E+01	3.547E+00	3.547E+00
2	NORTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
2	NORTHEAST BOUNDARY	3	2.632E-05	1.792E-05	7.202E-06	9.650E-06	2.473E+01	1.683E+01	6.760E+00	6.760E+00
2	NORTHEAST BOUNDARY	4	4.268E-05	2.906E-05	1.168E-05	1.565E-05	3.537E+02	2.408E+02	9.671E+01	9.671E+01
	CONCENTRATION TOTALS		4.281E-03	5.841E-05	2.266E-05	2.562E-05	4.336E+03	2.684E+02	1.070E+02	1.070E+02
3	SOUTHEAST BOUNDARY	1	3.707E-04	9.924E-07	3.284E-07	2.758E-08	3.480E+02	9.325E-01	3.082E-01	3.082E-01
3	SOUTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
3	SOUTHEAST BOUNDARY	3	8.480E-07	5.773E-07	2.321E-07	3.110E-07	7.968E-01	5.425E-01	2.178E-01	2.178E-01
3	SOUTHEAST BOUNDARY	4	1.086E-06	7.392E-07	2.972E-07	3.982E-07	8.999E+00	6.126E+00	2.460E+00	2.460E+00
	CONCENTRATION TOTALS		3.727E-04	2.309E-06	8.576E-07	7.367E-07	3.582E+02	7.601E+00	2.986E+00	2.986E+00
4	SOUTHWEST BOUNDARY	1	1.754E-03	4.771E-06	1.576E-06	1.330E-07	1.648E+03	4.483E+00	1.479E+00	1.479E+00
4	SOUTHWEST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
4	SOUTHWEST BOUNDARY	3	7.817E-07	5.322E-07	2.139E-07	2.867E-07	7.345E-01	5.001E-01	2.008E-01	2.008E-01
4	SOUTHWEST BOUNDARY	4	1.132E-06	7.710E-07	3.099E-07	4.153E-07	9.386E+00	6.390E+00	2.566E+00	2.566E+00
	CONCENTRATION TOTALS		1.756E-03	6.075E-06	2.100E-06	8.349E-07	1.658E+03	1.137E+01	4.246E+00	4.246E+00
5	NEAREST RESIDENT	1	2.313E-02	6.193E-05	2.049E-05	1.722E-06	2.173E+04	5.819E+01	1.923E+01	1.923E+01
5	NEAREST RESIDENT	2	0.	0.	0.	0.	0.	0.	0.	0.
5	NEAREST RESIDENT	3	1.559E-05	1.061E-05	4.266E-06	5.716E-06	1.465E+01	9.971E+00	4.004E+00	4.004E+00
5	NEAREST RESIDENT	4	2.508E-05	1.707E-05	6.864E-06	9.197E-06	2.079E+02	1.415E+02	5.683E+01	5.683E+01
	CONCENTRATION TOTALS		2.317E-02	8.962E-05	3.162E-05	1.663E-05	2.195E+04	2.097E+02	8.007E+01	8.007E+01
6	ENV MONITOR STA A	1	1.013E-02	2.715E-05	8.981E-06	7.546E-07	9.521E+03	2.551E+01	8.430E+00	8.430E+00
6	ENV MONITOR STA A	2	0.	0.	0.	0.	0.	0.	0.	0.
6	ENV MONITOR STA A	3	1.510E-05	1.028E-05	4.132E-06	5.536E-06	1.419E+01	9.657E+00	3.878E+00	3.878E+00
6	ENV MONITOR STA A	4	2.331E-05	1.587E-05	6.380E-06	8.548E-06	1.932E+02	1.315E+02	5.282E+01	5.282E+01
	CONCENTRATION TOTALS		1.017E-02	5.329E-05	1.949E-05	1.484E-05	9.728E+03	1.667E+02	6.513E+01	6.513E+01
7	NEAREST DOWNWIND RES	1	1.180E-03	3.116E-06	1.033E-06	8.641E-08	1.109E+03	2.928E+00	9.693E-01	9.693E-01
7	NEAREST DOWNWIND RES	2	0.	0.	0.	0.	0.	0.	0.	0.
7	NEAREST DOWNWIND RES	3	6.731E-06	4.582E-06	1.842E-06	2.469E-06	6.324E+00	4.306E+00	1.729E+00	1.729E+00
7	NEAREST DOWNWIND RES	4	8.257E-06	5.622E-06	2.260E-06	3.028E-06	6.843E+01	4.659E+01	1.871E+01	1.871E+01
	CONCENTRATION TOTALS		1.195E-03	1.332E-05	5.135E-06	5.583E-06	1.184E+03	5.382E+01	2.141E+01	2.141E+01
8	NEAREST COMMUNITY	1	5.515E-05	1.469E-07	4.863E-08	4.080E-09	5.182E+01	1.380E-01	4.565E-02	4.565E-02
8	NEAREST COMMUNITY	2	0.	0.	0.	0.	0.	0.	0.	0.
8	NEAREST COMMUNITY	3	1.051E-07	7.154E-08	2.876E-08	3.853E-08	9.874E-02	6.722E-02	2.699E-02	2.699E-02
8	NEAREST COMMUNITY	4	8.801E-08	5.992E-08	2.409E-08	3.228E-08	7.294E-01	4.966E-01	1.994E-01	1.994E-01
	CONCENTRATION TOTALS		5.534E-05	2.784E-07	1.015E-07	7.489E-08	5.264E+01	7.018E-01	2.721E-01	2.721E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
9	NEAREST DOWNWIND COM	1	1.692E-05	4.520E-08	1.496E-08	1.256E-09	1.590E+01	4.247E-02	1.404E-02	1.404E-02
9	NEAREST DOWNWIND COM	2	0.	0.	0.	0.	0.	0.	0.	0.
9	NEAREST DOWNWIND COM	3	1.160E-07	7.897E-08	3.174E-08	4.253E-08	1.090E-01	7.420E-02	2.980E-02	2.980E-02
9	NEAREST DOWNWIND COM	4	7.365E-08	5.014E-08	2.016E-08	2.701E-08	6.104E-01	4.156E-01	1.669E-01	1.669E-01
	CONCENTRATION TOTALS		1.711E-05	1.743E-07	6.686E-08	7.080E-08	1.662E+01	5.322E-01	2.107E-01	2.107E-01
10	NEAREST GRAZING AREA	1	9.864E-04	2.644E-06	8.747E-07	7.350E-08	9.269E+02	2.484E+00	8.210E-01	8.210E-01
10	NEAREST GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
10	NEAREST GRAZING AREA	3	2.730E-06	1.859E-06	7.473E-07	1.001E-06	2.566E+00	1.747E+00	7.014E-01	7.014E-01
10	NEAREST GRAZING AREA	4	6.582E-06	4.481E-06	1.801E-06	2.414E-06	5.455E+01	3.713E+01	1.491E+01	1.491E+01
	CONCENTRATION TOTALS		9.957E-04	8.984E-06	3.423E-06	3.488E-06	9.840E+02	4.137E+01	1.644E+01	1.644E+01
11	GALLUP	1	1.175E-05	3.132E-08	1.037E-08	8.700E-10	1.104E+01	2.943E-02	9.732E-03	9.732E-03
11	GALLUP	2	0.	0.	0.	0.	0.	0.	0.	0.
11	GALLUP	3	9.115E-09	6.206E-09	2.495E-09	3.343E-09	8.565E-03	5.831E-03	2.342E-03	2.342E-03
11	GALLUP	4	3.566E-09	2.428E-09	9.761E-10	1.308E-09	2.956E-02	2.012E-02	8.081E-03	8.081E-03
	CONCENTRATION TOTALS		1.176E-05	3.995E-08	1.384E-08	5.520E-09	1.108E+01	5.538E-02	2.015E-02	2.015E-02
12	SPRINGSTEAD TR. PARK	1	1.432E-04	3.853E-07	1.274E-07	1.072E-08	1.346E+02	3.620E-01	1.196E-01	1.196E-01
12	SPRINGSTEAD TR. PARK	2	0.	0.	0.	0.	0.	0.	0.	0.
12	SPRINGSTEAD TR. PARK	3	2.982E-08	2.030E-08	8.161E-09	1.094E-08	2.802E-02	1.908E-02	7.660E-03	7.660E-03
12	SPRINGSTEAD TR. PARK	4	3.289E-08	2.239E-08	9.000E-09	1.206E-08	2.725E-01	1.855E-01	7.451E-02	7.451E-02
	CONCENTRATION TOTALS		1.433E-04	4.280E-07	1.446E-07	3.371E-08	1.349E+02	5.667E-01	2.018E-01	2.018E-01
13	NAVAJO GRAZING AREA	1	7.156E-03	1.944E-05	6.422E-06	5.417E-07	6.724E+03	1.827E+01	6.028E+00	6.028E+00
13	NAVAJO GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
13	NAVAJO GRAZING AREA	3	4.037E-05	2.748E-05	1.105E-05	1.480E-05	3.793E+01	2.582E+01	1.037E+01	1.037E+01
13	NAVAJO GRAZING AREA	4	6.356E-05	4.327E-05	1.739E-05	2.331E-05	5.267E+02	3.586E+02	1.440E+02	1.440E+02
	CONCENTRATION TOTALS		7.260E-03	9.019E-05	3.486E-05	3.865E-05	7.289E+03	4.027E+02	1.604E+02	1.604E+02
14	NEXT NEAREST RESIDEN	1	1.071E-02	2.857E-05	9.458E-06	7.937E-07	1.007E+04	2.685E+01	8.878E+00	8.878E+00
14	NEXT NEAREST RESIDEN	2	0.	0.	0.	0.	0.	0.	0.	0.
14	NEXT NEAREST RESIDEN	3	3.259E-06	2.219E-06	8.920E-07	1.195E-06	3.062E+00	2.085E+00	8.373E-01	8.373E-01
14	NEXT NEAREST RESIDEN	4	4.437E-06	3.021E-06	1.214E-06	1.627E-06	3.677E+01	2.504E+01	1.005E+01	1.005E+01
	CONCENTRATION TOTALS		1.072E-02	3.381E-05	1.156E-05	3.614E-06	1.011E+04	5.397E+01	1.977E+01	1.977E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS TS... 5.0

INDIVIDUAL RECEPTOR RADON AND RADON DAUGHTER CONCENTRATIONS

	AIRBORNE CONCENTRATIONS, PCI/M3								GROUND CONCENTRATIONS, PCI/M2			
NO.	RN-222	PO-218	PB-214	BI-214	PB-210	BI-210	PO-210	WL	PO-218	PB-214	BI-214	PB-210
1	7.209E+02	4.066E+02	2.293E+01	1.115E+00	7.031E-08	5.654E-12	*********	5.392E-04	3.220E+02	3.220E+02	3.220E+02	2.981E-02
2	2.373E+01	2.211E+01	7.950E+00	2.396E+00	1.103E-06	6.081E-10	9.695E-15	7.202E-05	1.751E+01	1.751E+01	1.751E+01	4.678E-01
3	2.080E+00	2.026E+00	1.122E+00	5.444E-01	4.898E-07	5.049E-10	1.466E-14	9.805E-06	1.605E+00	1.605E+00	1.605E+00	2.077E-01
4	7.879E+00	7.739E+00	4.099E+00	1.836E+00	1.450E-06	1.324E-09	3.428E-14	3.560E-05	6.130E+00	6.130E+00	6.130E+00	6.149E-01
5	1.035E+02	9.181E+01	1.749E+01	2.715E+00	5.748E-07	1.507E-10	1.102E-15	1.934E-04	7.272E+01	7.272E+01	7.272E+01	2.437E-01
6	7.512E+01	6.946E+01	1.793E+01	3.761E+00	1.116E-06	4.047E-10	4.328E-15	1.765E-04	5.502E+01	5.502E+01	5.502E+01	4.731E-01
7	5.038E+00	4.967E+00	3.662E+00	2.618E+00	5.116E-06	1.071E-08	6.123E-13	3.345E-05	3.934E+00	3.934E+00	3.934E+00	2.169E+00
8	2.147E-01	2.147E-01	1.974E-01	1.832E-01	1.210E-06	7.497E-09	1.198E-12	1.906E-06	1.701E-01	1.701E-01	1.701E-01	5.130E-01
9	1.745E-01	1.746E-01	1.742E-01	1.730E-01	6.650E-06	2.203E-07	1.833E-10	1.708E-06	1.383E-01	1.383E-01	1.383E-01	2.820E+00
10	3.805E+00	3.123E+00	6.851E-01	1.340E-01	3.751E-08	1.291E-11	1.256E-16	7.191E-06	2.474E+00	2.474E+00	2.474E+00	1.590E-02
11	2.842E-01	2.843E-01	2.850E-01	2.845E-01	8.831E-06	2.297E-07	1.490E-10	2.799E-06	2.252E-01	2.252E-01	2.252E-01	3.744E+00
12	4.074E-01	4.076E-01	3.959E-01	3.826E-01	3.822E-06	3.420E-08	7.762E-12	3.854E-06	3.228E-01	3.228E-01	3.228E-01	1.620E+00
13	3.520E+01	3.219E+01	1.030E+01	2.765E+00	1.103E-06	5.303E-10	7.349E-15	9.569E-05	2.550E+01	2.550E+01	2.550E+01	4.676E-01
14	2.073E+01	2.022E+01	9.444E+00	3.658E+00	2.333E-06	1.744E-09	3.716E-14	8.235E-05	1.601E+01	1.601E+01	1.601E+01	9.893E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	0.
INFANT	GROUND	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02
INFANT	CLOUD	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.82E-01	4.81E+00	3.82E-01	2.40E-02	9.85E-01	3.82E-01
INFANT	TOTALS	8.63E-01	1.21E+01	4.51E+01	1.11E-01	2.75E+00	4.40E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	0.
CHILD	GROUND	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02
CHILD	CLOUD	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06
CHILD	VEG.ING.	1.89E-01	2.90E+00	1.89E-01	6.56E-02	5.87E-01	1.89E-01
CHILD	MEAT ING	2.17E-02	3.27E-01	2.17E-02	1.36E-02	7.99E-02	2.17E-02
CHILD	MILK ING	2.40E-01	3.61E+00	2.40E-01	1.73E-02	5.71E-01	2.40E-01
CHILD	TOTALS	9.32E-01	1.41E+01	4.52E+01	1.83E-01	3.00E+00	5.09E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	0.
TEENAGER	GROUND	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02
TEENAGER	CLOUD	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06
TEENAGER	VEG.ING.	1.15E-01	1.75E+00	1.15E-01	4.90E-02	4.64E-01	1.15E-01
TEENAGER	MEAT ING	1.33E-02	1.98E-01	1.33E-02	9.88E-03	6.15E-02	1.33E-02
TEENAGER	MILK ING	1.04E-01	1.54E+00	1.04E-01	9.13E-03	3.21E-01	1.04E-01
TEENAGER	TOTALS	7.14E-01	1.08E+01	4.50E+01	1.55E-01	2.61E+00	2.91E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	0.
ADULT	GROUND	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02	5.84E-02
ADULT	CLOUD	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06	1.98E-06
ADULT	VEG.ING.	1.21E-01	1.83E+00	1.21E-01	5.36E-02	4.53E-01	1.21E-01
ADULT	MEAT ING	1.81E-02	2.69E-01	1.81E-02	1.36E-02	7.61E-02	1.81E-02
ADULT	MILK ING	4.18E-02	6.07E-01	4.18E-02	3.80E-03	1.19E-01	4.18E-02
ADULT	TOTALS	6.62E-01	9.98E+00	4.49E+01	1.58E-01	2.41E+00	2.40E-01

REGION=UNC MILL RUN A CODE=MILDOS.REVO (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 29
TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	4.51E+02
INFANT	GROUND	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01
INFANT	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.82E-01	4.81E+00	3.82E-01	2.40E-02	9.85E-01	3.82E-01
INFANT	TOTALS	9.99E-01	1.22E+01	4.53E+01	2.47E-01	2.88E+00	4.51E+02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	4.51E+02
CHILD	GROUND	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01
CHILD	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
CHILD	VEG.ING.	1.89E-01	2.90E+00	1.89E-01	6.56E-02	5.87E-01	1.89E-01
CHILD	MEAT ING	2.17E-02	3.27E-01	2.17E-02	1.36E-02	7.99E-02	2.17E-02
CHILD	MILK ING	2.40E-01	3.61E+00	2.40E-01	1.73E-02	5.71E-01	2.40E-01
CHILD	TOTALS	1.07E+00	1.43E+01	4.53E+01	3.20E-01	3.13E+00	4.51E+02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	4.51E+02
TEENAGER	GROUND	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01
TEENAGER	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
TEENAGER	VEG.ING.	1.15E-01	1.75E+00	1.15E-01	4.90E-02	4.64E-01	1.15E-01
TEENAGER	MEAT ING	1.33E-02	1.98E-01	1.33E-02	9.88E-03	6.15E-02	1.33E-02
TEENAGER	MILK ING	1.04E-01	1.54E+00	1.04E-01	9.13E-03	3.21E-01	1.04E-01
TEENAGER	TOTALS	8.51E-01	1.09E+01	4.51E+01	2.91E-01	2.74E+00	4.51E+02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.23E-01	7.22E+00	4.47E+01	2.83E-02	1.70E+00	4.51E+02
ADULT	GROUND	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01	1.51E-01
ADULT	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
ADULT	VEG.ING.	1.21E-01	1.83E+00	1.21E-01	5.36E-02	4.53E-01	1.21E-01
ADULT	MEAT ING	1.81E-02	2.69E-01	1.81E-02	1.36E-02	7.61E-02	1.81E-02
ADULT	MILK ING	4.18E-02	6.07E-01	4.18E-02	3.80E-03	1.19E-01	4.18E-02
ADULT	TOTALS	7.99E-01	1.01E+01	4.51E+01	2.94E-01	2.55E+00	4.51E+02

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

NUMBER 2 NAME=NORTHEAST BOUNDARY   X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	9.47E-02	1.66E+00	9.82E+00	1.15E-02	3.95E-01	0.
INFANT	GROUND	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02
INFANT	CLOUD	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.05E-01	1.27E+00	1.05E-01	1.39E-02	2.51E-01	1.05E-01
INFANT	TOTALS	2.13E-01	2.94E+00	9.94E+00	3.90E-02	6.59E-01	1.19E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	9.47E-02	1.66E+00	9.82E+00	1.15E-02	3.95E-01	0.
CHILD	GROUND	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02
CHILD	CLOUD	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07
CHILD	VEG.ING.	5.90E-02	8.53E-01	5.90E-02	3.79E-02	2.05E-01	5.90E-02
CHILD	MEAT ING	7.49E-03	1.06E-01	7.49E-03	7.88E-03	3.29E-02	7.49E-03
CHILD	MILK ING	7.09E-02	9.81E-01	7.09E-02	1.00E-02	1.50E-01	7.09E-02
CHILD	TOTALS	2.46E-01	3.61E+00	9.97E+00	8.09E-02	7.97E-01	1.51E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	9.47E-02	1.66E+00	9.82E+00	1.15E-02	3.95E-01	0.
TEENAGER	GROUND	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02
TEENAGER	CLOUD	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07
TEENAGER	VEG.ING.	3.85E-02	5.53E-01	3.85E-02	2.83E-02	1.62E-01	3.85E-02
TEENAGER	MEAT ING	4.89E-03	6.95E-02	4.89E-03	5.71E-03	2.53E-02	4.89E-03
TEENAGER	MILK ING	3.32E-02	4.49E-01	3.32E-02	5.28E-03	8.44E-02	3.32E-02
TEENAGER	TOTALS	1.85E-01	2.74E+00	9.91E+00	6.44E-02	6.80E-01	9.02E-02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	9.47E-02	1.66E+00	9.82E+00	1.15E-02	3.95E-01	0.
ADULT	GROUND	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02	1.37E-02
ADULT	CLOUD	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07	4.36E-07
ADULT	VEG.ING.	4.27E-02	6.11E-01	4.27E-02	3.10E-02	1.60E-01	4.27E-02
ADULT	MEAT ING	7.00E-03	9.94E-02	7.00E-03	7.87E-03	3.14E-02	7.00E-03
ADULT	MILK ING	1.41E-02	1.86E-01	1.41E-02	2.20E-03	3.13E-02	1.41E-02
ADULT	TOTALS	1.72E-01	2.57E+00	9.90E+00	6.62E-02	6.31E-01	7.74E-02

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	9.48E-02	1.66E+00	9.82E+00	1.16E-02	3.95E-01	1.48E+01
INFANT	GROUND	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02
INFANT	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.05E-01	1.27E+00	1.05E-01	1.39E-02	2.51E-01	1.05E-01
INFANT	TOTALS	2.70E-01	3.00E+00	1.00E+01	9.53E-02	7.15E-01	1.50E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	9.48E-02	1.66E+00	9.82E+00	1.16E-02	3.95E-01	1.48E+01
CHILD	GROUND	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02
CHILD	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
CHILD	VEG.ING.	5.90E-02	8.53E-01	5.90E-02	3.80E-02	2.06E-01	5.90E-02
CHILD	MEAT ING	7.49E-03	1.07E-01	7.49E-03	7.90E-03	3.29E-02	7.49E-03
CHILD	MILK ING	7.09E-02	9.81E-01	7.09E-02	1.00E-02	1.50E-01	7.09E-02
CHILD	TOTALS	3.02E-01	3.67E+00	1.00E+01	1.37E-01	8.54E-01	1.50E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	9.48E-02	1.66E+00	9.82E+00	1.16E-02	3.95E-01	1.48E+01
TEENAGER	GROUND	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02
TEENAGER	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
TEENAGER	VEG.ING.	3.85E-02	5.54E-01	3.85E-02	2.83E-02	1.63E-01	3.85E-02
TEENAGER	MEAT ING	4.90E-03	6.95E-02	4.90E-03	5.72E-03	2.53E-02	4.90E-03
TEENAGER	MILK ING	3.32E-02	4.49E-01	3.32E-02	5.29E-03	8.44E-02	3.32E-02
TEENAGER	TOTALS	2.41E-01	2.80E+00	9.97E+00	1.21E-01	7.37E-01	1.50E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	9.48E-02	1.66E+00	9.82E+00	1.16E-02	3.95E-01	1.48E+01
ADULT	GROUND	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02	3.59E-02
ADULT	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
ADULT	VEG.ING.	4.27E-02	6.11E-01	4.27E-02	3.10E-02	1.60E-01	4.27E-02
ADULT	MEAT ING	7.00E-03	9.94E-02	7.00E-03	7.89E-03	3.15E-02	7.00E-03
ADULT	MILK ING	1.41E-02	1.86E-01	1.41E-02	2.20E-03	3.13E-02	1.41E-02
ADULT	TOTALS	2.28E-01	2.62E+00	9.96E+00	1.23E-01	6.88E-01	1.50E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.19E-04	3.24E-02	0.
INFANT	GROUND	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03
INFANT	CLOUD	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.05E-03	8.94E-02	7.05E-03	3.61E-04	1.84E-02	7.05E-03
INFANT	TOTALS	1.62E-02	2.28E-01	8.63E-01	1.99E-03	5.20E-02	8.15E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.19E-04	3.24E-02	0.
CHILD	GROUND	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03
CHILD	CLOUD	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08
CHILD	VEG.ING.	3.42E-03	5.29E-02	3.42E-03	9.89E-04	1.03E-02	3.42E-03
CHILD	MEAT ING	3.84E-04	5.85E-03	3.84E-04	2.05E-04	1.35E-03	3.84E-04
CHILD	MILK ING	4.37E-03	6.69E-02	4.37E-03	2.61E-04	1.06E-02	4.37E-03
CHILD	TOTALS	1.73E-02	2.64E-01	8.64E-01	3.08E-03	5.59E-02	9.28E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.19E-04	3.24E-02	0.
TEENAGER	GROUND	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03
TEENAGER	CLOUD	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08
TEENAGER	VEG.ING.	2.05E-03	3.15E-02	2.05E-03	7.38E-04	8.17E-03	2.05E-03
TEENAGER	MEAT ING	2.32E-04	3.49E-03	2.32E-04	1.49E-04	1.04E-03	2.32E-04
TEENAGER	MILK ING	1.87E-03	2.81E-02	1.87E-03	1.38E-04	5.98E-03	1.87E-03
TEENAGER	TOTALS	1.33E-02	2.02E-01	8.60E-01	2.65E-03	4.87E-02	5.26E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.19E-04	3.24E-02	0.
ADULT	GROUND	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03
ADULT	CLOUD	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08	3.79E-08
ADULT	VEG.ING.	2.14E-03	3.26E-02	2.14E-03	8.09E-04	7.98E-03	2.14E-03
ADULT	MEAT ING	3.11E-04	4.67E-03	3.11E-04	2.05E-04	1.29E-03	3.11E-04
ADULT	MILK ING	7.43E-04	1.10E-02	7.43E-04	5.72E-05	2.21E-03	7.43E-04
ADULT	TOTALS	1.24E-02	1.87E-01	8.59E-01	2.70E-03	4.50E-02	4.30E-03

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.48E-04	3.25E-02	1.30E+00
INFANT	GROUND	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03
INFANT	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.05E-03	8.94E-02	7.05E-03	3.75E-04	1.85E-02	7.05E-03
INFANT	TOTALS	2.38E-02	2.36E-01	8.70E-01	9.61E-03	5.97E-02	1.32E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.48E-04	3.25E-02	1.30E+00
CHILD	GROUND	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03
CHILD	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
CHILD	VEG.ING.	3.42E-03	5.31E-02	3.42E-03	1.03E-03	1.05E-02	3.42E-03
CHILD	MEAT ING	3.85E-04	5.87E-03	3.85E-04	2.13E-04	1.38E-03	3.85E-04
CHILD	MILK ING	4.37E-03	6.69E-02	4.37E-03	2.71E-04	1.06E-02	4.37E-03
CHILD	TOTALS	2.49E-02	2.72E-01	8.71E-01	1.07E-02	6.37E-02	1.32E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.48E-04	3.25E-02	1.30E+00
TEENAGER	GROUND	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03
TEENAGER	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
TEENAGER	VEG.ING.	2.06E-03	3.16E-02	2.06E-03	7.66E-04	8.26E-03	2.06E-03
TEENAGER	MEAT ING	2.32E-04	3.51E-03	2.32E-04	1.55E-04	1.06E-03	2.32E-04
TEENAGER	MILK ING	1.87E-03	2.81E-02	1.87E-03	1.43E-04	6.00E-03	1.87E-03
TEENAGER	TOTALS	2.09E-02	2.10E-01	8.67E-01	1.03E-02	5.65E-02	1.31E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.07E-03	1.38E-01	8.54E-01	5.48E-04	3.25E-02	1.30E+00
ADULT	GROUND	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03	1.93E-03
ADULT	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
ADULT	VEG.ING.	2.14E-03	3.27E-02	2.14E-03	8.59E-04	8.06E-03	2.14E-03
ADULT	MEAT ING	3.12E-04	4.70E-03	3.12E-04	2.13E-04	1.31E-03	3.12E-04
ADULT	MILK ING	7.43E-04	1.10E-02	7.43E-04	5.95E-05	2.22E-03	7.43E-04
ADULT	TOTALS	2.00E-02	1.95E-01	8.66E-01	1.03E-02	5.28E-02	1.31E+00

REGION=UNC MILL RUN 8 CODE=MILDOS.REVO (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 34
TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.58E-03	1.49E-01	0.
INFANT	GROUND	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03
INFANT	CLOUD	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.00E-02	3.89E-01	3.00E-02	3.89E-04	8.15E-02	3.00E-02
INFANT	TOTALS	7.28E-02	1.03E+00	4.06E+00	7.05E-03	2.36E-01	3.50E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.58E-03	1.49E-01	0.
CHILD	GROUND	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03
CHILD	CLOUD	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07
CHILD	VEG.ING.	1.34E-02	2.16E-01	1.34E-02	1.07E-03	3.70E-02	1.34E-02
CHILD	MEAT ING	1.39E-03	2.22E-02	1.39E-03	2.20E-04	4.03E-03	1.39E-03
CHILD	MILK ING	1.78E-02	2.86E-01	1.78E-02	2.80E-04	4.62E-02	1.78E-02
CHILD	TOTALS	7.54E-02	1.17E+00	4.06E+00	8.23E-03	2.42E-01	3.77E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.58E-03	1.49E-01	0.
TEENAGER	GROUND	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03
TEENAGER	CLOUD	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07
TEENAGER	VEG.ING.	7.67E-03	1.23E-01	7.67E-03	8.00E-04	2.93E-02	7.67E-03
TEENAGER	MEAT ING	7.89E-04	1.25E-02	7.89E-04	1.60E-04	3.12E-03	7.89E-04
TEENAGER	MILK ING	7.26E-03	1.15E-01	7.26E-03	1.48E-04	2.61E-02	7.26E-03
TEENAGER	TOTALS	5.85E-02	8.92E-01	4.04E+00	7.77E-03	2.13E-01	2.08E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.58E-03	1.49E-01	0.
ADULT	GROUND	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03	5.08E-03
ADULT	CLOUD	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07	1.78E-07
ADULT	VEG.ING.	7.62E-03	1.22E-01	7.62E-03	8.80E-04	2.84E-02	7.62E-03
ADULT	MEAT ING	1.00E-03	1.59E-02	1.00E-03	2.21E-04	3.82E-03	1.00E-03
ADULT	MILK ING	2.75E-03	4.36E-02	2.75E-03	6.14E-05	9.64E-03	2.75E-03
ADULT	TOTALS	5.42E-02	8.23E-01	4.04E+00	7.82E-03	1.96E-01	1.65E-02

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.67E-03	1.50E-01	4.92E+00
INFANT	GROUND	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03
INFANT	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.00E-02	3.89E-01	3.00E-02	4.30E-04	8.16E-02	3.00E-02
INFANT	TOTALS	9.79E-02	1.06E+00	4.08E+00	3.23E-02	2.61E-01	4.98E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.67E-03	1.50E-01	4.92E+00
CHILD	GROUND	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03
CHILD	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
CHILD	VEG.ING.	1.35E-02	2.17E-01	1.35E-02	1.18E-03	3.74E-02	1.35E-02
CHILD	MEAT ING	1.40E-03	2.23E-02	1.40E-03	2.44E-04	4.10E-03	1.40E-03
CHILD	MILK ING	1.78E-02	2.86E-01	1.78E-02	3.10E-04	4.63E-02	1.78E-02
CHILD	TOTALS	1.01E-01	1.19E+00	4.09E+00	3.36E-02	2.68E-01	4.99E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.67E-03	1.50E-01	4.92E+00
TEENAGER	GROUND	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03
TEENAGER	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
TEENAGER	VEG.ING.	7.68E-03	1.23E-01	7.68E-03	8.82E-04	2.95E-02	7.68E-03
TEENAGER	MEAT ING	7.92E-04	1.25E-02	7.92E-04	1.77E-04	3.17E-03	7.92E-04
TEENAGER	MILK ING	7.26E-03	1.15E-01	7.26E-03	1.63E-04	2.61E-02	7.26E-03
TEENAGER	TOTALS	8.36E-02	9.18E-01	4.07E+00	3.31E-02	2.39E-01	4.97E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.77E-02	6.37E-01	4.02E+00	1.67E-03	1.50E-01	4.92E+00
ADULT	GROUND	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03	6.93E-03
ADULT	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
ADULT	VEG.ING.	7.63E-03	1.22E-01	7.63E-03	9.68E-04	2.86E-02	7.63E-03
ADULT	MEAT ING	1.01E-03	1.59E-02	1.01E-03	2.44E-04	3.89E-03	1.01E-03
ADULT	MILK ING	2.75E-03	4.36E-02	2.75E-03	6.80E-05	9.65E-03	2.75E-03
ADULT	TOTALS	7.93E-02	8.49E-01	4.07E+00	3.31E-02	2.22E-01	4.97E+00

REGION=UNC MILL RUN 8
METSET=GALLUP, 76-80

CODE=MILDOS,REV0 (7/79)

DATE= 15/12/81
PAGE NO. 36

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	0.
INFANT	GROUND	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02
INFANT	CLOUD	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.03E-01	5.21E+00	4.03E-01	8.37E-03	1.09E+00	4.03E-01
INFANT	TOTALS	9.69E-01	1.37E+01	5.36E+01	9.81E-02	3.13E+00	4.71E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	0.
CHILD	GROUND	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02
CHILD	CLOUD	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06
CHILD	VEG.ING.	1.84E-01	2.94E+00	1.84E-01	2.29E-02	5.17E-01	1.84E-01
CHILD	MEAT ING	1.94E-02	3.07E-01	1.94E-02	4.75E-03	5.90E-02	1.94E-02
CHILD	MILK ING	2.42E-01	3.85E+00	2.42E-01	6.05E-03	6.19E-01	2.42E-01
CHILD	TOTALS	1.01E+00	1.56E+01	5.36E+01	1.23E-01	3.24E+00	5.13E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	0.
TEENAGER	GROUND	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02
TEENAGER	CLOUD	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06
TEENAGER	VEG.ING.	1.06E-01	1.68E+00	1.06E-01	1.72E-02	4.09E-01	1.06E-01
TEENAGER	MEAT ING	1.12E-02	1.74E-01	1.12E-02	3.45E-03	4.55E-02	1.12E-02
TEENAGER	MILK ING	9.96E-02	1.56E+00	9.96E-02	3.18E-03	3.49E-01	9.96E-02
TEENAGER	TOTALS	7.82E-01	1.19E+01	5.34E+01	1.14E-01	2.85E+00	2.84E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	0.
ADULT	GROUND	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02	6.73E-02
ADULT	CLOUD	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06	2.35E-06
ADULT	VEG.ING.	1.07E-01	1.69E+00	1.07E-01	1.88E-02	3.97E-01	1.07E-01
ADULT	MEAT ING	1.44E-02	2.24E-01	1.44E-02	4.76E-03	5.60E-02	1.44E-02
ADULT	MILK ING	3.82E-02	5.95E-01	3.82E-02	1.32E-03	1.29E-01	3.82E-02
ADULT	TOTALS	7.28E-01	1.10E+01	5.33E+01	1.15E-01	2.63E+00	2.26E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	6.47E+01
INFANT	GROUND	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02
INFANT	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.03E-01	5.21E+00	4.03E-01	8.39E-03	1.09E+00	4.03E-01
INFANT	TOTALS	1.05E+00	1.38E+01	5.36E+01	1.76E-01	3.21E+00	6.53E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	6.47E+01
CHILD	GROUND	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02
CHILD	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
CHILD	VEG.ING.	1.84E-01	2.94E+00	1.84E-01	2.30E-02	5.18E-01	1.84E-01
CHILD	MEAT ING	1.94E-02	3.07E-01	1.94E-02	4.76E-03	5.90E-02	1.94E-02
CHILD	MILK ING	2.42E-01	3.85E+00	2.42E-01	6.06E-03	6.20E-01	2.42E-01
CHILD	TOTALS	1.09E+00	1.57E+01	5.37E+01	2.01E-01	3.32E+00	6.53E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	6.47E+01
TEENAGER	GROUND	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02
TEENAGER	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
TEENAGER	VEG.ING.	1.06E-01	1.68E+00	1.06E-01	1.72E-02	4.09E-01	1.06E-01
TEENAGER	MEAT ING	1.12E-02	1.74E-01	1.12E-02	3.45E-03	4.56E-02	1.12E-02
TEENAGER	MILK ING	9.96E-02	1.56E+00	9.96E-02	3.19E-03	3.49E-01	9.96E-02
TEENAGER	TOTALS	8.60E-01	1.20E+01	5.34E+01	1.91E-01	2.93E+00	6.51E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.98E-01	8.42E+00	5.31E+01	2.24E-02	1.98E+00	6.47E+01
ADULT	GROUND	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02	9.46E-02
ADULT	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
ADULT	VEG.ING.	1.07E-01	1.69E+00	1.07E-01	1.89E-02	3.97E-01	1.07E-01
ADULT	MEAT ING	1.44E-02	2.24E-01	1.44E-02	4.77E-03	5.60E-02	1.44E-02
ADULT	MILK ING	3.82E-02	5.95E-01	3.82E-02	1.33E-03	1.29E-01	3.82E-02
ADULT	TOTALS	9.02E-01	1.11E+01	5.34E+01	1.92E-01	2.70E+00	6.50E+01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 6 NAME=ENV MONITOR STA 4 X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.23E-02	8.78E-01	0.
INFANT	GROUND	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02
INFANT	CLOUD	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.87E-01	2.39E+00	1.87E-01	7.68E-03	4.94E-01	1.87E-01
INFANT	TOTALS	4.36E-01	6.14E+00	2.35E+01	4.99E-02	1.40E+00	2.17E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.23E-02	8.78E-01	0.
CHILD	GROUND	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02
CHILD	CLOUD	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06
CHILD	VEG.ING.	8.88E-02	1.39E+00	8.88E-02	2.10E-02	2.63E-01	8.88E-02
CHILD	MEAT ING	9.79E-03	1.51E-01	9.79E-03	4.36E-03	3.30E-02	9.79E-03
CHILD	MILK ING	1.15E-01	1.78E+00	1.15E-01	5.55E-03	2.84E-01	1.15E-01
CHILD	TOTALS	4.63E-01	7.08E+00	2.36E+01	7.32E-02	1.49E+00	2.43E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.23E-02	8.78E-01	0.
TEENAGER	GROUND	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02
TEENAGER	CLOUD	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06
TEENAGER	VEG.ING.	5.27E-02	8.17E-01	5.27E-02	1.57E-02	2.08E-01	5.27E-02
TEENAGER	MEAT ING	5.82E-03	8.87E-02	5.82E-03	3.16E-03	2.55E-02	5.82E-03
TEENAGER	MILK ING	4.85E-02	7.38E-01	4.85E-02	2.92E-03	1.60E-01	4.85E-02
TEENAGER	TOTALS	3.57E-01	5.40E+00	2.34E+01	6.40E-02	1.30E+00	1.37E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.23E-02	8.78E-01	0.
ADULT	GROUND	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02	3.00E-02
ADULT	CLOUD	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06	1.03E-06
ADULT	VEG.ING.	5.43E-02	8.37E-01	5.43E-02	1.72E-02	2.02E-01	5.43E-02
ADULT	MEAT ING	7.73E-03	1.17E-01	7.73E-03	4.36E-03	3.14E-02	7.73E-03
ADULT	MILK ING	1.90E-02	2.86E-01	1.90E-02	1.22E-03	5.91E-02	1.90E-02
ADULT	TOTALS	3.31E-01	5.00E+00	2.34E+01	6.50E-02	1.20E+00	1.11E-01

REGION=UNC MILL RUN 8 CODE=MILDOS,REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 39

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.24E-02	8.78E-01	4.69E+01
INFANT	GROUND	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02
INFANT	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.87E-01	2.39E+00	1.87E-01	7.71E-03	4.94E-01	1.87E-01
INFANT	TOTALS	5.19E-01	6.23E+00	2.36E+01	1.32E-01	1.48E+00	4.72E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.24E-02	8.78E-01	4.69E+01
CHILD	GROUND	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02
CHILD	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
CHILD	VEG.ING.	8.88E-02	1.39E+00	8.88E-02	2.11E-02	2.63E-01	8.88E-02
CHILD	MEAT ING	9.79E-03	1.51E-01	9.79E-03	4.38E-03	3.31E-02	9.79E-03
CHILD	MILK ING	1.15E-01	1.78E+00	1.15E-01	5.57E-03	2.84E-01	1.15E-01
CHILD	TOTALS	5.45E-01	7.16E+00	2.36E+01	1.56E-01	1.57E+00	4.73E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.24E-02	8.78E-01	4.69E+01
TEENAGER	GROUND	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02
TEENAGER	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
TEENAGER	VEG.ING.	5.27E-02	8.17E-01	5.27E-02	1.58E-02	2.08E-01	5.27E-02
TEENAGER	MEAT ING	5.82E-03	8.87E-02	5.82E-03	3.18E-03	2.55E-02	5.82E-03
TEENAGER	MILK ING	4.85E-02	7.38E-01	4.85E-02	2.93E-03	1.60E-01	4.85E-02
TEENAGER	TOTALS	4.39E-01	5.49E+00	2.35E+01	1.47E-01	1.38E+00	4.72E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.20E-01	3.73E+00	2.33E+01	1.24E-02	8.78E-01	4.69E+01
ADULT	GROUND	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02	5.14E-02
ADULT	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
ADULT	VEG.ING.	5.43E-02	8.37E-01	5.43E-02	1.73E-02	2.03E-01	5.43E-02
ADULT	MEAT ING	7.73E-03	1.17E-01	7.73E-03	4.38E-03	3.15E-02	7.73E-03
ADULT	MILK ING	1.90E-02	2.86E-01	1.90E-02	1.22E-03	5.91E-02	1.90E-02
ADULT	TOTALS	4.13E-01	5.08E+00	2.35E+01	1.48E-01	1.28E+00	4.71E+01

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.63E-02	4.56E-01	2.74E+00	2.74E-03	1.08E-01	0.
INFANT	GROUND	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03
INFANT	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.65E-02	3.26E-01	2.65E-02	2.74E-03	6.54E-02	2.65E-02
INFANT	TOTALS	5.65E-02	7.86E-01	2.77E+00	9.17E-03	1.77E-01	3.02E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.63E-02	4.56E-01	2.74E+00	2.74E-03	1.08E-01	0.
CHILD	GROUND	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03
CHILD	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
CHILD	VEG.ING.	1.42E-02	2.10E-01	1.42E-02	7.50E-03	4.73E-02	1.42E-02
CHILD	MEAT ING	1.73E-03	2.51E-02	1.73E-03	1.56E-03	7.16E-03	1.73E-03
CHILD	MILK ING	1.74E-02	2.49E-01	1.74E-02	1.98E-03	3.86E-02	1.74E-02
CHILD	TOTALS	6.33E-02	9.44E-01	2.78E+00	1.75E-02	2.05E-01	3.70E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.63E-02	4.56E-01	2.74E+00	2.74E-03	1.08E-01	0.
TEENAGER	GROUND	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03
TEENAGER	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
TEENAGER	VEG.ING.	9.01E-03	1.32E-01	9.01E-03	5.59E-03	3.74E-02	9.01E-03
TEENAGER	MEAT ING	1.11E-03	1.60E-02	1.11E-03	1.13E-03	5.51E-03	1.11E-03
TEENAGER	MILK ING	7.91E-03	1.11E-01	7.91E-03	1.04E-03	2.17E-02	7.91E-03
TEENAGER	TOTALS	4.80E-02	7.19E-01	2.77E+00	1.42E-02	1.77E-01	2.17E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.63E-02	4.56E-01	2.74E+00	2.74E-03	1.08E-01	0.
ADULT	GROUND	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03	3.70E-03
ADULT	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
ADULT	VEG.ING.	9.80E-03	1.43E-01	9.80E-03	6.12E-03	3.67E-02	9.80E-03
ADULT	MEAT ING	1.55E-03	2.24E-02	1.55E-03	1.56E-03	6.84E-03	1.55E-03
ADULT	MILK ING	3.28E-03	4.50E-02	3.28E-03	4.34E-04	8.05E-03	3.28E-03
ADULT	TOTALS	4.46E-02	6.70E-01	2.76E+00	1.46E-02	1.64E-01	1.83E-02

REGION=UNC MILL RUN A
METSET=GALLUP, 76-80

CODE=MILDOS,REV0 (7/79)

DATE= 15/12/81

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.63E-02	4.57E-01	2.74E+00	3.04E-03	1.09E-01	3.15E+00
INFANT	GROUND	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03
INFANT	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.65E-02	3.26E-01	2.65E-02	2.89E-03	6.58E-02	2.65E-02
INFANT	TOTALS	9.12E-02	8.22E-01	2.81E+00	4.43E-02	2.13E-01	3.21E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.63E-02	4.57E-01	2.74E+00	3.04E-03	1.09E-01	3.15E+00
CHILD	GROUND	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03
CHILD	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
CHILD	VEG.ING.	1.42E-02	2.11E-01	1.42E-02	7.88E-03	4.84E-02	1.42E-02
CHILD	MEAT ING	1.75E-03	2.54E-02	1.75E-03	1.64E-03	7.41E-03	1.75E-03
CHILD	MILK ING	1.74E-02	2.49E-01	1.74E-02	2.09E-03	3.89E-02	1.74E-02
CHILD	TOTALS	9.80E-02	9.81E-01	2.82E+00	5.30E-02	2.42E-01	3.22E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.63E-02	4.57E-01	2.74E+00	3.04E-03	1.09E-01	3.15E+00
TEENAGER	GROUND	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03
TEENAGER	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
TEENAGER	VEG.ING.	9.04E-03	1.33E-01	9.04E-03	5.88E-03	3.83E-02	9.04E-03
TEENAGER	MEAT ING	1.11E-03	1.61E-02	1.11E-03	1.19E-03	5.70E-03	1.11E-03
TEENAGER	MILK ING	7.91E-03	1.11E-01	7.91E-03	1.10E-03	2.19E-02	7.91E-03
TEENAGER	TOTALS	8.27E-02	7.56E-01	2.80E+00	4.95E-02	2.14E-01	3.21E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.63E-02	4.57E-01	2.74E+00	3.04E-03	1.09E-01	3.15E+00
ADULT	GROUND	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03	8.23E-03
ADULT	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
ADULT	VEG.ING.	9.84E-03	1.44E-01	9.84E-03	6.44E-03	3.76E-02	9.84E-03
ADULT	MEAT ING	1.56E-03	2.27E-02	1.56E-03	1.64E-03	7.08E-03	1.56E-03
ADULT	MILK ING	3.28E-03	4.51E-02	3.28E-03	4.57E-04	8.12E-03	3.28E-03
ADULT	TOTALS	7.98E-02	7.08E-01	2.80E+00	4.99E-02	2.00E-01	3.20E+00

REGION=UNC MILL RUN 8   CODE=MILDOS,REV0 (7/79)   DATE= 15/12/81
METSET=GALLUP, 76-80   PAGE NO. 42

TIME STEP NUMBER 1, AFTER 5 YEARS   DURATION IN YRS IS... 5.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.19E-03	2.03E-02	1.27E-01	6.66E-05	4.78E-03	0.
INFANT	GROUND	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
INFANT	CLOUD	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	9.89E-04	1.27E-02	9.89E-04	3.08E-05	2.64E-03	9.89E-04
INFANT	TOTALS	2.35E-03	3.32E-02	1.28E-01	2.59E-04	7.58E-03	1.15E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.19E-03	2.03E-02	1.27E-01	6.66E-05	4.78E-03	0.
CHILD	GROUND	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
CHILD	CLOUD	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09
CHILD	VEG.ING.	4.61E-04	7.28E-03	4.61E-04	8.44E-05	1.33E-03	4.61E-04
CHILD	MEAT ING	4.98E-05	7.75E-04	4.98E-05	1.75E-05	1.60E-04	4.98E-05
CHILD	MILK ING	6.01E-04	9.42E-03	6.01E-04	2.23E-05	1.51E-03	6.01E-04
CHILD	TOTALS	2.47E-03	3.79E-02	1.28E-01	3.53E-04	7.94E-03	1.27E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.19E-03	2.03E-02	1.27E-01	6.66E-05	4.78E-03	0.
TEENAGER	GROUND	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
TEENAGER	CLOUD	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09
TEENAGER	VEG.ING.	2.70E-04	4.23E-03	2.70E-04	6.31E-05	1.05E-03	2.70E-04
TEENAGER	MEAT ING	2.91E-05	4.49E-04	2.91E-05	1.27E-05	1.24E-04	2.91E-05
TEENAGER	MILK ING	2.51E-04	3.87E-03	2.51E-04	1.17E-05	8.51E-04	2.51E-04
TEENAGER	TOTALS	1.91E-03	2.90E-02	1.28E-01	3.16E-04	6.96E-03	7.11E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.19E-03	2.03E-02	1.27E-01	6.66E-05	4.78E-03	0.
ADULT	GROUND	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
ADULT	CLOUD	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09	5.62E-09
ADULT	VEG.ING.	2.75E-04	4.29E-03	2.75E-04	6.91E-05	1.02E-03	2.75E-04
ADULT	MEAT ING	3.81E-05	5.86E-04	3.81E-05	1.75E-05	1.52E-04	3.81E-05
ADULT	MILK ING	9.72E-05	1.49E-03	9.72E-05	4.88E-06	3.15E-04	9.72E-05
ADULT	TOTALS	1.77E-03	2.68E-02	1.27E-01	3.20E-04	6.43E-03	5.72E-04

REGION=UNC MILL RUN 8 CODE=MILDOS.REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 43

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.20E-03	2.06E-02	1.27E-01	1.38E-04	5.01E-03	1.34E-01
INFANT	GROUND	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04
INFANT	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	9.95E-04	1.28E-02	9.95E-04	6.52E-05	2.74E-03	9.95E-04
INFANT	TOTALS	4.47E-03	3.56E-02	1.30E-01	2.47E-03	1.00E-02	1.37E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.20E-03	2.06E-02	1.27E-01	1.38E-04	5.01E-03	1.34E-01
CHILD	GROUND	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04
CHILD	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
CHILD	VEG.ING.	4.76E-04	7.59E-03	4.76E-04	1.77E-04	1.61E-03	4.76E-04
CHILD	MEAT ING	5.30E-05	8.41E-04	5.30E-05	3.71E-05	2.20E-04	5.30E-05
CHILD	MILK ING	6.05E-04	9.51E-03	6.05E-04	4.72E-05	1.59E-03	6.05E-04
CHILD	TOTALS	4.61E-03	4.08E-02	1.30E-01	2.67E-03	1.07E-02	1.38E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.20E-03	2.06E-02	1.27E-01	1.38E-04	5.01E-03	1.34E-01
TEENAGER	GROUND	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04
TEENAGER	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
TEENAGER	VEG.ING.	2.78E-04	4.42E-03	2.78E-04	1.31E-04	1.27E-03	2.78E-04
TEENAGER	MEAT ING	3.09E-05	4.90E-04	3.09E-05	2.69E-05	1.69E-04	3.09E-05
TEENAGER	MILK ING	2.52E-04	3.91E-03	2.52E-04	2.49E-05	8.93E-04	2.52E-04
TEENAGER	TOTALS	4.03E-03	3.17E-02	1.30E-01	2.59E-03	9.61E-03	1.37E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.20E-03	2.06E-02	1.27E-01	1.38E-04	5.01E-03	1.34E-01
ADULT	GROUND	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04
ADULT	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
ADULT	VEG.ING.	2.84E-04	4.51E-03	2.84E-04	1.43E-04	1.24E-03	2.84E-04
ADULT	MEAT ING	4.05E-05	6.46E-04	4.05E-05	3.70E-05	2.09E-04	4.05E-05
ADULT	MILK ING	9.79E-05	1.50E-03	9.79E-05	1.03E-05	3.30E-04	9.79E-05
ADULT	TOTALS	3.89E-03	2.95E-02	1.30E-01	2.60E-03	9.05E-03	1.37E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.76E-04	6.53E-03	3.94E-02	3.81E-05	1.55E-03	0.
INFANT	GROUND	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05
INFANT	CLOUD	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.47E-04	4.34E-03	3.47E-04	2.64E-05	8.83E-04	3.47E-04
INFANT	TOTALS	7.75E-04	1.09E-02	3.98E-02	1.16E-04	2.48E-03	3.99E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.76E-04	6.53E-03	3.94E-02	3.81E-05	1.55E-03	0.
CHILD	GROUND	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05
CHILD	CLOUD	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09
CHILD	VEG.ING.	1.76E-04	2.67E-03	1.76E-04	7.23E-05	5.62E-04	1.76E-04
CHILD	MEAT ING	2.07E-05	3.08E-04	2.07E-05	1.50E-05	7.96E-05	2.07E-05
CHILD	MILK ING	2.21E-04	3.28E-03	2.21E-04	1.91E-05	5.15E-04	2.21E-04
CHILD	TOTALS	8.46E-04	1.28E-02	3.99E-02	1.96E-04	2.76E-03	4.70E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.76E-04	6.53E-03	3.94E-02	3.81E-05	1.55E-03	0.
TEENAGER	GROUND	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05
TEENAGER	CLOUD	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09
TEENAGER	VEG.ING.	1.09E-04	1.64E-03	1.09E-04	5.40E-05	4.44E-04	1.09E-04
TEENAGER	MEAT ING	1.29E-05	1.90E-04	1.29E-05	1.09E-05	6.13E-05	1.29E-05
TEENAGER	MILK ING	9.77E-05	1.41E-03	9.77E-05	1.01E-05	2.90E-04	9.77E-05
TEENAGER	TOTALS	6.48E-04	9.82E-03	3.97E-02	1.65E-04	2.40E-03	2.71E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.76E-04	6.53E-03	3.94E-02	3.81E-05	1.55E-03	0.
ADULT	GROUND	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05	5.16E-05
ADULT	CLOUD	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09	1.74E-09
ADULT	VEG.ING.	1.16E-04	1.73E-03	1.16E-04	5.91E-05	4.35E-04	1.16E-04
ADULT	MEAT ING	1.77E-05	2.60E-04	1.77E-05	1.50E-05	7.59E-05	1.77E-05
ADULT	MILK ING	3.96E-05	5.64E-04	3.96E-05	4.19E-06	1.07E-04	3.96E-05
ADULT	TOTALS	6.01E-04	9.14E-03	3.96E-02	1.68E-04	2.22E-03	2.25E-04

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.26E-04	8.07E-03	3.98E-02	4.31E-04	2.83E-03	1.09E-01
INFANT	GROUND	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04
INFANT	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.76E-04	4.86E-03	3.76E-04	2.15E-04	1.41E-03	3.76E-04
INFANT	TOTALS	2.82E-03	1.49E-02	4.22E-02	2.66E-03	6.26E-03	1.11E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.26E-04	8.07E-03	3.98E-02	4.31E-04	2.83E-03	1.09E-01
CHILD	GROUND	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04
CHILD	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
CHILD	VEG.ING.	2.61E-04	4.37E-03	2.61E-04	5.79E-04	2.18E-03	2.61E-04
CHILD	MEAT ING	3.88E-05	6.68E-04	3.88E-05	1.23E-04	4.06E-04	3.88E-05
CHILD	MILK ING	2.44E-04	3.74E-03	2.44E-04	1.56E-04	9.31E-04	2.44E-04
CHILD	TOTALS	2.99E-03	1.89E-02	4.24E-02	3.30E-03	8.28E-03	1.12E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.26E-04	8.07E-03	3.98E-02	4.31E-04	2.83E-03	1.09E-01
TEENAGER	GROUND	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04
TEENAGER	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
TEENAGER	VEG.ING.	1.56E-04	2.70E-03	1.56E-04	4.27E-04	1.64E-03	1.56E-04
TEENAGER	MEAT ING	2.27E-05	4.12E-04	2.27E-05	8.87E-05	3.10E-04	2.27E-05
TEENAGER	MILK ING	1.07E-04	1.62E-03	1.07E-04	8.23E-05	5.21E-04	1.07E-04
TEENAGER	TOTALS	2.73E-03	1.48E-02	4.21E-02	3.04E-03	7.32E-03	1.11E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.26E-04	8.07E-03	3.98E-02	4.31E-04	2.83E-03	1.09E-01
ADULT	GROUND	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04
ADULT	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
ADULT	VEG.ING.	1.66E-04	2.97E-03	1.66E-04	4.64E-04	1.61E-03	1.66E-04
ADULT	MEAT ING	3.09E-05	5.87E-04	3.09E-05	1.22E-04	3.86E-04	3.09E-05
ADULT	MILK ING	4.33E-05	6.56E-04	4.33E-05	3.42E-05	1.94E-04	4.33E-05
ADULT	TOTALS	2.58E-03	1.43E-02	4.21E-02	3.07E-03	7.04E-03	1.11E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	0.
INFANT	GROUND	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03
INFANT	CLOUD	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.16E-02	2.67E-01	2.16E-02	2.09E-03	5.38E-02	2.16E-02
INFANT	TOTALS	4.64E-02	6.44E-01	2.30E+00	6.97E-03	1.45E-01	2.47E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	0.
CHILD	GROUND	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03
CHILD	CLOUD	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07
CHILD	VEG.ING.	1.14E-02	1.70E-01	1.14E-02	5.73E-03	3.77E-02	1.14E-02
CHILD	MEAT ING	1.39E-03	2.02E-02	1.39E-03	1.19E-03	5.63E-03	1.39E-03
CHILD	MILK ING	1.41E-02	2.04E-01	1.41E-02	1.51E-03	3.17E-02	1.41E-02
CHILD	TOTALS	5.17E-02	7.70E-01	2.31E+00	1.33E-02	1.66E-01	3.00E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	0.
TEENAGER	GROUND	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03
TEENAGER	CLOUD	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07
TEENAGER	VEG.ING.	7.22E-03	1.07E-01	7.22E-03	4.27E-03	2.98E-02	7.22E-03
TEENAGER	MEAT ING	8.79E-04	1.28E-02	8.79E-04	8.63E-04	4.33E-03	8.79E-04
TEENAGER	MILK ING	6.37E-03	8.98E-02	6.37E-03	7.98E-04	1.78E-02	6.37E-03
TEENAGER	TOTALS	3.93E-02	5.86E-01	2.30E+00	1.08E-02	1.43E-01	1.75E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	0.
ADULT	GROUND	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03
ADULT	CLOUD	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07	1.01E-07
ADULT	VEG.ING.	7.82E-03	1.15E-01	7.82E-03	4.68E-03	2.93E-02	7.82E-03
ADULT	MEAT ING	1.23E-03	1.78E-02	1.23E-03	1.19E-03	5.38E-03	1.23E-03
ADULT	MILK ING	2.63E-03	3.64E-02	2.63E-03	3.32E-04	6.60E-03	2.63E-03
ADULT	TOTALS	3.65E-02	5.45E-01	2.29E+00	1.11E-02	1.33E-01	1.47E-02

REGION=UNC MILL RUN 8 CODE=MILDOS.REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 47

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, TRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	2.38E+00
INFANT	GROUND	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03
INFANT	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.16E-02	2.67E-01	2.16E-02	2.10E-03	5.38E-02	2.16E-02
INFANT	TOTALS	5.20E-02	6.49E-01	2.31E+00	1.26E-02	1.51E-01	2.41E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	2.38E+00
CHILD	GROUND	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03
CHILD	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
CHILD	VEG.ING.	1.14E-02	1.70E-01	1.14E-02	5.73E-03	3.77E-02	1.14E-02
CHILD	MEAT ING	1.39E-03	2.02E-02	1.39E-03	1.19E-03	5.64E-03	1.39E-03
CHILD	MILK ING	1.41E-02	2.04E-01	1.41E-02	1.52E-03	3.17E-02	1.41E-02
CHILD	TOTALS	5.73E-02	7.76E-01	2.32E+00	1.89E-02	1.72E-01	2.41E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	2.38E+00
TEENAGER	GROUND	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03
TEENAGER	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
TEENAGER	VEG.ING.	7.22E-03	1.07E-01	7.22E-03	4.28E-03	2.98E-02	7.22E-03
TEENAGER	MEAT ING	8.79E-04	1.28E-02	8.79E-04	8.64E-04	4.34E-03	8.79E-04
TEENAGER	MILK ING	6.37E-03	8.98E-02	6.37E-03	7.98E-04	1.78E-02	6.37E-03
TEENAGER	TOTALS	4.89E-02	5.91E-01	2.30E+00	1.64E-02	1.49E-01	2.40E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.17E-02	3.73E-01	2.28E+00	1.81E-03	8.83E-02	2.38E+00
ADULT	GROUND	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03	6.45E-03
ADULT	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
ADULT	VEG.ING.	7.82E-03	1.15E-01	7.82E-03	4.68E-03	2.93E-02	7.82E-03
ADULT	MEAT ING	1.23E-03	1.78E-02	1.23E-03	1.19E-03	5.38E-03	1.23E-03
ADULT	MILK ING	2.63E-03	3.64E-02	2.63E-03	3.32E-04	6.60E-03	2.63E-03
ADULT	TOTALS	4.21E-02	5.51E-01	2.30E+00	1.67E-02	1.38E-01	2.40E+00

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.53E-04	4.26E-03	2.70E-02	1.06E-05	1.00E-03	0.
INFANT	GROUND	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05
INFANT	CLOUD	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.98E-04	2.57E-03	1.98E-04	1.52E-06	5.41E-04	1.98E-04
INFANT	TOTALS	4.84E-04	6.87E-03	2.72E-02	4.61E-05	1.58E-03	2.32E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.53E-04	4.26E-03	2.70E-02	1.06E-05	1.00E-03	0.
CHILD	GROUND	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05
CHILD	CLOUD	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09
CHILD	VEG.ING.	8.77E-05	1.42E-03	8.77E-05	4.18E-06	2.38E-04	8.77E-05
CHILD	MEAT ING	8.98E-06	1.44E-04	8.98E-06	8.59E-07	2.50E-05	8.98E-06
CHILD	MILK ING	1.17E-04	1.89E-03	1.17E-04	1.09E-06	3.06E-04	1.17E-04
CHILD	TOTALS	5.00E-04	7.76E-03	2.72E-02	5.07E-05	1.60E-03	2.48E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.53E-04	4.26E-03	2.70E-02	1.06E-05	1.00E-03	0.
TEENAGER	GROUND	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05
TEENAGER	CLOUD	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09
TEENAGER	VEG.ING.	4.97E-05	7.99E-04	4.97E-05	3.15E-06	1.88E-04	4.97E-05
TEENAGER	MEAT ING	5.03E-06	8.03E-05	5.03E-06	6.24E-07	1.94E-05	5.03E-06
TEENAGER	MILK ING	4.72E-05	7.58E-04	4.72E-05	5.76E-07	1.73E-04	4.72E-05
TEENAGER	TOTALS	3.88E-04	5.93E-03	2.71E-02	4.89E-05	1.41E-03	1.36E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.53E-04	4.26E-03	2.70E-02	1.06E-05	1.00E-03	0.
ADULT	GROUND	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05	3.39E-05
ADULT	CLOUD	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09	1.19E-09
ADULT	VEG.ING.	4.90E-05	7.89E-04	4.90E-05	3.47E-06	1.82E-04	4.90E-05
ADULT	MEAT ING	6.34E-06	1.01E-04	6.34E-06	8.62E-07	2.37E-05	6.34E-06
ADULT	MILK ING	1.78E-05	2.85E-04	1.78E-05	2.40E-07	6.38E-05	1.78E-05
ADULT	TOTALS	3.60E-04	5.47E-03	2.71E-02	4.91E-05	1.30E-03	1.07E-04

REGION=UNC MILL RUN 8 CODE=MILDOS.REVO (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 49

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.18E-04	6.31E-03	2.75E-02	5.33E-04	2.70E-03	1.78E-01
INFANT	GROUND	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05
INFANT	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.37E-04	3.27E-03	2.37E-04	2.52E-04	1.24E-03	2.37E-04
INFANT	TOTALS	3.76E-03	1.28E-02	3.09E-02	3.99E-03	7.15E-03	1.81E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.18E-04	6.31E-03	2.75E-02	5.33E-04	2.70E-03	1.78E-01
CHILD	GROUND	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05
CHILD	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
CHILD	VEG.ING.	2.01E-04	3.67E-03	2.01E-04	6.77E-04	2.28E-03	2.01E-04
CHILD	MEAT ING	3.30E-05	6.24E-04	3.30E-05	1.44E-04	4.59E-04	3.30E-05
CHILD	MILK ING	1.48E-04	2.50E-03	1.48E-04	1.83E-04	8.59E-04	1.48E-04
CHILD	TOTALS	3.90E-03	1.63E-02	3.11E-02	4.74E-03	9.50E-03	1.81E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.18E-04	6.31E-03	2.75E-02	5.33E-04	2.70E-03	1.78E-01
TEENAGER	GROUND	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05
TEENAGER	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
TEENAGER	VEG.ING.	1.12E-04	2.21E-03	1.12E-04	4.98E-04	1.77E-03	1.12E-04
TEENAGER	MEAT ING	1.81E-05	3.75E-04	1.81E-05	1.04E-04	3.50E-04	1.81E-05
TEENAGER	MILK ING	5.94E-05	1.03E-03	5.94E-05	9.65E-05	4.80E-04	5.94E-05
TEENAGER	TOTALS	3.71E-03	1.31E-02	3.09E-02	4.43E-03	8.51E-03	1.81E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.18E-04	6.31E-03	2.75E-02	5.33E-04	2.70E-03	1.78E-01
ADULT	GROUND	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05	8.48E-05
ADULT	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
ADULT	VEG.ING.	1.15E-04	2.43E-03	1.15E-04	5.42E-04	1.74E-03	1.15E-04
ADULT	MEAT ING	2.38E-05	5.35E-04	2.38E-05	1.43E-04	4.36E-04	2.38E-05
ADULT	MILK ING	2.27E-05	4.07E-04	2.27E-05	4.01E-05	1.79E-04	2.27E-05
ADULT	TOTALS	3.68E-03	1.29E-02	3.09E-02	4.46E-03	8.26E-03	1.81E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.07E-03	5.18E-02	3.28E-01	1.17E-04	1.21E-02	0.
INFANT	GROUND	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04
INFANT	CLOUD	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.40E-03	3.12E-02	2.40E-03	1.26E-05	6.57E-03	2.40E-03
INFANT	TOTALS	5.88E-03	8.34E-02	3.31E-01	5.42E-04	1.91E-02	2.81E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.07E-03	5.18E-02	3.28E-01	1.17E-04	1.21E-02	0.
CHILD	GROUND	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04
CHILD	CLOUD	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08
CHILD	VEG.ING.	1.06E-03	1.72E-02	1.06E-03	3.46E-05	2.85E-03	1.06E-03
CHILD	MEAT ING	1.08E-04	1.74E-03	1.08E-04	7.07E-06	2.95E-04	1.08E-04
CHILD	MILK ING	1.41E-03	2.29E-02	1.41E-03	9.01E-06	3.72E-03	1.41E-03
CHILD	TOTALS	6.06E-03	9.40E-02	3.31E-01	5.80E-04	1.94E-02	2.99E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.07E-03	5.18E-02	3.28E-01	1.17E-04	1.21E-02	0.
TEENAGER	GROUND	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04
TEENAGER	CLOUD	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08
TEENAGER	VEG.ING.	5.96E-04	9.63E-03	5.96E-04	2.62E-05	2.25E-03	5.96E-04
TEENAGER	MEAT ING	6.00E-05	9.60E-04	6.00E-05	5.15E-06	2.28E-04	6.00E-05
TEENAGER	MILK ING	5.69E-04	9.16E-03	5.69E-04	4.75E-06	2.10E-03	5.69E-04
TEENAGER	TOTALS	4.71E-03	7.19E-02	3.30E-01	5.66E-04	1.71E-02	1.64E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.07E-03	5.18E-02	3.28E-01	1.17E-04	1.21E-02	0.
ADULT	GROUND	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04	4.13E-04
ADULT	CLOUD	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08
ADULT	VEG.ING.	5.86E-04	9.47E-03	5.86E-04	2.89E-05	2.18E-03	5.86E-04
ADULT	MEAT ING	7.52E-05	1.20E-03	7.52E-05	7.12E-06	2.79E-04	7.52E-05
ADULT	MILK ING	2.14E-04	3.44E-03	2.14E-04	1.97E-06	7.75E-04	2.14E-04
ADULT	TOTALS	4.36E-03	6.63E-02	3.30E-01	5.68E-04	1.58E-02	1.29E-03

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.10E-03	5.27E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
INFANT	GROUND	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04
INFANT	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.41E-03	3.15E-02	2.41E-03	1.21E-04	6.88E-03	2.41E-03
INFANT	TOTALS	1.02E-02	8.89E-02	3.36E-01	5.18E-03	2.45E-02	2.62E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.10E-03	5.27E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
CHILD	GROUND	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04
CHILD	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
CHILD	VEG.ING.	1.11E-03	1.82E-02	1.11E-03	3.26E-04	3.73E-03	1.11E-03
CHILD	MEAT ING	1.18E-04	1.94E-03	1.18E-04	6.90E-05	4.82E-04	1.18E-04
CHILD	MILK ING	1.43E-03	2.32E-02	1.43E-03	8.79E-05	3.96E-03	1.43E-03
CHILD	TOTALS	1.05E-02	1.01E-01	3.36E-01	5.54E-03	2.58E-02	2.62E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.10E-03	5.27E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
TEENAGER	GROUND	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04
TEENAGER	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
TEENAGER	VEG.ING.	6.23E-04	1.02E-02	6.23E-04	2.40E-04	2.94E-03	6.23E-04
TEENAGER	MEAT ING	6.56E-05	1.09E-03	6.56E-05	4.99E-05	3.71E-04	6.56E-05
TEENAGER	MILK ING	5.74E-04	9.28E-03	5.74E-04	4.63E-05	2.23E-03	5.74E-04
TEENAGER	TOTALS	9.08E-03	7.80E-02	3.35E-01	5.40E-03	2.31E-02	2.61E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.10E-03	5.27E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
ADULT	GROUND	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04
ADULT	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
ADULT	VEG.ING.	6.15E-04	1.02E-02	6.15E-04	2.62E-04	2.85E-03	6.15E-04
ADULT	MEAT ING	8.27E-05	1.39E-03	8.27E-05	6.87E-05	4.57E-04	8.27E-05
ADULT	MILK ING	2.16E-04	3.49E-03	2.16E-04	1.92E-05	8.25E-04	2.16E-04
ADULT	TOTALS	8.73E-03	7.24E-02	3.34E-01	5.41E-03	2.17E-02	2.60E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.63E-01	0.
INFANT	GROUND	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02
INFANT	CLOUD	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.71E-01	2.08E+00	1.71E-01	2.07E-02	4.14E-01	1.71E-01
INFANT	TOTALS	3.54E-01	4.89E+00	1.69E+01	6.15E-02	1.10E+00	1.94E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.63E-01	0.
CHILD	GROUND	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02
CHILD	CLOUD	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07
CHILD	VEG.ING.	9.43E-02	1.38E+00	9.43E-02	5.66E-02	3.23E-01	9.43E-02
CHILD	MEAT ING	1.18E-02	1.69E-01	1.18E-02	1.18E-02	5.07E-02	1.18E-02
CHILD	MILK ING	1.14E-01	1.60E+00	1.14E-01	1.50E-02	2.46E-01	1.14E-01
CHILD	TOTALS	4.03E-01	5.96E+00	1.69E+01	1.24E-01	1.31E+00	2.43E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.63E-01	0.
TEENAGER	GROUND	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02
TEENAGER	CLOUD	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07
TEENAGER	VEG.ING.	6.09E-02	8.83E-01	6.09E-02	4.22E-02	2.55E-01	6.09E-02
TEENAGER	MEAT ING	7.65E-03	1.09E-01	7.65E-03	8.52E-03	3.90E-02	7.65E-03
TEENAGER	MILK ING	5.29E-02	7.25E-01	5.29E-02	7.88E-03	1.39E-01	5.29E-02
TEENAGER	TOTALS	3.05E-01	4.53E+00	1.68E+01	9.94E-02	1.12E+00	1.44E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.63E-01	0.
ADULT	GROUND	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02
ADULT	CLOUD	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07	7.39E-07
ADULT	VEG.ING.	6.71E-02	9.67E-01	6.71E-02	4.62E-02	2.51E-01	6.71E-02
ADULT	MEAT ING	1.09E-02	1.55E-01	1.09E-02	1.18E-02	4.84E-02	1.09E-02
ADULT	MILK ING	2.22E-02	2.99E-01	2.22E-02	3.28E-03	5.14E-02	2.22E-02
ADULT	TOTALS	2.83E-01	4.23E+00	1.68E+01	1.02E-01	1.04E+00	1.23E-01

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.64E-01	2.20E+01
INFANT	GROUND	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02
INFANT	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.71E-01	2.08E+00	1.71E-01	2.07E-02	4.14E-01	1.71E-01
INFANT	TOTALS	4.28E-01	4.97E+00	1.69E+01	1.36E-01	1.17E+00	2.23E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.64E-01	2.20E+01
CHILD	GROUND	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02
CHILD	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
CHILD	VEG.ING.	9.43E-02	1.38E+00	9.43E-02	5.66E-02	3.23E-01	9.43E-02
CHILD	MEAT ING	1.18E-02	1.69E-01	1.18E-02	1.18E-02	5.08E-02	1.18E-02
CHILD	MILK ING	1.14E-01	1.60E+00	1.14E-01	1.50E-02	2.46E-01	1.14E-01
CHILD	TOTALS	4.77E-01	6.03E+00	1.70E+01	1.98E-01	1.38E+00	2.23E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.64E-01	2.20E+01
TEENAGER	GROUND	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02
TEENAGER	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
TEENAGER	VEG.ING.	6.09E-02	8.83E-01	6.09E-02	4.23E-02	2.56E-01	6.09E-02
TEENAGER	MEAT ING	7.65E-03	1.09E-01	7.65E-03	8.54E-03	3.90E-02	7.65E-03
TEENAGER	MILK ING	5.29E-02	7.25E-01	5.29E-02	7.89E-03	1.39E-01	5.29E-02
TEENAGER	TOTALS	3.79E-01	4.60E+00	1.69E+01	1.74E-01	1.19E+00	2.22E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.60E-01	2.79E+00	1.67E+01	1.80E-02	6.64E-01	2.20E+01
ADULT	GROUND	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02	5.61E-02
ADULT	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
ADULT	VEG.ING.	6.71E-02	9.67E-01	6.71E-02	4.63E-02	2.52E-01	6.71E-02
ADULT	MEAT ING	1.09E-02	1.55E-01	1.09E-02	1.18E-02	4.85E-02	1.09E-02
ADULT	MILK ING	2.22E-02	2.99E-01	2.22E-02	3.28E-03	5.18E-02	2.22E-02
ADULT	TOTALS	3.57E-01	4.31E+00	1.69E+01	1.76E-01	1.11E+00	2.22E+01

REGION=UNC MILL RUN 8
METSET=GALLUP, 76-80

CODE=MILDOS,REV0 (7/79)

DATE= 15/12/81
PAGE NO. 54

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.03E-03	9.09E-01	0.
INFANT	GROUND	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02
INFANT	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.81E-01	2.35E+00	1.81E-01	1.57E-03	4.94E-01	1.81E-01
INFANT	TOTALS	4.42E-01	6.26E+00	2.48E+01	4.15E-02	1.43E+00	2.12E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.03E-03	9.09E-01	0.
CHILD	GROUND	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02
CHILD	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
CHILD	VEG.ING.	8.04E-02	1.30E+00	8.04E-02	4.31E-03	2.19E-01	8.04E-02
CHILD	MEAT ING	8.25E-03	1.33E-01	8.25E-03	8.88E-04	2.32E-02	8.25E-03
CHILD	MILK ING	1.07E-01	1.73E+00	1.07E-01	1.13E-03	2.80E-01	1.07E-01
CHILD	TOTALS	4.57E-01	7.07E+00	2.48E+01	4.63E-02	1.46E+00	2.27E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.03E-03	9.09E-01	0.
TEENAGER	GROUND	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02
TEENAGER	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
TEENAGER	VEG.ING.	4.56E-02	7.33E-01	4.56E-02	3.25E-03	1.73E-01	4.56E-02
TEENAGER	MEAT ING	4.63E-03	7.38E-02	4.63E-03	6.46E-04	1.79E-02	4.63E-03
TEENAGER	MILK ING	4.33E-02	6.93E-01	4.33E-02	5.96E-04	1.58E-01	4.33E-02
TEENAGER	TOTALS	3.54E-01	5.41E+00	2.47E+01	4.45E-02	1.29E+00	1.24E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.03E-03	9.09E-01	0.
ADULT	GROUND	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02	3.09E-02
ADULT	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
ADULT	VEG.ING.	4.50E-02	7.24E-01	4.50E-02	3.58E-03	1.67E-01	4.50E-02
ADULT	MEAT ING	5.84E-03	9.29E-02	5.84E-03	8.92E-04	2.20E-02	5.84E-03
ADULT	MILK ING	1.63E-02	2.61E-01	1.63E-02	2.48E-04	5.83E-02	1.63E-02
ADULT	TOTALS	3.28E-01	4.99E+00	2.47E+01	4.47E-02	1.19E+00	9.81E-02

TIME STEP NUMBER 1, AFTER 5 YEARS DURATION IN YRS IS... 5.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.17E-03	9.10E-01	1.30E+01
INFANT	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
INFANT	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.81E-01	2.35E+00	1.81E-01	1.64E-03	4.95E-01	1.81E-01
INFANT	TOTALS	4.96E-01	6.32E+00	2.48E+01	9.62E-02	1.49E+00	1.32E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.17E-03	9.10E-01	1.30E+01
CHILD	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
CHILD	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
CHILD	VEG.ING.	8.04E-02	1.30E+00	8.04E-02	4.49E-03	2.19E-01	8.04E-02
CHILD	MEAT ING	8.26E-03	1.33E-01	8.26E-03	9.26E-04	2.33E-02	8.26E-03
CHILD	MILK ING	1.07E-01	1.73E+00	1.07E-01	1.18E-03	2.80E-01	1.07E-01
CHILD	TOTALS	5.11E-01	7.13E+00	2.48E+01	1.01E-01	1.52E+00	1.32E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.17E-03	9.10E-01	1.30E+01
TEENAGER	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
TEENAGER	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
TEENAGER	VEG.ING.	4.56E-02	7.33E-01	4.56E-02	3.38E-03	1.73E-01	4.56E-02
TEENAGER	MEAT ING	4.64E-03	7.38E-02	4.64E-03	6.73E-04	1.80E-02	4.64E-03
TEENAGER	MILK ING	4.33E-02	6.98E-01	4.33E-02	6.21E-04	1.58E-01	4.33E-02
TEENAGER	TOTALS	4.09E-01	5.46E+00	2.47E+01	9.93E-02	1.34E+00	1.31E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.30E-01	3.88E+00	2.46E+01	9.17E-03	9.10E-01	1.30E+01
ADULT	GROUND	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02	3.73E-02
ADULT	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
ADULT	VEG.ING.	4.50E-02	7.24E-01	4.50E-02	3.72E-03	1.68E-01	4.50E-02
ADULT	MEAT ING	5.85E-03	9.31E-02	5.85E-03	9.29E-04	2.21E-02	5.85E-03
ADULT	MILK ING	1.63E-02	2.61E-01	1.63E-02	2.58E-04	5.84E-02	1.63E-02
ADULT	TOTALS	3.83E-01	5.04E+00	2.47E+01	9.95E-02	1.24E+00	1.31E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE N DIRECTION, THETA EQUALS 0.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.015E-03	2.062E-05	7.126E-06	2.802E-06	1.706E+01	1.672E+01	8.676E+00	3.790E+00	2.876E-06	7.535E-05
2.5	3.315E-03	1.069E-05	3.668E-06	1.229E-06	7.740E+00	7.686E+00	5.456E+00	3.489E+00	5.127E-06	4.859E-05
3.5	1.835E-03	5.910E-06	2.028E-06	6.851E-07	4.688E+00	4.676E+00	3.819E+00	2.941E+00	6.828E-06	3.515E-05
4.5	1.097E-03	3.576E-06	1.230E-06	4.359E-07	3.266E+00	3.264E+00	2.864E+00	2.438E+00	8.049E-06	2.697E-05
7.5	3.347E-04	1.158E-06	4.027E-07	1.702E-07	1.627E+00	1.628E+00	1.547E+00	1.464E+00	9.974E-06	1.498E-05
15.0	5.779E-05	2.339E-07	8.316E-08	4.760E-08	6.801E-01	6.805E-01	6.724E-01	6.604E-01	1.113E-05	6.573E-06
25.0	1.805E-05	8.135E-08	2.929E-08	1.927E-08	3.703E-01	3.706E-01	3.706E-01	3.689E-01	1.133E-05	3.636E-06
35.0	9.014E-06	4.254E-08	1.539E-08	1.065E-08	2.486E-01	2.487E-01	2.496E-01	2.497E-01	1.127E-05	2.453E-06
45.0	5.427E-06	2.671E-08	9.710E-09	7.001E-09	1.842E-01	1.843E-01	1.851E-01	1.855E-01	1.114E-05	1.820E-06
55.0	3.579E-06	1.823E-08	6.650E-09	4.948E-09	1.443E-01	1.444E-01	1.451E-01	1.456E-01	1.099E-05	1.428E-06
65.0	2.472E-06	1.285E-08	4.696E-09	3.554E-09	1.173E-01	1.173E-01	1.179E-01	1.184E-01	1.082E-05	1.160E-06
75.0	1.756E-06	9.177E-09	3.357E-09	2.552E-09	9.771E-02	9.777E-02	9.829E-02	9.866E-02	1.065E-05	9.670E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	2.048E+04	1.357E+02	5.040E+01	5.040E+01	5.040E+01	6.364E+01	6.364E+01	6.364E+01	3.592E+00
2.5	1.127E+04	6.231E+01	2.282E+01	2.282E+01	2.282E+01	2.891E+01	2.891E+01	2.891E+01	6.405E+00
3.5	6.238E+03	3.399E+01	1.244E+01	1.244E+01	1.244E+01	1.614E+01	1.614E+01	1.614E+01	8.529E+00
4.5	3.730E+03	2.081E+01	7.632E+00	7.632E+00	7.632E+00	1.022E+01	1.022E+01	1.022E+01	1.005E+01
7.5	1.139E+03	7.171E+00	2.659E+00	2.659E+00	2.659E+00	3.948E+00	3.948E+00	3.948E+00	1.246E+01
15.0	1.971E+02	1.602E+00	6.045E-01	6.045E-01	6.045E-01	1.144E+00	1.144E+00	1.144E+00	1.390E+01
25.0	6.159E+01	5.571E-01	2.116E-01	2.116E-01	2.116E-01	5.051E-01	5.051E-01	5.051E-01	1.415E+01
35.0	3.075E+01	2.801E-01	1.064E-01	1.064E-01	1.064E-01	3.034E-01	3.034E-01	3.034E-01	1.407E+01
45.0	1.851E+01	1.700E-01	6.462E-02	6.462E-02	6.462E-02	2.106E-01	2.106E-01	2.106E-01	1.391E+01
55.0	1.220E+01	1.129E-01	4.291E-02	4.291E-02	4.291E-02	1.573E-01	1.573E-01	1.573E-01	1.372E+01
65.0	8.430E+00	7.753E-02	2.946E-02	2.946E-02	2.946E-02	1.224E-01	1.224E-01	1.224E-01	1.352E+01
75.0	5.987E+00	5.406E-02	2.052E-02	2.052E-02	2.052E-02	9.796E-02	9.796E-02	9.796E-02	1.331E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	6.044E-05	4.016E-07	1.498E-07	1.417E-07
2.5	3.326E-05	1.844E-07	6.781E-08	6.929E-08
3.5	1.841E-05	1.006E-07	3.695E-08	4.962E-08
4.5	1.100E-05	6.156E-08	2.268E-08	4.238E-08
7.5	3.361E-06	2.122E-08	7.902E-09	3.681E-08
15.0	5.810E-07	4.742E-09	1.797E-09	3.515E-08
25.0	1.817E-07	1.650E-09	6.290E-10	3.463E-08
35.0	9.073E-08	8.292E-10	3.163E-10	3.412E-08
45.0	5.462E-08	5.033E-10	1.921E-10	3.361E-08
55.0	3.601E-08	3.341E-10	1.275E-10	3.309E-08
65.0	2.487E-08	2.294E-10	8.755E-11	3.256E-08
75.0	1.766E-08	1.600E-10	6.099E-11	3.202E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE ENE DIRECTION, THETA EQUALS 67.5 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	6.782E-03	7.057E-05	2.707E-05	2.871E-05	2.184E+01	2.076E+01	9.639E+00	3.862E+00	2.605E-06	8.465E-05
2.5	3.534E-03	2.887E-05	1.094E-05	1.073E-05	8.715E+00	8.524E+00	5.629E+00	3.448E+00	4.718E-06	5.018E-05
3.5	1.964E-03	1.560E-05	5.900E-06	5.736E-06	5.003E+00	4.949E+00	3.813E+00	2.855E+00	6.286E-06	3.508E-05
4.5	1.194E-03	9.714E-06	3.681E-06	3.614E-06	3.383E+00	3.364E+00	2.809E+00	2.338E+00	7.396E-06	2.643E-05
7.5	3.960E-04	3.704E-06	1.415E-06	1.460E-06	1.652E+00	1.651E+00	1.514E+00	1.408E+00	9.284E-06	1.463E-05
15.0	8.505E-05	1.005E-06	3.883E-07	4.268E-07	6.742E-01	6.746E-01	6.549E-01	6.344E-01	1.037E-05	6.382E-06
25.0	3.158E-05	4.034E-07	1.562E-07	1.746E-07	3.611E-01	3.613E-01	3.584E-01	3.536E-01	1.049E-05	3.508E-06
35.0	1.721E-05	2.224E-07	8.620E-08	9.658E-08	2.399E-01	2.401E-01	2.399E-01	2.387E-01	1.038E-05	2.354E-06
45.0	1.108E-05	1.460E-07	5.664E-08	6.371E-08	1.769E-01	1.770E-01	1.774E-01	1.772E-01	1.024E-05	1.743E-06
55.0	7.709E-06	1.033E-07	4.007E-08	4.522E-08	1.381E-01	1.382E-01	1.387E-01	1.389E-01	1.008E-05	1.364E-06
65.0	5.549E-06	7.440E-08	2.887E-08	3.259E-08	1.118E-01	1.119E-01	1.124E-01	1.127E-01	9.915E-06	1.105E-06
75.0	4.067E-06	5.374E-08	2.084E-08	2.346E-08	9.280E-02	9.286E-02	9.332E-02	9.360E-02	9.745E-06	9.179E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	2.420E+04	1.064E+03	4.217E+02	4.217E+02	4.217E+02	4.382E+02	4.382E+02	4.382E+02	3.254E+00
2.5	1.241E+04	3.904E+02	1.541E+02	1.541E+02	1.541E+02	1.608E+02	1.608E+02	1.608E+02	5.894E+00
3.5	6.876E+03	2.035E+02	8.023E+01	8.023E+01	8.023E+01	8.415E+01	8.415E+01	8.415E+01	7.852E+00
4.5	4.182E+03	1.250E+02	4.929E+01	4.929E+01	4.929E+01	5.195E+01	5.195E+01	5.195E+01	9.238E+00
7.5	1.393E+03	4.712E+01	1.862E+01	1.862E+01	1.862E+01	1.992E+01	1.992E+01	1.992E+01	1.160E+01
15.0	3.011E+02	1.216E+01	4.816E+00	4.816E+00	4.816E+00	5.351E+00	5.351E+00	5.351E+00	1.295E+01
25.0	1.116E+02	4.464E+00	1.767E+00	1.767E+00	1.767E+00	2.053E+00	2.053E+00	2.053E+00	1.310E+01
35.0	6.055E+01	2.270E+00	8.982E-01	8.982E-01	8.982E-01	1.088E+00	1.088E+00	1.088E+00	1.297E+01
45.0	3.486E+01	1.393E+00	5.508E-01	5.508E-01	5.508E-01	6.910E-01	6.910E-01	6.910E-01	1.279E+01
55.0	2.698E+01	9.339E-01	3.691E-01	3.691E-01	3.691E-01	4.785E-01	4.785E-01	4.785E-01	1.259E+01
65.0	1.938E+01	6.449E-01	2.547E-01	2.547E-01	2.547E-01	3.433E-01	3.433E-01	3.433E-01	1.238E+01
75.0	1.418E+01	4.503E-01	1.777E-01	1.777E-01	1.777E-01	2.513E-01	2.513E-01	2.513E-01	1.217E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	7.142E-05	3.157E-06	1.256E-06	1.612E-06
2.5	3.662E-05	1.158E-06	4.588E-07	5.887E-07
3.5	2.029E-05	6.034E-07	2.389E-07	3.167E-07
4.5	1.234E-05	3.707E-07	1.468E-07	2.053E-07
7.5	4.111E-06	1.397E-07	5.543E-08	9.765E-08
15.0	8.887E-07	3.606E-08	1.434E-08	4.935E-08
25.0	3.293E-07	1.323E-08	5.260E-09	3.816E-08
35.0	1.787E-07	6.730E-09	2.673E-09	3.453E-08
45.0	1.147E-07	4.129E-09	1.639E-09	3.278E-08
55.0	7.963E-08	2.767E-09	1.098E-09	3.163E-08
65.0	5.720E-08	1.911E-09	7.577E-10	3.070E-08
75.0	4.180E-08	1.334E-09	5.287E-10	2.990E-08

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE E   DIRECTION, THETA EQUALS 90.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	3.872E-03	2.728E-05	1.022E-05	9.371E-06	1.177E+01	1.126E+01	5.277E+00	2.119E+00	1.432E-06	4.626E-05
2.5	1.988E-03	1.172E-05	4.334E-06	3.600E-06	4.809E+00	4.721E+00	3.149E+00	1.933E+00	2.647E-06	2.804E-05
3.5	1.100E-03	6.385E-06	2.359E-06	1.943E-06	2.790E+00	2.767E+00	2.153E+00	1.615E+00	3.558E-06	1.979E-05
4.5	6.674E-04	3.965E-06	1.468E-06	1.230E-06	1.897E+00	1.889E+00	1.593E+00	1.330E+00	4.205E-06	1.498E-05
7.5	2.225E-04	1.473E-06	5.504E-07	4.921E-07	9.240E-01	9.237E-01	8.542E-01	7.977E-01	5.266E-06	8.258E-06
15.0	4.892E-05	3.871E-07	1.464E-07	1.423E-07	3.767E-01	3.769E-01	3.677E-01	3.574E-01	5.869E-06	3.585E-06
25.0	1.874E-05	1.546E-07	5.863E-08	5.787E-08	2.020E-01	2.021E-01	2.010E-01	1.987E-01	5.939E-06	1.968E-06
35.0	1.041E-05	8.560E-08	3.245E-08	3.198E-08	1.346E-01	1.347E-01	1.348E-01	1.343E-01	5.890E-06	1.323E-06
45.0	6.763E-06	5.617E-08	2.130E-08	2.108E-08	9.941E-02	9.987E-02	9.977E-02	9.977E-02	5.816E-06	9.804E-07
55.0	4.735E-06	3.968E-08	1.506E-08	1.495E-08	7.771E-02	7.776E-02	7.808E-02	7.822E-02	5.731E-06	7.677E-07
65.0	3.437E-06	2.863E-08	1.086E-08	1.076E-08	6.296E-02	6.299E-02	6.329E-02	6.347E-02	5.639E-06	6.225E-07
75.0	2.549E-06	2.078E-08	7.873E-09	7.734E-09	5.229E-02	5.233E-02	5.259E-02	5.276E-02	5.544E-06	5.173E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.351E+04	3.547E+02	1.395E+02	1.395E+02	1.395E+02	1.484E+02	1.484E+02	1.484E+02	1.789E+00
2.5	6.879E+03	1.346E+02	5.263E+01	5.263E+01	5.263E+01	5.637E+01	5.637E+01	5.637E+01	3.307E+00
3.5	3.807E+03	7.085E+01	2.767E+01	2.767E+01	2.767E+01	2.986E+01	2.986E+01	2.986E+01	4.445E+00
4.5	2.306E+03	4.361E+01	1.703E+01	1.703E+01	1.703E+01	1.853E+01	1.853E+01	1.853E+01	5.253E+00
7.5	7.704E+02	1.616E+01	6.331E+00	6.331E+00	6.331E+00	7.062E+00	7.062E+00	7.062E+00	6.579E+00
15.0	1.699E+02	4.083E+00	1.604E+00	1.604E+00	1.604E+00	1.902E+00	1.902E+00	1.902E+00	7.331E+00
25.0	6.494E+01	1.485E+00	5.825E-01	5.825E-01	5.825E-01	7.426E-01	7.426E-01	7.426E-01	7.419E+00
35.0	3.597E+01	7.542E-01	2.953E-01	2.953E-01	2.953E-01	4.020E-01	4.020E-01	4.020E-01	7.357E+00
45.0	2.332E+01	4.619E-01	1.806E-01	1.806E-01	1.806E-01	2.594E-01	2.594E-01	2.594E-01	7.265E+00
55.0	1.630E+01	3.092E-01	1.208E-01	1.208E-01	1.208E-01	1.824E-01	1.824E-01	1.824E-01	7.159E+00
65.0	1.182E+01	2.133E-01	8.323E-02	8.323E-02	8.323E-02	1.331E-01	1.331E-01	1.331E-01	7.044E+00
75.0	8.754E+00	1.490E-01	5.804E-02	5.804E-02	5.804E-02	9.948E-02	9.948E-02	9.948E-02	6.926E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	3.986E-05	1.052E-06	4.154E-07	5.167E-07
2.5	2.030E-05	3.992E-07	1.567E-07	1.955E-07
3.5	1.122E-05	2.100E-07	8.236E-08	1.087E-07
4.5	6.806E-06	1.293E-07	5.070E-08	7.308E-08
7.5	2.273E-06	4.792E-08	1.884E-08	3.856E-08
15.0	5.013E-07	1.210E-08	4.773E-09	2.345E-08
25.0	1.916E-07	4.400E-09	1.733E-09	1.993E-08
35.0	1.061E-07	2.235E-09	8.786E-10	1.873E-08
45.0	6.881E-08	1.368E-09	5.373E-10	1.809E-08
55.0	4.811E-08	9.157E-10	3.592E-10	1.762E-08
65.0	3.487E-08	6.318E-10	2.475E-10	1.721E-08
75.0	2.583E-08	4.412E-10	1.726E-10	1.680E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE S DIRECTION, THETA EQUALS 180.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	2.795E-03	9.161E-06	3.143E-06	1.080E-06	8.340E+00	8.175E+00	4.303E+00	1.920E+00	1.505E-06	3.740E-05
2.5	1.488E-03	4.651E-06	1.586E-06	4.711E-07	3.620E+00	3.596E+00	2.560E+00	1.649E+00	2.469E-06	2.284E-05
3.5	8.218E-04	2.563E-06	8.747E-07	2.614E-07	2.143E+00	2.138E+00	1.746E+00	1.348E+00	3.170E-06	1.608E-05
4.5	4.929E-04	1.551E-06	5.305E-07	1.656E-07	1.471E+00	1.469E+00	1.289E+00	1.098E+00	3.659E-06	1.214E-05
7.5	1.561E-04	5.121E-07	1.765E-07	6.413E-08	7.185E-01	7.188E-01	6.827E-01	6.459E-01	4.419E-06	6.611E-06
15.0	3.029E-05	1.092E-07	3.816E-08	1.764E-08	2.935E-01	2.937E-01	2.902E-01	2.849E-01	4.807E-06	2.836E-06
25.0	1.061E-05	3.995E-08	1.405E-08	7.079E-09	1.602E-01	1.603E-01	1.603E-01	1.596E-01	4.900E-06	1.573E-06
35.0	5.643E-06	2.148E-08	7.566E-09	3.884E-09	1.077E-01	1.077E-01	1.081E-01	1.081E-01	4.874E-06	1.062E-06
45.0	3.541E-06	1.367E-08	4.825E-09	2.540E-09	7.980E-02	7.985E-02	8.022E-02	8.041E-02	4.820E-06	7.889E-07
55.0	2.412E-06	9.415E-09	3.328E-09	1.785E-09	6.256E-02	6.260E-02	6.291E-02	6.311E-02	4.755E-06	6.188E-07
65.0	1.718E-06	6.710E-09	2.372E-09	1.274E-09	5.082E-02	5.085E-02	5.112E-02	5.130E-02	4.683E-06	5.029E-07
75.0	1.259E-06	4.870E-09	1.719E-09	9.065E-10	4.234E-02	4.237E-02	4.259E-02	4.275E-02	4.607E-06	4.190E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	9.508E+03	5.489E+01	2.016E+01	2.016E+01	2.016E+01	2.663E+01	2.663E+01	2.663E+01	1.880E+00
2.5	5.058E+03	2.510E+01	9.094E+00	9.094E+00	9.094E+00	1.194E+01	1.194E+01	1.194E+01	3.084E+00
3.5	2.792E+03	1.365E+01	4.941E+00	4.941E+00	4.941E+00	6.634E+00	6.634E+00	6.634E+00	3.960E+00
4.5	1.675E+03	8.330E+00	3.021E+00	3.021E+00	3.021E+00	4.185E+00	4.185E+00	4.185E+00	4.571E+00
7.5	5.306E+02	2.868E+00	1.049E+00	1.049E+00	1.049E+00	1.619E+00	1.619E+00	1.619E+00	5.519E+00
15.0	1.031E+02	6.428E-01	2.381E-01	2.381E-01	2.381E-01	4.707E-01	4.707E-01	4.707E-01	6.005E+00
25.0	3.608E+01	2.265E-01	8.392E-02	8.392E-02	8.392E-02	2.109E-01	2.109E-01	2.109E-01	6.120E+00
35.0	1.919E+01	1.152E-01	4.250E-02	4.250E-02	4.250E-02	1.278E-01	1.278E-01	1.278E-01	6.088E+00
45.0	1.204E+01	7.037E-02	2.591E-02	2.591E-02	2.591E-02	8.916E-02	8.916E-02	8.916E-02	6.021E+00
55.0	8.196E+00	4.694E-02	1.725E-02	1.725E-02	1.725E-02	6.683E-02	6.683E-02	6.683E-02	5.940E+00
65.0	5.835E+00	3.244E-02	1.189E-02	1.189E-02	1.189E-02	5.217E-02	5.217E-02	5.217E-02	5.850E+00
75.0	4.277E+00	2.282E-02	8.330E-03	8.330E-03	8.330E-03	4.189E-02	4.189E-02	4.189E-02	5.755E+00

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	2.805E-05	1.624E-07	5.990E-08	5.338E-08
2.5	1.492E-05	7.425E-08	2.702E-08	2.703E-08
3.5	8.239E-06	4.038E-08	1.468E-08	2.005E-08
4.5	4.942E-06	2.464E-08	8.975E-09	1.754E-08
7.5	1.566E-06	8.486E-09	3.118E-09	1.571E-08
15.0	3.041E-07	1.902E-09	7.075E-10	1.503E-08
25.0	1.065E-07	6.702E-10	2.493E-10	1.491E-08
35.0	5.661E-08	3.407E-10	1.263E-10	1.473E-08
45.0	3.551E-08	2.081E-10	7.695E-11	1.453E-08
55.0	2.418E-08	1.388E-10	5.122E-11	1.431E-08
65.0	1.722E-08	9.592E-11	3.530E-11	1.408E-08
75.0	1.262E-08	6.746E-11	2.473E-11	1.384E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

CONCENTRATION DATA FOR THE W DIRECTION, THETA EQUALS 270.0 DEGREES

TOTAL AIR CONCENTRATIONS, PCI/M3, AND WL

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210	WL
1.5	4.937E-03	1.500E-05	5.074E-06	1.250E-06	1.390E+01	1.376E+01	7.898E+00	3.818E+00	3.368E-06	6.845E-05
2.5	2.779E-03	8.133E-06	2.740E-06	5.796E-07	6.468E+00	6.449E+00	4.845E+00	3.264E+00	5.314E-06	4.338E-05
3.5	1.533E-03	4.482E-06	1.512E-06	3.267E-07	4.021E+00	4.018E+00	3.410E+00	2.710E+00	6.807E-06	3.154E-05
4.5	9.079E-04	2.673E-06	9.033E-07	2.064E-07	2.838E+00	2.838E+00	2.564E+00	2.229E+00	7.846E-06	2.423E-05
7.5	2.658E-04	8.126E-07	2.767E-07	7.753E-08	1.439E+00	1.439E+00	1.391E+00	1.332E+00	9.460E-06	1.350E-05
15.0	4.017E-05	1.385E-07	4.812E-08	2.014E-08	6.046E-01	6.050E-01	6.020E-01	5.956E-01	1.033E-05	5.897E-06
25.0	1.112E-05	4.248E-08	1.498E-08	7.762E-09	3.277E-01	3.279E-01	3.287E-01	3.285E-01	1.038E-05	3.230E-06
35.0	5.264E-06	2.107E-08	7.475E-09	4.188E-09	2.195E-01	2.196E-01	2.206E-01	2.211E-01	1.026E-05	2.169E-06
45.0	3.069E-06	1.289E-08	4.565E-09	2.718E-09	1.623E-01	1.624E-01	1.632E-01	1.638E-01	1.012E-05	1.606E-06
55.0	1.985E-06	8.543E-09	3.059E-09	1.900E-09	1.271E-01	1.272E-01	1.278E-01	1.283E-01	9.960E-06	1.258E-06
65.0	1.359E-06	5.939E-09	2.130E-09	1.349E-09	1.032E-01	1.033E-01	1.038E-01	1.042E-01	9.799E-06	1.021E-06
75.0	9.651E-07	4.212E-09	1.510E-09	9.546E-10	8.601E-02	8.607E-02	8.652E-02	8.686E-02	9.639E-06	8.513E-07

GROUND SURFACE CONCENTRATIONS, PCI/M2

XRHO, KM	U-238	TH-230	RA-226	PB-210	RN-222	PO-218	PB-214	BI-214	PB-210
1.5	1.677E+04	7.489E+01	2.675E+01	2.675E+01	2.675E+01	3.765E+01	3.765E+01	3.765E+01	4.207E+00
2.5	9.432E+03	3.723E+01	1.312E+01	1.312E+01	1.312E+01	1.823E+01	1.823E+01	1.823E+01	6.638E+00
3.5	5.203E+03	2.048E+01	7.221E+00	7.221E+00	7.221E+00	1.040E+01	1.040E+01	1.040E+01	8.503E+00
4.5	3.082E+03	1.239E+01	4.382E+00	4.382E+00	4.382E+00	6.630E+00	6.630E+00	6.630E+00	9.800E+00
7.5	9.028E+02	4.009E+00	1.436E+00	1.436E+00	1.436E+00	2.576E+00	2.576E+00	2.576E+00	1.182E+01
15.0	1.366E+02	7.756E-01	2.850E-01	2.850E-01	2.850E-01	7.642E-01	7.642E-01	7.642E-01	1.291E+01
25.0	3.785E+01	2.445E-01	9.081E-02	9.081E-02	9.081E-02	3.505E-01	3.505E-01	3.505E-01	1.297E+01
35.0	1.791E+01	1.175E-01	4.369E-02	4.369E-02	4.369E-02	2.176E-01	2.176E-01	2.176E-01	1.282E+01
45.0	1.044E+01	6.926E-02	2.577E-02	2.577E-02	2.577E-02	1.544E-01	1.544E-01	1.544E-01	1.264E+01
55.0	6.749E+00	4.496E-02	1.674E-02	1.674E-02	1.674E-02	1.175E-01	1.175E-01	1.175E-01	1.244E+01
65.0	4.620E+00	3.037E-02	1.129E-02	1.129E-02	1.129E-02	9.309E-02	9.309E-02	9.309E-02	1.224E+01
75.0	3.281E+00	2.089E-02	7.746E-03	7.746E-03	7.746E-03	7.591E-02	7.591E-02	7.591E-02	1.204E+01

TOTAL DEPOSITION RATES, PCI/M2-SEC

XRHO, KM	U-238	TH-230	RA-226	PB-210
1.5	4.947E-05	2.214E-07	7.944E-08	6.099E-08
2.5	2.783E-05	1.101E-07	3.894E-08	3.718E-08
3.5	1.535E-05	6.054E-08	2.143E-08	3.214E-08
4.5	9.093E-06	3.662E-08	1.301E-08	3.092E-08
7.5	2.664E-06	1.185E-08	4.265E-09	3.116E-08
15.0	4.031E-07	2.295E-09	8.469E-10	3.169E-08
25.0	1.117E-07	7.235E-10	2.698E-10	3.158E-08
35.0	5.288E-08	3.477E-10	1.298E-10	3.091E-08
45.0	3.081E-08	2.049E-10	7.655E-11	3.042E-08
55.0	1.991E-08	1.330E-10	4.971E-11	2.992E-08
65.0	1.343E-08	8.982E-11	3.353E-11	2.943E-08
75.0	9.680E-09	6.177E-11	2.300E-11	2.894E-08

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.363E-03	0.	0.	0.	3.921E-04	1.247E-04	3.505E-05	1.170E-05	6.070E-05	2.215E-05	1.825E-05	5.286E-06
NNE	0.	0.	0.	0.	2.468E-04	5.298E-05	6.502E-05	1.336E-05	2.831E-06	2.929E-05	3.443E-05	4.102E-06
NE	0.	0.	9.768E-04	0.	2.885E-04	8.181E-05	1.019E-04	3.190E-05	7.949E-07	2.014E-06	2.160E-05	6.124E-05
ENE	0.	0.	4.708E-04	0.	7.863E-05	2.660E-04	1.059E-04	4.689E-05	6.457E-06	1.581E-05	1.601E-05	0.
E	0.	0.	0.	0.	6.667E-04	1.510E-04	1.094E-04	3.009E-03	1.609E-04	1.039E-05	1.126E-05	1.175E-05
ESE	0.	0.	0.	5.646E-05	2.586E-04	6.275E-05	9.145E-05	4.797E-05	7.763E-05	3.395E-05	1.352E-06	7.831E-06
SE	0.	0.	9.855E-05	3.901E-05	1.746E-04	1.278E-05	2.981E-05	6.116E-05	4.684E-05	8.318E-06	3.069E-05	2.130E-04
SSE	0.	0.	5.983E-05	9.193E-05	5.299E-05	3.021E-05	1.243E-05	7.941E-06	4.755E-06	3.660E-06	2.122E-06	1.281E-05
S	0.	0.	0.	1.802E-04	7.441E-05	2.479E-04	1.006E-05	2.161E-05	1.604E-05	5.243E-07	1.294E-06	0.
SSW	0.	1.017E-03	1.023E-04	1.735E-04	7.267E-05	2.125E-04	8.113E-06	4.897E-05	3.226E-05	1.099E-05	3.598E-05	3.735E-04
SW	0.	0.	0.	2.051E-04	1.475E-03	3.510E-05	3.323E-03	1.505E-04	2.139E-05	5.055E-05	2.666E-05	4.504E-06
WSW	2.306E-03	4.974E-04	0.	0.	7.032E-04	1.203E-04	5.494E-03	2.024E-04	5.830E-05	1.094E-05	4.226E-06	3.731E-06
W	0.	0.	0.	0.	8.945E-04	1.400E-04	2.413E-04	7.519E-05	1.373E-04	1.111E-04	5.018E-06	4.543E-06
WNW	0.	0.	0.	0.	1.659E-04	1.660E-04	2.402E-04	1.642E-04	1.487E-05	1.465E-04	2.796E-06	2.553E-06
NW	0.	0.	0.	0.	1.541E-04	4.812E-05	2.795E-05	4.902E-05	3.574E-07	6.127E-05	1.611E-05	1.909E-06
NNW	2.590E-03	4.072E-04	0.	7.314E-05	1.981E-04	6.034E-05	2.843E-05	1.814E-05	1.921E-04	6.841E-05	3.841E-05	5.953E-05

TOTAL DOSE COMMITMENT IS 4.075E-02 PERSON-REM/YR

TIME STEP NUMBER 2. AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.243E-01	0.	0.	0.	6.676E-03	2.221E-03	6.830E-04	2.485E-04	1.387E-03	5.373E-04	4.653E-04	1.403E-04
NNE	0.	0.	0.	0.	4.224E-03	9.365E-04	1.216E-03	2.648E-04	5.933E-05	6.464E-04	7.974E-04	9.939E-05
NE	0.	0.	1.675E-02	0.	4.998E-03	1.463E-03	1.909E-03	6.269E-04	1.636E-05	4.330E-05	4.850E-04	1.435E-03
ENE	0.	0.	8.088E-03	0.	1.366E-03	4.784E-03	2.001E-03	9.301E-04	1.342E-04	3.432E-04	3.628E-04	0.
E	0.	0.	0.	0.	1.147E-02	2.679E-03	2.032E-03	5.859E-02	3.280E-03	2.213E-04	2.502E-04	2.720E-04
ESE	0.	0.	0.	9.622E-04	4.431E-03	1.099E-03	1.654E-03	8.984E-04	1.508E-03	6.841E-04	2.828E-05	1.701E-04
SE	0.	0.	1.671E-03	6.624E-04	2.980E-03	2.228E-04	5.370E-04	1.143E-03	9.093E-04	1.679E-04	6.445E-04	4.655E-03
SSE	0.	0.	1.012E-03	1.556E-03	9.025E-04	5.302E-04	2.303E-04	1.554E-04	9.809E-05	7.933E-05	4.815E-05	3.031E-04
S	0.	0.	0.	3.045E-03	1.266E-03	4.372E-03	1.897E-04	4.362E-04	3.442E-04	1.189E-05	3.082E-05	0.
SSW	0.	1.715E-02	1.726E-03	2.931E-03	1.236E-03	3.772E-03	1.569E-04	1.028E-03	7.271E-04	2.629E-04	9.037E-04	9.768E-03
SW	0.	0.	0.	3.462E-03	2.507E-02	6.288E-04	6.633E-02	3.312E-03	5.081E-04	1.274E-03	7.028E-04	1.229E-04
WSW	3.888E-02	8.385E-03	0.	0.	1.197E-02	2.148E-03	1.078E-01	4.336E-03	1.341E-03	2.664E-04	1.078E-04	9.886E-05
W	0.	0.	0.	0.	1.523E-02	2.527E-03	4.919E-03	1.703E-03	3.363E-03	2.881E-03	1.357E-04	1.269E-04
WNW	0.	0.	0.	0.	2.824E-03	3.002E-03	4.949E-03	3.784E-03	3.718E-04	3.881E-03	7.718E-05	7.257E-05
NW	0.	0.	0.	0.	2.623E-03	8.660E-04	5.640E-04	1.096E-03	8.654E-06	1.576E-03	4.335E-04	5.312E-05
NNW	4.371E-02	6.871E-03	0.	1.236E-03	3.376E-03	1.086E-03	5.708E-04	4.023E-04	4.607E-03	1.741E-03	1.023E-03	1.643E-03

TOTAL DOSE COMMITMENT IS 7.488E-01 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS AVG.LUNG

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.856E-01	0.	0.	0.	4.145E-02	1.252E-02	3.117E-03	8.985E-04	3.986E-03	1.238E-03	8.646E-04	2.116E-04
NNE	0.	0.	0.	0.	2.601E-02	5.388E-03	6.159E-03	1.161E-03	2.240E-04	2.093E-03	2.198E-03	2.313E-04
NE	0.	0.	1.030E-01	0.	3.013E-02	8.262E-03	9.703E-03	2.838E-03	6.564E-05	1.534E-04	1.501E-03	3.835E-03
ENE	0.	0.	4.956E-02	0.	8.191E-03	2.672E-02	9.995E-03	4.119E-03	5.248E-04	1.181E-03	1.090E-03	0.
E	0.	0.	0.	0.	6.998E-02	1.534E-02	1.048E-02	2.696E-01	1.340E-02	7.997E-04	7.939E-04	7.525E-04
ESE	0.	0.	0.	5.979E-03	2.723E-02	6.459E-03	9.052E-03	4.533E-03	6.965E-03	2.874E-03	1.073E-04	5.774E-04
SE	0.	0.	1.048E-02	4.141E-03	1.843E-02	1.319E-03	2.957E-03	5.784E-03	4.194E-03	7.004E-04	2.410E-03	1.547E-02
SSE	0.	0.	6.374E-03	9.782E-03	5.601E-03	3.087E-03	1.187E-03	7.007E-04	3.848E-04	2.698E-04	1.415E-04	7.669E-04
S	0.	0.	0.	1.920E-02	7.874E-03	2.517E-02	9.357E-04	1.815E-03	1.204E-03	3.498E-05	7.620E-05	0.
SSW	0.	1.086E-01	1.092E-02	1.849E-02	7.686E-03	2.139E-02	7.288E-04	3.837E-03	2.183E-03	6.394E-04	1.793E-03	1.593E-02
SW	0.	0.	0.	2.188E-02	1.560E-01	3.493E-03	2.837E-01	1.073E-02	1.265E-03	2.487E-03	1.098E-03	1.566E-04
WSW	2.462E-01	5.311E-02	0.	0.	7.436E-02	1.204E-02	4.825E-01	1.527E-02	3.757E-03	6.022E-04	1.989E-04	1.504E-04
W	0.	0.	0.	0.	9.449E-02	1.382E-02	1.993E-02	5.035E-03	7.446E-03	4.914E-03	1.829E-04	1.382E-04
WNW	0.	0.	0.	0.	1.753E-02	1.632E-02	1.945E-02	1.053E-02	7.516E-04	5.896E-03	9.107E-05	6.861E-05
NW	0.	0.	0.	0.	1.628E-02	4.764E-03	2.348E-03	3.381E-03	2.005E-05	2.801E-03	6.044E-04	5.945E-05
NNW	2.763E-01	4.346E-02	0.	7.789E-03	2.092E-02	5.984E-03	2.411E-03	1.276E-03	1.112E-02	3.263E-03	1.514E-03	1.948E-03

TOTAL DOSE COMMITMENT IS 3.934E+00 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS INHAL. EXPOSED ORGAN IS BRONCHI

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	6.079E-01	0.	0.	0.	5.491E-02	3.996E-02	1.713E-02	6.525E-03	3.487E-02	1.254E-02	9.967E-03	2.748E-03
NNE	0.	0.	0.	0.	3.032E-02	1.223E-02	2.103E-02	4.955E-03	1.113E-03	1.179E-02	1.397E-02	1.659E-03
NE	0.	0.	6.904E-02	0.	3.222E-02	1.657E-02	2.792E-02	9.957E-03	2.626E-04	6.844E-04	7.480E-03	2.147E-02
ENE	0.	0.	3.440E-02	0.	9.291E-03	5.731E-02	3.069E-02	1.530E-02	2.211E-03	5.526E-03	5.661E-03	0.
E	0.	0.	0.	0.	7.912E-02	3.202E-02	3.043E-02	9.325E-01	5.225E-02	3.448E-03	3.777E-03	3.955E-03
ESE	0.	0.	0.	4.228E-03	2.624E-02	1.028E-02	1.890E-02	1.107E-02	1.907E-02	8.688E-03	3.571E-04	2.118E-03
SE	0.	0.	6.930E-03	3.015E-03	1.814E-02	2.094E-03	6.158E-03	1.415E-02	1.160E-02	2.160E-03	8.257E-03	5.884E-02
SSE	0.	0.	5.957E-03	9.635E-03	7.288E-03	6.989E-03	3.868E-03	2.757E-03	1.730E-03	1.356E-03	7.875E-04	4.708E-03
S	0.	0.	0.	1.563E-02	9.879E-03	6.622E-02	3.805E-03	9.218E-03	7.133E-03	2.346E-04	5.718E-04	0.
SSW	0.	8.240E-02	8.610E-03	1.643E-02	1.050E-02	6.590E-02	3.779E-03	2.594E-02	1.764E-02	5.946E-03	1.883E-02	1.865E-01
SW	0.	0.	0.	1.822E-02	2.195E-01	1.294E-02	1.924E+00	9.782E-02	1.399E-02	3.177E-02	1.576E-02	2.477E-03
WSW	1.908E-01	3.395E-02	0.	0.	9.978E-02	4.058E-02	2.819E+00	1.167E-01	3.410E-02	6.216E-03	2.290E-03	1.908E-03
W	0.	0.	0.	0.	1.394E-01	5.631E-02	1.561E-01	5.432E-02	9.841E-02	7.538E-02	3.161E-03	2.634E-03
WNW	0.	0.	0.	0.	2.639E-02	7.029E-02	1.664E-01	1.273E-01	1.140E-02	1.057E-01	1.858E-03	1.549E-03
NW	0.	0.	0.	0.	2.352E-02	1.870E-02	1.718E-02	3.393E-02	2.490E-04	4.094E-02	1.009E-02	1.107E-03
NNW	2.309E-01	2.924E-02	0.	6.667E-03	2.972E-02	2.256E-02	1.677E-02	1.210E-02	1.293E-01	4.430E-02	2.343E-02	3.384E-02

TOTAL DOSE COMMITMENT IS 1.070E+01 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS GROUND EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.224E-03	0.	0.	0.	2.277E-04	7.843E-05	2.262E-05	7.344E-06	3.650E-05	1.268E-05	9.933E-06	2.735E-06
NNE	0.	0.	0.	0.	1.658E-04	3.813E-05	4.693E-05	9.323E-06	1.900E-06	1.883E-05	2.113E-05	2.395E-06
NE	0.	0.	7.941E-04	0.	2.500E-04	7.665E-05	9.358E-05	2.775E-05	6.551E-07	1.573E-06	1.593E-05	4.247E-05
ENE	0.	0.	4.000E-04	0.	7.117E-05	2.609E-04	1.005E-04	4.153E-05	5.365E-06	1.235E-05	1.172E-05	0.
E	0.	0.	0.	0.	5.002E-04	1.195E-04	8.366E-05	2.179E-03	1.109E-04	6.833E-06	7.045E-06	6.982E-06
ESE	0.	0.	0.	3.901E-05	1.819E-04	4.476E-05	6.274E-05	3.154E-05	4.930E-05	2.086E-05	8.023E-07	4.476E-06
SE	0.	0.	6.226E-05	2.478E-05	1.129E-04	8.351E-06	1.892E-05	3.760E-05	2.801E-05	4.841E-06	1.733E-05	1.165E-04
SSE	0.	0.	3.472E-05	5.332E-05	3.116E-05	1.830E-05	7.514E-06	4.686E-06	2.727E-06	2.035E-06	1.141E-06	6.649E-06
S	0.	0.	0.	9.999E-05	4.232E-05	1.483E-04	6.066E-06	1.274E-05	9.160E-06	2.889E-07	6.865E-07	0.
SSW	6.	5.552E-04	5.585E-05	9.523E-05	4.090E-05	1.272E-04	4.960E-06	2.926E-05	1.858E-05	6.067E-06	1.899E-05	1.887E-04
SW	0.	0.	0.	1.098E-04	8.086E-04	2.069E-05	2.026E-03	8.968E-05	1.221E-05	2.750E-05	1.382E-05	2.229E-06
WSW	1.276E-03	2.701E-04	0.	0.	3.959E-04	7.302E-05	3.419E-03	1.227E-04	3.386E-05	6.060E-06	2.232E-06	1.882E-06
W	0.	0.	0.	0.	5.028E-04	8.626E-05	1.546E-04	4.663E-05	8.074E-05	6.165E-05	2.632E-06	2.262E-06
WNW	0.	0.	0.	0.	9.184E-05	1.007E-04	1.524E-04	1.012E-04	8.684E-06	8.064E-05	1.454E-06	1.260E-06
NW	0.	0.	0.	0.	8.688E-05	2.972E-05	1.792E-05	3.054E-05	2.119E-07	3.435E-05	8.543E-06	9.605E-07
NNW	1.481E-03	2.270E-04	0.	4.122E-05	1.160E-04	3.908E-05	1.902E-05	1.170E-05	1.173E-04	3.934E-05	2.081E-05	3.047E-05

TOTAL DOSE COMMITMENT IS 2.517E-02 PERSON-REM/YR

TIME STEP NUMBER 2. AFTER 20 YEARS   DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS CLOUD   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	2.752E-03	0.	0.	0.	8.720E-04	6.813E-04	2.991E-04	1.148E-04	6.155E-04	2.215E-04	1.762E-04	4.859E-05
NNE	0.	0.	0.	0.	4.610E-04	2.035E-04	3.630E-04	8.670E-05	1.958E-05	2.080E-04	2.467E-04	2.933E-05
NE	0.	0.	7.082E-04	0.	4.775E-04	2.713E-04	4.775E-04	1.733E-04	4.607E-06	1.205E-05	1.320E-04	3.793E-04
ENE	0.	0.	3.585E-04	0.	1.401E-04	9.487E-04	5.275E-04	2.668E-04	3.882E-05	9.733E-05	9.989E-05	0.
E	0.	0.	0.	0.	1.207E-03	5.342E-04	5.252E-04	1.631E-02	9.188E-04	6.080E-05	6.670E-05	6.988E-05
ESE	0.	0.	0.	5.127E-05	3.884E-04	1.688E-04	3.240E-04	1.930E-04	3.348E-04	1.531E-04	6.303E-06	3.742E-05
SE	0.	0.	7.313E-05	3.767E-05	2.743E-04	3.479E-05	1.062E-04	2.475E-04	2.041E-04	3.810E-05	1.458E-04	1.040E-03
SSE	0.	0.	6.621E-05	1.264E-04	1.147E-04	1.187E-04	6.740E-05	4.847E-05	3.051E-05	2.394E-05	1.392E-05	8.323E-05
S	0.	0.	0.	2.089E-04	1.567E-04	1.129E-03	6.645E-05	1.622E-04	1.259E-04	4.145E-06	1.011E-05	0.
SSW	0.	7.251E-04	1.004E-04	2.226E-04	1.678E-04	1.128E-03	6.612E-05	4.569E-04	3.115E-04	1.051E-04	3.328E-04	3.298E-03
SW	0.	0.	0.	2.534E-04	3.570E-03	2.236E-04	3.380E-02	1.726E-03	2.471E-04	5.617E-04	2.787E-04	4.381E-05
WSW	1.014E-03	3.111E-04	0.	0.	1.607E-03	6.969E-04	4.939E-02	2.058E-03	6.022E-04	1.099E-04	4.050E-05	3.374E-05
W	0.	0.	0.	0.	2.274E-03	9.731E-04	2.741E-03	9.585E-04	1.739E-03	1.333E-03	5.589E-05	4.658E-05
WNW	0.	0.	0.	0.	4.318E-04	1.218E-03	2.926E-03	2.248E-03	2.015E-04	1.869E-03	3.286E-05	2.739E-05
NW	0.	0.	0.	0.	3.818E-04	3.229E-04	3.017E-04	5.988E-04	4.401E-06	7.238E-04	1.784E-04	1.957E-05
NNW	1.120E-03	2.570E-04	0.	9.110E-05	4.791E-04	3.880E-04	2.941E-04	2.133E-04	2.284E-03	7.830E-04	4.143E-04	5.984E-04

TOTAL DOSE COMMITMENT IS 1.706E-01 PERSON-REM/YR

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS VEG.ING.   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	8.497E-05	7.661E-05	5.946E-05	4.611E-05	1.234E-04	1.104E-04	8.948E-05	9.377E-05	1.038E-04	1.156E-04	1.278E-04	1.401E-04
NNE	6.510E-05	5.418E-05	4.200E-05	3.309E-05	9.500E-05	9.416E-05	7.252E-05	6.953E-05	7.192E-05	7.604E-05	8.065E-05	8.546E-05
NE	1.230E-04	9.545E-05	7.355E-05	5.842E-05	1.741E-04	1.793E-04	1.319E-04	1.189E-04	1.173E-04	1.193E-04	1.223E-04	1.258E-04
ENE	1.667E-04	1.236E-04	9.387E-05	7.395E-05	2.195E-04	2.241E-04	1.644E-04	1.483E-04	1.466E-04	1.496E-04	1.538E-04	1.587E-04
E	7.547E-05	5.854E-05	4.478E-05	3.522E-05	1.033E-04	1.061E-04	8.141E-05	7.640E-05	7.740E-05	8.035E-05	8.387E-05	8.765E-05
ESE	2.594E-05	1.980E-05	1.519E-05	1.204E-05	3.651E-05	3.969E-05	3.074E-05	2.833E-05	2.803E-05	2.847E-05	2.914E-05	2.995E-05
SE	1.605E-05	1.264E-05	9.755E-06	7.722E-06	2.356E-05	2.628E-05	2.093E-05	1.964E-05	1.963E-05	2.008E-05	2.070E-05	2.142E-05
SSE	1.328E-05	1.098E-05	8.430E-06	6.564E-06	1.856E-05	1.855E-05	1.525E-05	1.531E-05	1.622E-05	1.740E-05	1.868E-05	1.999E-05
S	3.885E-05	3.403E-05	2.635E-05	2.049E-05	5.647E-05	5.391E-05	4.428E-05	4.549E-05	4.928E-05	5.388E-05	5.874E-05	6.365E-05
SSW	3.597E-05	3.244E-05	2.518E-05	1.951E-05	5.231E-05	4.700E-05	3.859E-05	4.065E-05	4.505E-05	5.015E-05	5.547E-05	6.081E-05
SW	6.372E-05	5.878E-05	4.549E-05	3.496E-05	9.058E-05	7.737E-05	6.526E-05	7.167E-05	8.172E-05	9.279E-05	1.041E-04	1.154E-04
WSW	5.248E-05	4.759E-05	3.686E-05	2.847E-05	7.523E-05	6.627E-05	5.483E-05	5.864E-05	6.575E-05	7.377E-05	8.200E-05	9.020E-05
W	6.692E-05	6.232E-05	4.831E-05	3.713E-05	9.564E-05	8.035E-05	6.739E-05	7.445E-05	8.543E-05	9.745E-05	1.097E-04	1.218E-04
WNW	3.819E-05	3.577E-05	2.770E-05	2.124E-05	5.427E-05	4.509E-05	3.807E-05	4.249E-05	4.908E-05	5.625E-05	6.356E-05	7.080E-05
NW	3.288E-05	3.049E-05	2.365E-05	1.821E-05	4.737E-05	4.087E-05	3.410E-05	3.713E-05	4.217E-05	4.779E-05	5.358E-05	5.936E-05
NNW	4.347E-05	3.980E-05	3.089E-05	2.387E-05	6.283E-05	5.484E-05	4.480E-05	4.783E-05	5.377E-05	6.054E-05	6.751E-05	7.447E-05

TOTAL DOSE COMMITMENT IS 1.215E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS VEG.ING.   EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.361E-03	1.233E-03	9.590E-04	7.451E-04	2.017E-03	1.935E-03	1.722E-03	1.909E-03	2.183E-03	2.480E-03	2.780E-03	3.076E-03
NNE	1.009E-03	8.496E-04	6.604E-04	5.209E-04	1.504E-03	1.557E-03	1.293E-03	1.316E-03	1.420E-03	1.548E-03	1.680E-03	1.813E-03
NE	1.820E-03	1.437E-03	1.111E-03	8.829E-04	2.635E-03	2.799E-03	2.200E-03	2.110E-03	2.182E-03	2.304E-03	2.436E-03	2.572E-03
ENE	2.432E-03	1.847E-03	1.409E-03	1.111E-03	3.303E-03	3.486E-03	2.744E-03	2.641E-03	2.740E-03	2.902E-03	3.078E-03	3.259E-03
E	1.139E-03	8.991E-04	6.904E-04	5.437E-04	1.602E-03	1.714E-03	1.413E-03	1.407E-03	1.489E-03	1.597E-03	1.711E-03	1.826E-03
ESE	3.955E-04	3.060E-04	2.355E-04	1.870E-04	5.707E-04	6.430E-04	5.286E-04	5.128E-04	5.284E-04	5.542E-04	5.828E-04	6.126E-04
SE	2.501E-04	1.986E-04	1.536E-04	1.218E-04	3.743E-04	4.336E-04	3.662E-04	3.611E-04	3.752E-04	3.959E-04	4.188E-04	4.426E-04
SSE	2.101E-04	1.755E-04	1.353E-04	1.057E-04	3.023E-04	3.186E-04	2.819E-04	2.979E-04	3.270E-04	3.600E-04	3.938E-04	4.275E-04
S	6.245E-04	5.491E-04	4.261E-04	3.319E-04	9.257E-04	9.347E-04	8.377E-04	9.074E-04	1.017E-03	1.137E-03	1.260E-03	1.381E-03
SSW	5.803E-04	5.251E-04	4.083E-04	3.172E-04	8.616E-04	8.305E-04	7.470E-04	8.298E-04	9.484E-04	1.077E-03	1.207E-03	1.335E-03
SW	1.033E-03	9.553E-04	7.408E-04	5.708E-04	1.503E-03	1.398E-03	1.301E-03	1.500E-03	1.755E-03	2.023E-03	2.291E-03	2.556E-03
WSW	8.465E-04	7.702E-04	5.977E-04	4.627E-04	1.239E-03	1.178E-03	1.072E-03	1.207E-03	1.393E-03	1.591E-03	1.789E-03	1.985E-03
W	1.082E-03	1.010E-03	7.845E-04	6.045E-04	1.581E-03	1.452E-03	1.351E-03	1.568E-03	1.844E-03	2.133E-03	2.422E-03	2.706E-03
WNW	6.183E-04	5.811E-04	4.509E-04	3.468E-04	9.009E-04	8.224E-04	7.713E-04	9.026E-04	1.067E-03	1.238E-03	1.410E-03	1.579E-03
NW	5.311E-04	4.939E-04	3.838E-04	2.962E-04	7.818E-04	7.346E-04	6.783E-04	7.771E-04	9.063E-04	1.043E-03	1.181E-03	1.317E-03
NNW	6.970E-04	6.411E-04	4.984E-04	3.858E-04	1.028E-03	9.707E-04	8.785E-04	9.909E-04	1.147E-03	1.314E-03	1.482E-03	1.648E-03

TOTAL DOSE COMMITMENT IS 2.237E-01 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	4.501E-06	4.021E-06	3.132E-06	2.450E-06	6.880E-06	7.568E-06	7.604E-06	8.915E-06	1.050E-05	1.214E-05	1.377E-05	1.536E-05
NNE	3.739E-06	3.037E-06	2.356E-06	1.869E-06	5.572E-06	6.282E-06	5.622E-06	5.990E-06	6.658E-06	7.407E-06	8.164E-06	8.911E-06
NE	7.803E-06	5.856E-06	4.501E-06	3.596E-06	1.105E-05	1.240E-05	1.007E-05	9.867E-06	1.038E-05	1.111E-05	1.188E-05	1.265E-05
ENE	1.087E-05	7.718E-06	5.823E-06	4.607E-06	1.410E-05	1.570E-05	1.271E-05	1.244E-05	1.310E-05	1.404E-05	1.504E-05	1.606E-05
E	4.596E-06	3.441E-06	2.623E-06	2.075E-06	6.289E-06	7.158E-06	6.180E-06	6.360E-06	6.902E-06	7.548E-06	8.209E-06	8.868E-06
ESE	1.595E-06	1.147E-06	8.772E-07	6.984E-07	2.168E-06	2.551E-06	2.188E-06	2.204E-06	2.344E-06	2.523E-06	2.709E-06	2.896E-06
SE	9.092E-07	7.043E-07	5.839E-07	4.332E-07	1.358E-06	1.656E-06	1.480E-06	1.530E-06	1.651E-06	1.795E-06	1.943E-06	2.092E-06
SSE	7.274E-07	5.882E-07	4.514E-07	3.537E-07	1.038E-06	1.201E-06	1.172E-06	1.314E-06	1.498E-06	1.692E-06	1.886E-06	2.076E-06
S	2.040E-06	1.775E-06	1.380E-06	1.082E-06	3.117E-06	3.560E-06	3.555E-06	4.093E-06	4.754E-06	5.441E-06	6.124E-06	6.792E-06
SSW	1.871E-06	1.681E-06	1.311E-06	1.025E-06	2.885E-06	3.185E-06	3.251E-06	3.836E-06	4.529E-06	5.242E-06	5.949E-06	6.640E-06
SW	3.270E-06	3.012E-06	2.342E-06	1.815E-06	4.956E-06	5.420E-06	5.804E-06	7.086E-06	8.522E-06	9.976E-06	1.141E-05	1.281E-05
WSW	2.730E-06	2.465E-06	1.919E-06	1.495E-06	4.154E-06	4.579E-06	4.733E-06	5.644E-06	6.704E-06	7.787E-06	8.856E-06	9.897E-06
W	3.464E-06	3.216E-06	2.507E-06	1.946E-06	5.303E-06	5.762E-06	6.141E-06	7.504E-06	9.039E-06	1.059E-05	1.213E-05	1.362E-05
WNW	1.967E-06	1.837E-06	1.429E-06	1.106E-06	2.991E-06	3.260E-06	3.524E-06	4.343E-06	5.254E-06	6.174E-06	7.081E-06	7.965E-06
NW	1.705E-06	1.576E-06	1.229E-06	9.554E-07	2.624E-06	2.905E-06	3.065E-06	3.704E-06	4.432E-06	5.174E-06	5.909E-06	6.627E-06
NNW	2.297E-06	2.088E-06	1.628E-06	1.271E-06	3.529E-06	3.887E-06	3.979E-06	4.722E-06	5.604E-06	6.511E-06	7.408E-06	8.283E-06

TOTAL DOSE COMMITMENT IS 9.818E-04 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MEAT ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	7.129E-05	6.415E-05	5.019E-05	3.947E-05	1.142E-04	1.423E-04	1.589E-04	1.951E-04	2.350E-04	2.752E-04	3.146E-04	3.529E-04
NNE	5.707E-05	4.699E-05	3.661E-05	2.917E-05	8.857E-05	1.090E-04	1.083E-04	1.230E-04	1.419E-04	1.616E-04	1.812E-04	2.002E-04
NE	1.140E-04	8.693E-05	6.710E-05	5.374E-05	1.670E-04	2.001E-04	1.794E-04	1.893E-04	2.091E-04	2.316E-04	2.541E-04	2.763E-04
ENE	1.569E-04	1.137E-04	8.631E-05	6.850E-05	2.122E-04	2.530E-04	2.269E-04	2.396E-04	2.651E-04	2.940E-04	3.231E-04	3.518E-04
E	6.834E-05	5.206E-05	3.991E-05	3.168E-05	9.764E-05	1.205E-04	1.153E-04	1.270E-04	1.437E-04	1.616E-04	1.794E-04	1.969E-04
ESE	2.319E-05	1.746E-05	1.342E-05	1.073E-05	3.385E-05	4.279E-05	4.023E-05	4.322E-05	4.798E-05	5.320E-05	5.842E-05	6.354E-05
SE	1.396E-05	1.092E-05	8.467E-06	6.768E-06	2.162E-05	2.844E-05	2.782E-05	3.055E-05	3.430E-05	3.831E-05	4.232E-05	4.627E-05
SSE	1.135E-05	9.311E-06	7.193E-06	5.675E-06	1.715E-05	2.190E-05	2.354E-05	2.777E-05	3.259E-05	3.749E-05	4.231E-05	4.700E-05
S	3.245E-05	2.842E-05	2.219E-05	1.749E-05	5.189E-05	6.634E-05	7.317E-05	8.832E-05	1.052E-04	1.222E-04	1.389E-04	1.551E-04
SSW	2.991E-05	2.702E-05	2.117E-05	1.666E-05	4.841E-05	6.051E-05	6.838E-05	8.423E-05	1.016E-04	1.190E-04	1.361E-04	1.527E-04
SW	5.260E-05	4.866E-05	3.801E-05	2.967E-05	8.409E-05	1.061E-04	1.253E-04	1.584E-04	1.935E-04	2.285E-04	2.627E-04	2.959E-04
WSW	4.364E-05	3.962E-05	3.097E-05	2.428E-05	6.973E-05	8.775E-05	1.004E-04	1.246E-04	1.509E-04	1.772E-04	2.029E-04	2.278E-04
W	5.551E-05	5.179E-05	4.055E-05	3.169E-05	8.964E-05	1.128E-04	1.330E-04	1.682E-04	2.058E-04	2.431E-04	2.797E-04	3.151E-04
WNW	3.160E-05	2.966E-05	2.319E-05	1.807E-05	5.086E-05	6.453E-05	7.698E-05	9.795E-05	1.201E-04	1.422E-04	1.637E-04	1.846E-04
NW	2.730E-05	2.536E-05	1.986E-05	1.554E-05	4.422E-05	5.647E-05	6.595E-05	8.269E-05	1.006E-04	1.185E-04	1.361E-04	1.532E-04
NNW	3.643E-05	3.334E-05	2.611E-05	2.049E-05	5.876E-05	7.413E-05	8.450E-05	1.046E-04	1.265E-04	1.486E-04	1.702E-04	1.912E-04

TOTAL DOSE COMMITMENT IS 1.961E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MILK ING   EXPOSED ORGAN IS WH.BODY

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	8.326E-06	7.534E-06	5.832E-06	4.498E-06	1.165E-05	8.726E-06	5.255E-06	4.332E-06	4.013E-06	3.908E-06	3.894E-06	3.933E-06
NNE	6.136E-06	5.166E-06	4.081E-06	3.137E-06	8.777E-06	7.787E-06	5.010E-06	4.037E-06	3.590E-06	3.328E-06	3.139E-06	2.996E-06
NE	1.097E-05	8.682E-06	6.696E-06	5.297E-06	1.544E-05	1.468E-05	9.547E-06	7.560E-06	6.597E-06	5.984E-06	5.490E-06	5.074E-06
ENE	1.463E-05	1.114E-05	8.481E-06	6.658E-06	1.930E-05	1.815E-05	1.173E-05	9.269E-06	8.088E-06	7.348E-06	6.762E-06	6.276E-06
E	6.896E-06	5.451E-06	4.174E-06	3.269E-06	9.364E-06	8.767E-06	5.830E-06	4.739E-06	4.209E-06	3.878E-06	3.621E-06	3.414E-06
ESE	2.399E-06	1.857E-06	1.426E-06	1.127E-06	3.359E-06	3.407E-06	2.363E-06	1.934E-06	1.706E-06	1.552E-06	1.429E-06	1.327E-06
SE	1.523E-06	1.209E-06	9.321E-07	7.348E-07	2.200E-06	2.277E-06	1.607E-06	1.328E-06	1.174E-06	1.069E-06	9.868E-07	9.199E-07
SSE	1.281E-06	1.070E-06	8.204E-07	6.360E-07	1.751E-06	1.551E-06	1.047E-06	8.791E-07	8.001E-07	7.543E-07	7.239E-07	7.033E-07
S	3.822E-06	3.355E-06	2.591E-06	2.004E-06	5.364E-06	4.410E-06	2.845E-06	2.376E-06	2.180E-06	2.084E-06	2.035E-06	2.013E-06
SSW	3.553E-06	3.207E-06	2.881E-06	1.912E-06	4.963E-06	3.740E-06	2.289E-06	1.903E-06	1.767E-06	1.722E-06	1.718E-06	1.738E-06
SW	6.330E-06	5.841E-06	4.506E-06	3.443E-06	8.617E-06	5.914E-06	3.481E-06	2.952E-06	2.825E-06	2.840E-06	2.919E-06	3.034E-06
WSW	5.183E-06	4.706E-06	3.634E-06	2.790E-06	7.132E-06	5.167E-06	3.114E-06	2.614E-06	2.466E-06	2.440E-06	2.465E-06	2.519E-06
W	6.624E-06	6.172E-06	4.768E-06	3.642E-06	9.034E-06	6.004E-06	3.430E-06	2.901E-06	2.800E-06	2.844E-06	2.950E-06	3.088E-06
WNW	3.787E-06	3.551E-06	2.741E-06	2.090E-06	5.139E-06	3.326E-06	1.865E-06	1.579E-06	1.532E-06	1.568E-06	1.642E-06	1.735E-06
NW	3.252E-06	3.018E-06	2.333E-06	1.786E-06	4.079E-06	3.087E-06	1.789E-06	1.495E-06	1.420E-06	1.422E-06	1.461E-06	1.519E-06
NNW	4.264E-06	3.915E-06	3.029E-06	2.325E-06	5.906E-06	4.180E-06	2.422E-06	1.996E-06	1.875E-06	1.861E-06	1.891E-06	1.946E-06

TOTAL DOSE COMMITMENT IS 7.848E-04 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED BY THE POPULATION OF THIS REGION. SEE SUMMARY TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

EXPOSURE PATHWAY IS MILK ING EXPOSED ORGAN IS BONE

DOSES SHOWN BELOW ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DIRECTION	XRHO 1.5	XRHO 2.5	XRHO 3.5	XRHO 4.5	XRHO 7.5	XRHO 15.0	XRHO 25.0	XRHO 35.0	XRHO 45.0	XRHO 55.0	XRHO 65.0	XRHO 75.0
N	1.311E-04	1.193E-04	9.238E-05	7.124E-05	1.845E-04	1.400E-04	8.787E-05	7.584E-05	7.314E-05	7.369E-05	7.560E-05	7.826E-05
NNE	9.282E-05	7.925E-05	6.149E-05	4.817E-05	1.342E-04	1.193E-04	7.876E-05	6.563E-05	6.027E-05	5.764E-05	5.605E-05	5.510E-05
NE	1.559E-04	1.263E-04	9.773E-05	7.720E-05	2.231E-04	2.112E-04	1.405E-04	1.148E-04	1.033E-04	9.655E-05	9.141E-05	8.727E-05
ENE	2.036E-04	1.602E-04	1.227E-04	9.627E-05	2.766E-04	2.589E-04	1.718E-04	1.406E-04	1.268E-04	1.190E-04	1.132E-04	1.087E-04
E	1.007E-04	8.144E-05	6.259E-05	4.900E-05	1.397E-04	1.311E-04	8.967E-05	7.532E-05	6.897E-05	6.540E-05	6.288E-05	6.102E-05
ESE	3.553E-05	2.798E-05	2.155E-05	1.704E-05	5.072E-05	5.183E-05	3.681E-05	3.090E-05	2.789E-05	2.597E-05	2.448E-05	2.329E-05
SE	2.320E-05	1.859E-05	1.436E-05	1.132E-05	3.386E-05	3.536E-05	2.552E-05	2.159E-05	1.952E-05	1.818E-05	1.717E-05	1.639E-05
SSE	1.987E-05	1.679E-05	1.291E-05	1.002E-05	2.764E-05	2.477E-05	1.719E-05	1.488E-05	1.393E-05	1.349E-05	1.328E-05	1.321E-05
S	6.042E-05	5.325E-05	4.116E-05	3.183E-05	8.527E-05	7.104E-05	4.739E-05	4.103E-05	3.890E-05	3.831E-05	3.842E-05	3.893E-05
SSW	5.641E-05	5.108E-05	3.954E-05	3.048E-05	7.920E-05	6.064E-05	3.868E-05	3.358E-05	3.238E-05	3.258E-05	3.340E-05	3.456E-05
SW	1.011E-04	9.345E-05	7.215E-05	5.516E-05	1.384E-04	9.724E-05	6.031E-05	5.374E-05	5.353E-05	5.552E-05	5.847E-05	6.192E-05
WSW	8.227E-05	7.493E-05	5.790E-05	4.447E-05	1.138E-04	8.389E-05	5.289E-05	4.649E-05	4.559E-05	4.656E-05	4.828E-05	5.039E-05
W	1.054E-04	9.846E-05	7.609E-05	5.813E-05	1.444E-04	9.812E-05	5.941E-05	5.312E-05	5.351E-05	5.611E-05	5.964E-05	6.361E-05
WNW	6.039E-05	5.677E-05	4.385E-05	3.346E-05	8.249E-05	5.478E-05	3.270E-05	2.933E-05	2.973E-05	3.141E-05	3.365E-05	3.615E-05
NW	5.170E-05	4.810E-05	3.720E-05	2.848E-05	7.153E-05	5.029E-05	3.076E-05	2.713E-05	2.690E-05	2.786E-05	2.937E-05	3.117E-05
NNW	6.723E-05	6.200E-05	4.798E-05	3.683E-05	9.348E-05	6.712E-05	4.092E-05	3.560E-05	3.498E-05	3.595E-05	3.759E-05	3.956E-05

TOTAL DOSE COMMITMENT IS 1.262E-02 PERSON-REM/YR

WARNING--POPULATION FOOD INGESTION DOSES SHOWN
ABOVE HAVE NOT BEEN CORRECTED TO REFLECT POTENTIAL
FOOD EXPORT AND MAY EXCEED DOSES ACTUALLY RECEIVED
BY THE POPULATION OF THIS REGION. SEE SUMMARY
TABLE FOR THIS INFORMATION.

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

SUMMARY PRINT OF POPULATION DOSES COMPUTED FOR ISTEP 2--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	4.075E-02	7.488E-01	3.934E+00	3.452E-02	2.526E-01	1.070E+01
GROUND	2.517E-02	2.517E-02	2.517E-02	2.517E-02	2.517E-02	2.517E-02
CLOUD	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01
VEG.ING.	1.215E-02	2.237E-01	1.215E-02	3.793E-02	1.331E-01	1.215E-02
MEAT ING	9.818E-04	1.961E-02	9.818E-04	4.545E-03	1.450E-02	9.818E-04
MILK ING	7.848E-04	1.262E-02	7.848E-04	7.745E-04	4.185E-03	7.848E-04
RNPLUS50	0.	0.	0.	0.	0.	0.
TOTALS	2.505E-01	1.201E+00	4.143E+00	2.736E-01	6.002E-01	1.091E+01

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.	0.	0.	0.	0.	0.
GROUND	0.	0.	0.	0.	0.	0.
CLOUD	0.	0.	0.	0.	0.	0.
VEG.ING.	0.	0.	0.	0.	0.	0.
MEAT ING	0.	0.	0.	0.	0.	0.
MILK ING	0.	0.	0.	0.	0.	0.
RNPLUS50	2.119E+00	2.842E+01	4.651E-01	2.119E+00	2.119E+00	1.344E+01
TOTALS	2.119E+00	2.842E+01	4.651E-01	2.119E+00	2.119E+00	1.344E+01

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	4.075E-02	7.488E-01	3.934E+00	3.452E-02	2.526E-01	1.070E+01
GROUND	2.517E-02	2.517E-02	2.517E-02	2.517E-02	2.517E-02	2.517E-02
CLOUD	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01	1.706E-01
VEG.ING.	1.215E-02	2.237E-01	1.215E-02	3.793E-02	1.331E-01	1.215E-02
MEAT ING	9.818E-04	1.961E-02	9.818E-04	4.545E-03	1.450E-02	9.818E-04
MILK ING	7.848E-04	1.262E-02	7.848E-04	7.745E-04	4.185E-03	7.848E-04
RNPLUS50	2.119E+00	2.842E+01	4.651E-01	2.119E+00	2.119E+00	1.344E+01
TOTALS	2.369E+00	2.962E+01	4.609E+00	2.392E+00	2.719E+00	2.435E+01

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
1	NORTH BOUNDARY	1	1.944E-02	5.299E-05	1.750E-05	1.489E-06	6.590E+04	1.796E+02	5.907E+01	5.907E+01
1	NORTH BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
1	NORTH BOUNDARY	3	3.923E-05	2.671E-05	1.074E-05	1.438E-05	1.330E+02	9.051E+01	3.624E+01	3.624E+01
1	NORTH BOUNDARY	4	7.475E-05	5.089E-05	2.046E-05	2.735E-05	2.221E+03	1.512E+03	6.055E+02	6.055E+02
	CONCENTRATION TOTALS		1.956E-02	1.306E-04	4.869E-05	4.322E-05	6.825E+04	1.782E+03	7.008E+02	7.008E+02
2	NORTHEAST BOUNDARY	1	4.222E-03	1.147E-05	3.788E-06	3.219E-07	1.431E+04	3.886E+01	1.278E+01	1.278E+01
2	NORTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
2	NORTHEAST BOUNDARY	3	2.638E-05	1.796E-05	7.220E-06	9.668E-06	8.941E+01	6.087E+01	2.437E+01	2.437E+01
2	NORTHEAST BOUNDARY	4	4.304E-05	2.930E-05	1.178E-05	1.575E-05	1.279E+03	8.707E+02	3.486E+02	3.486E+02
	CONCENTRATION TOTALS		4.292E-03	5.873E-05	2.279E-05	2.574E-05	1.568E+04	9.704E+02	3.858E+02	3.858E+02
3	SOUTHEAST BOUNDARY	1	3.716E-04	9.949E-07	3.292E-07	2.787E-08	1.260E+03	3.372E+00	1.111E+00	1.111E+00
3	SOUTHEAST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
3	SOUTHEAST BOUNDARY	3	8.501E-07	5.787E-07	2.326E-07	3.115E-07	2.881E+00	1.961E+00	7.853E-01	7.853E-01
3	SOUTHEAST BOUNDARY	4	1.095E-06	7.455E-07	2.997E-07	4.007E-07	3.254E+01	2.215E+01	8.869E+00	8.869E+00
	CONCENTRATION TOTALS		3.736E-04	2.319E-06	8.615E-07	7.401E-07	1.295E+03	2.748E+01	1.077E+01	1.077E+01
4	SOUTHWEST BOUNDARY	1	1.759E-03	4.783E-06	1.580E-06	1.343E-07	5.960E+03	1.621E+01	5.332E+00	5.332E+00
4	SOUTHWEST BOUNDARY	2	0.	0.	0.	0.	0.	0.	0.	0.
4	SOUTHWEST BOUNDARY	3	7.836E-07	5.335E-07	2.145E-07	2.872E-07	2.656E+00	1.808E+00	7.239E-01	7.239E-01
4	SOUTHWEST BOUNDARY	4	1.142E-06	7.775E-07	3.125E-07	4.179E-07	3.394E+01	2.310E+01	9.250E+00	9.250E+00
	CONCENTRATION TOTALS		1.760E-03	6.094E-06	2.107E-06	8.394E-07	5.997E+03	4.112E+01	1.531E+01	1.531E+01
5	NEAREST RESIDENT	1	2.318E-02	6.209E-05	2.054E-05	1.739E-06	7.858E+04	2.104E+02	6.934E+01	6.934E+01
5	NEAREST RESIDENT	2	0.	0.	0.	0.	0.	0.	0.	0.
5	NEAREST RESIDENT	3	1.563E-05	1.064E-05	4.276E-06	5.726E-06	5.296E+01	3.605E+01	1.443E+01	1.443E+01
5	NEAREST RESIDENT	4	2.529E-05	1.722E-05	6.921E-06	9.254E-06	7.516E+02	5.116E+02	2.048E+02	2.048E+02
	CONCENTRATION TOTALS		2.323E-02	8.994E-05	3.174E-05	1.672E-05	7.938E+04	7.581E+02	2.886E+02	2.886E+02
6	ENV MONITOR STA A	1	1.016E-02	2.721E-05	9.003E-06	7.624E-07	3.443E+04	9.222E+01	3.039E+01	3.039E+01
6	ENV MONITOR STA A	2	0.	0.	0.	0.	0.	0.	0.	0.
6	ENV MONITOR STA A	3	1.513E-05	1.030E-05	4.142E-06	5.546E-06	5.129E+01	3.492E+01	1.398E+01	1.398E+01
6	ENV MONITOR STA A	4	2.351E-05	1.600E-05	6.433E-06	8.602E-06	6.985E+02	4.755E+02	1.904E+02	1.904E+02
	CONCENTRATION TOTALS		1.020E-02	5.352E-05	1.958E-05	1.491E-05	3.517E+04	6.027E+02	2.348E+02	2.348E+02
7	NEAREST DOWNWIND RES	1	1.183E-03	3.124E-06	1.035E-06	8.730E-08	4.010E+03	1.059E+01	3.494E+00	3.494E+00
7	NEAREST DOWNWIND RES	2	0.	0.	0.	0.	0.	0.	0.	0.
7	NEAREST DOWNWIND RES	3	6.747E-06	4.594E-06	1.847E-06	2.473E-06	2.287E+01	1.557E+01	6.233E+00	6.233E+00
7	NEAREST DOWNWIND RES	4	8.327E-06	5.669E-06	2.279E-06	3.047E-06	2.474E+02	1.685E+02	6.745E+01	6.745E+01
	CONCENTRATION TOTALS		1.198E-03	1.339E-05	5.161E-06	5.607E-06	4.281E+03	1.946E+02	7.717E+01	7.717E+01
8	NEAREST COMMUNITY	1	5.528E-05	1.473E-07	4.875E-08	4.122E-09	1.874E+02	4.991E-01	1.645E-01	1.645E-01
8	NEAREST COMMUNITY	2	0.	0.	0.	0.	0.	0.	0.	0.
8	NEAREST COMMUNITY	3	1.053E-07	7.172E-08	2.883E-08	3.860E-08	3.570E-01	2.430E-01	9.731E-02	9.731E-02
8	NEAREST COMMUNITY	4	8.876E-08	6.043E-08	2.429E-08	3.248E-08	2.638E+00	1.795E+00	7.189E-01	7.189E-01
	CONCENTRATION TOTALS		5.547E-05	2.794E-07	1.019E-07	7.520E-08	1.904E+02	2.538E+00	9.807E-01	9.807E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

INDIVIDUAL RECEPTOR PARTICULATE CONCENTRATIONS

NO.	NAME	PTSZ	AIRBORNE CONCENTRATIONS, PCI/M3 U-238	TH-230	RA-226	PB-210	GROUND CONCENTRATIONS, PCI/M2 U-238	TH-230	RA-226	PB-210
9	NEAREST DOWNWIND COM	1	1.697E-05	4.531E-08	1.499E-08	1.269E-09	5.750E+01	1.535E-01	5.061E-02	5.061E-02
9	NEAREST DOWNWIND COM	2	0.	0.	0.	0.	0.	0.	0.	0.
9	NEAREST DOWNWIND COM	3	1.163E-07	7.916E-08	3.182E-08	4.261E-08	3.941E-01	2.683E-01	1.074E-01	1.074E-01
9	NEAREST DOWNWIND COM	4	7.427E-08	5.057E-08	2.033E-08	2.718E-08	2.207E+00	1.503E+00	6.016E-01	6.016E-01
	CONCENTRATION TOTALS		1.716E-05	1.750E-07	6.714E-08	7.106E-08	6.010E+01	1.924E+00	7.596E-01	7.596E-01
10	NEAREST GRAZING AREA	1	9.889E-04	2.650E-06	8.768E-07	7.426E-08	3.351E+03	8.982E+00	2.960E+00	2.960E+00
10	NEAREST GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
10	NEAREST GRAZING AREA	3	2.737E-06	1.863E-06	7.491E-07	1.003E-06	9.277E+00	6.315E+00	2.529E+00	2.529E+00
10	NEAREST GRAZING AREA	4	6.637E-06	4.519E-06	1.816E-06	2.429E-06	1.972E+02	1.343E+02	5.376E+01	5.376E+01
	CONCENTRATION TOTALS		9.982E-04	9.032E-06	3.442E-06	3.506E-06	3.558E+03	1.496E+02	5.925E+01	5.925E+01
11	GALLUP	1	1.178E-05	3.140E-08	1.039E-08	8.789E-10	3.991E+01	1.064E-01	3.508E-02	3.508E-02
11	GALLUP	2	0.	0.	0.	0.	0.	0.	0.	0.
11	GALLUP	3	9.137E-09	6.221E-09	2.501E-09	3.349E-09	3.097E-02	2.108E-02	8.441E-03	8.441E-03
11	GALLUP	4	3.597E-09	2.449E-09	9.843E-10	1.316E-09	1.069E-01	7.276E-02	2.913E-02	2.913E-02
	CONCENTRATION TOTALS		1.179E-05	4.007E-08	1.388E-08	5.544E-09	4.005E+01	2.002E-01	7.265E-02	7.265E-02
12	SPRINGSTEAD TR. PARK	1	1.436E-04	3.863E-07	1.277E-07	1.083E-08	4.866E+02	1.309E+00	4.311E-01	4.311E-01
12	SPRINGSTEAD TR. PARK	2	0.	0.	0.	0.	0.	0.	0.	0.
12	SPRINGSTEAD TR. PARK	3	2.989E-08	2.035E-08	8.181E-09	1.095E-08	1.013E-01	6.897E-02	2.761E-02	2.761E-02
12	SPRINGSTEAD TR. PARK	4	3.316E-08	2.258E-08	9.076E-09	1.213E-08	9.855E-01	6.709E-01	2.686E-01	2.686E-01
	CONCENTRATION TOTALS		1.436E-04	4.292E-07	1.450E-07	3.392E-08	4.877E+02	2.049E+00	7.274E-01	7.274E-01
13	NAVAJO GRAZING AREA	1	7.174E-03	1.949E-05	6.438E-06	5.472E-07	2.431E+04	6.605E+01	2.173E+01	2.173E+01
13	NAVAJO GRAZING AREA	2	0.	0.	0.	0.	0.	0.	0.	0.
13	NAVAJO GRAZING AREA	3	4.047E-05	2.755E-05	1.108E-05	1.483E-05	1.372E+02	9.337E+01	3.738E+01	3.738E+01
13	NAVAJO GRAZING AREA	4	6.409E-05	4.363E-05	1.754E-05	2.345E-05	1.905E+03	1.297E+03	5.191E+02	5.191E+02
	CONCENTRATION TOTALS		7.278E-03	9.067E-05	3.505E-05	3.883E-05	2.636E+04	1.456E+03	5.782E+02	5.782E+02
14	NEXT NEAREST RESIDEN	1	1.074E-02	2.864E-05	9.481E-06	8.019E-07	3.640E+04	9.707E+01	3.200E+01	3.200E+01
14	NEXT NEAREST RESIDEN	2	0.	0.	0.	0.	0.	0.	0.	0.
14	NEXT NEAREST RESIDEN	3	3.267E-06	2.224E-06	8.942E-07	1.197E-06	1.107E+01	7.538E+00	3.018E+00	3.018E+00
14	NEXT NEAREST RESIDEN	4	4.475E-06	3.046E-06	1.225E-06	1.637E-06	1.330E+02	9.052E+01	3.624E+01	3.624E+01
	CONCENTRATION TOTALS		1.075E-02	3.392E-05	1.160E-05	3.637E-06	3.655E+04	1.951E+02	7.126E+01	7.126E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

INDIVIDUAL RECEPTOR RADON AND RADON DAUGHTER CONCENTRATIONS

NO.	AIRBORNE CONCENTRATIONS, PCI/M3 RN-222	PO-218	PB-214	BI-214	PB-210	BI-210	PO-210	WL	GROUND CONCENTRATIONS, PCI/M2 PO-218	PB-214	BI-214	PB-210
1	7.209E+02	4.066E+02	2.293E+01	1.115E+00	7.031E-08	5.654E-12	**********	5.392E-04	3.220E+02	3.220E+02	3.220E+02	8.783E-02
2	2.373E+01	2.211E+01	7.950E+00	2.396E+00	1.103E-06	6.081E-10	9.695E-15	7.202E-05	1.751E+01	1.751E+01	1.751E+01	1.378E+00
3	2.080E+00	2.026E+00	1.122E+00	5.444E-01	4.898E-07	5.049E-10	1.466E-14	9.805E-06	1.605E+00	1.605E+00	1.605E+00	6.119E-01
4	7.879E+00	7.739E+00	4.099E+00	1.836E+00	1.450E-06	1.324E-09	3.428E-14	3.560E-05	6.130E+00	6.130E+00	6.130E+00	1.812E+00
5	1.035E+02	9.181E+01	1.749E+01	2.715E+00	5.748E-07	1.507E-10	1.102E-15	1.934E-04	7.272E+01	7.272E+01	7.272E+01	7.181E-01
6	7.512E+01	6.946E+01	1.793E+01	3.761E+00	1.116E-06	4.047E-10	4.328E-15	1.765E-04	5.502E+01	5.502E+01	5.502E+01	1.394E+00
7	5.038E+00	4.967E+00	3.662E+00	2.618E+00	5.116E-06	1.071E-08	6.123E-13	3.345E-05	3.934E+00	3.934E+00	3.934E+00	6.391E+00
8	2.147E-01	2.147E-01	1.974E-01	1.832E-01	1.210E-06	7.497E-09	1.198E-12	1.906E-06	1.701E-01	1.701E-01	1.701E-01	1.512E+00
9	1.745E-01	1.746E-01	1.742E-01	1.730E-01	6.650E-06	2.203E-07	1.833E-10	1.708E-06	1.383E-01	1.383E-01	1.383E-01	8.307E+00
10	3.805E+00	3.123E+00	6.851E-01	1.340E-01	3.751E-08	1.291E-11	1.256E-16	7.191E-06	2.474E+00	2.474E+00	2.474E+00	4.686E-02
11	2.842E-01	2.843E-01	2.850E-01	2.845E-01	8.831E-06	2.297E-07	1.490E-10	2.799E-06	2.252E-01	2.252E-01	2.252E-01	1.103E+01
12	4.074E-01	4.076E-01	3.959E-01	3.826E-01	3.822E-06	3.420E-08	7.762E-12	3.854E-06	3.228E-01	3.228E-01	3.228E-01	4.774E+00
13	3.520E+01	3.219E+01	1.030E+01	2.765E+00	1.103E-06	5.303E-10	7.349E-15	9.569E-05	2.550E+01	2.550E+01	2.550E+01	1.378E+00
14	2.073E+01	2.022E+01	9.444E+00	3.658E+00	2.333E-06	1.748E-09	3.716E-14	8.235E-05	1.601E+01	1.601E+01	1.601E+01	2.915E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	0.
INFANT	GROUND	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01
INFANT	CLOUD	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.88E-01	4.88E+00	3.88E-01	2.56E-02	9.98E-01	3.88E-01
INFANT	TOTALS	1.02E+00	1.23E+01	4.54E+01	2.65E-01	2.92E+00	5.99E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	0.
CHILD	GROUND	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01
CHILD	CLOUD	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06
CHILD	VEG.ING.	1.99E-01	3.04E+00	1.99E-01	6.90E-02	6.12E-01	1.99E-01
CHILD	MEAT ING	2.23E-02	3.35E-01	2.23E-02	1.46E-02	8.31E-02	2.23E-02
CHILD	MILK ING	2.45E-01	3.67E+00	2.45E-01	1.85E-02	5.79E-01	2.45E-01
CHILD	TOTALS	1.10E+00	1.45E+01	4.55E+01	3.42E-01	3.19E+00	6.77E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	0.
TEENAGER	GROUND	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01
TEENAGER	CLOUD	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06
TEENAGER	VEG.ING.	1.22E-01	1.84E+00	1.22E-01	5.15E-02	4.83E-01	1.22E-01
TEENAGER	MEAT ING	1.37E-02	2.04E-01	1.37E-02	1.06E-02	6.40E-02	1.37E-02
TEENAGER	MILK ING	1.07E-01	1.57E+00	1.07E-01	9.75E-03	3.26E-01	1.07E-01
TEENAGER	TOTALS	8.77E-01	1.11E+01	4.53E+01	3.11E-01	2.79E+00	4.53E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	0.
ADULT	GROUND	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01	2.11E-01
ADULT	CLOUD	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06	1.99E-06
ADULT	VEG.ING.	1.29E-01	1.93E+00	1.29E-01	5.64E-02	4.73E-01	1.29E-01
ADULT	MEAT ING	1.87E-02	2.77E-01	1.87E-02	1.45E-02	7.92E-02	1.87E-02
ADULT	MILK ING	4.29E-02	6.20E-01	4.29E-02	4.06E-03	1.21E-01	4.29E-02
ADULT	TOTALS	8.25E-01	1.03E+01	4.52E+01	3.14E-01	2.59E+00	4.01E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 1 NAME=NORTH BOUNDARY X= 0.0KM, Y= .1KM, Z= 6.1M, DIST= .1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	4.51E+02
INFANT	GROUND	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01
INFANT	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.88E-01	4.88E+00	3.88E-01	2.56E-02	9.98E-01	3.88E-01
INFANT	TOTALS	1.25E+00	1.26E+01	4.56E+01	4.92E-01	3.14E+00	4.51E+02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	4.51E+02
CHILD	GROUND	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01
CHILD	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
CHILD	VEG.ING.	1.99E-01	3.04E+00	1.99E-01	6.90E-02	6.12E-01	1.99E-01
CHILD	MEAT ING	2.23E-02	3.35E-01	2.23E-02	1.46E-02	8.31E-02	2.23E-02
CHILD	MILK ING	2.45E-01	3.67E+00	2.45E-01	1.85E-02	5.79E-01	2.45E-01
CHILD	TOTALS	1.33E+00	1.47E+01	4.57E+01	5.69E-01	3.42E+00	4.51E+02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	4.51E+02
TEENAGER	GROUND	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01
TEENAGER	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
TEENAGER	VEG.ING.	1.22E-01	1.84E+00	1.22E-01	5.15E-02	4.83E-01	1.22E-01
TEENAGER	MEAT ING	1.37E-02	2.04E-01	1.37E-02	1.06E-02	6.40E-02	1.37E-02
TEENAGER	MILK ING	1.07E-01	1.57E+00	1.07E-01	9.75E-03	3.26E-01	1.07E-01
TEENAGER	TOTALS	1.10E+00	1.13E+01	4.55E+01	5.38E-01	3.02E+00	4.51E+02
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.24E-01	7.24E+00	4.48E+01	2.84E-02	1.71E+00	4.51E+02
ADULT	GROUND	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01
ADULT	CLOUD	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02
ADULT	VEG.ING.	1.29E-01	1.93E+00	1.29E-01	5.64E-02	4.73E-01	1.29E-01
ADULT	MEAT ING	1.87E-02	2.77E-01	1.87E-02	1.46E-02	7.92E-02	1.87E-02
ADULT	MILK ING	4.29E-02	6.20E-01	4.29E-02	4.06E-03	1.21E-01	4.29E-02
ADULT	TOTALS	1.05E+00	1.05E+01	4.54E+01	5.41E-01	2.82E+00	4.51E+02

TIME STEP NUMBER 2, AFTER 20 YEARS　　　　DURATION IN YRS IS... 15.0

NUMBER 2 NAME=NORTHEAST BOUNDARY　X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.15E-02	3.96E-01	0.
INFANT	GROUND	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02
INFANT	CLOUD	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.07E-01	1.30E+00	1.07E-01	1.48E-02	2.55E-01	1.07E-01
INFANT	TOTALS	2.52E-01	3.01E+00	1.00E+01	7.57E-02	7.00E-01	1.57E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.15E-02	3.96E-01	0.
CHILD	GROUND	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02
CHILD	CLOUD	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07
CHILD	VEG.ING.	6.29E-02	9.01E-01	6.29E-02	3.98E-02	2.15E-01	6.29E-02
CHILD	MEAT ING	7.78E-03	1.10E-01	7.78E-03	8.39E-03	3.45E-02	7.78E-03
CHILD	MILK ING	7.29E-02	1.00E+00	7.29E-02	1.07E-02	1.53E-01	7.29E-02
CHILD	TOTALS	2.88E-01	3.73E+00	1.00E+01	1.20E-01	8.48E-01	1.93E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.15E-02	3.96E-01	0.
TEENAGER	GROUND	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02
TEENAGER	CLOUD	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07
TEENAGER	VEG.ING.	4.12E-02	5.88E-01	4.12E-02	2.96E-02	1.70E-01	4.12E-02
TEENAGER	MEAT ING	5.10E-03	7.22E-02	5.10E-03	6.08E-03	2.65E-02	5.10E-03
TEENAGER	MILK ING	3.43E-02	4.61E-01	3.43E-02	5.62E-03	8.62E-02	3.43E-02
TEENAGER	TOTALS	2.25E-01	2.83E+00	9.98E+00	1.02E-01	7.27E-01	1.30E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.15E-02	3.96E-01	0.
ADULT	GROUND	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02	4.94E-02
ADULT	CLOUD	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07	4.37E-07
ADULT	VEG.ING.	4.58E-02	6.51E-01	4.58E-02	3.25E-02	1.67E-01	4.58E-02
ADULT	MEAT ING	7.30E-03	1.04E-01	7.30E-03	8.39E-03	3.30E-02	7.30E-03
ADULT	MILK ING	1.46E-02	1.92E-01	1.46E-02	2.34E-03	3.20E-02	1.46E-02
ADULT	TOTALS	2.12E-01	2.66E+00	9.96E+00	1.04E-01	6.77E-01	1.17E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 2 NAME=NORTHEAST BOUNDARY X= 1.2KM, Y= .1KM, Z= -3.0M, DIST= 1.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.16E-02	3.96E-01	1.48E+01
INFANT	GROUND	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01
INFANT	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.07E-01	1.30E+00	1.07E-01	1.48E-02	2.55E-01	1.07E-01
INFANT	TOTALS	3.58E-01	3.11E+00	1.01E+01	1.82E-01	8.07E-01	1.51E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.16E-02	3.96E-01	1.48E+01
CHILD	GROUND	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01
CHILD	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
CHILD	VEG.ING.	6.29E-02	9.02E-01	6.29E-02	3.99E-02	2.15E-01	6.29E-02
CHILD	MEAT ING	7.78E-03	1.10E-01	7.78E-03	8.41E-03	3.46E-02	7.78E-03
CHILD	MILK ING	7.29E-02	1.00E+00	7.29E-02	1.07E-02	1.53E-01	7.29E-02
CHILD	TOTALS	3.94E-01	3.83E+00	1.01E+01	2.26E-01	9.54E-01	1.51E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.16E-02	3.96E-01	1.48E+01
TEENAGER	GROUND	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01
TEENAGER	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
TEENAGER	VEG.ING.	4.12E-02	5.88E-01	4.12E-02	2.97E-02	1.70E-01	4.12E-02
TEENAGER	MEAT ING	5.10E-03	7.22E-02	5.10E-03	6.10E-03	2.66E-02	5.10E-03
TEENAGER	MILK ING	3.43E-02	4.61E-01	3.43E-02	5.63E-03	8.63E-02	3.43E-02
TEENAGER	TOTALS	3.31E-01	2.94E+00	1.01E+01	2.08E-01	8.34E-01	1.51E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	9.50E-02	1.66E+00	9.85E+00	1.16E-02	3.96E-01	1.48E+01
ADULT	GROUND	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01
ADULT	CLOUD	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02	3.39E-02
ADULT	VEG.ING.	4.59E-02	6.51E-01	4.59E-02	3.25E-02	1.67E-01	4.59E-02
ADULT	MEAT ING	7.31E-03	1.04E-01	7.31E-03	8.40E-03	3.30E-02	7.31E-03
ADULT	MILK ING	1.46E-02	1.92E-01	1.46E-02	2.34E-03	3.20E-02	1.46E-02
ADULT	TOTALS	3.18E-01	2.76E+00	1.01E+01	2.10E-01	7.84E-01	1.51E+01

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY   X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.21E-04	3.25E-02	0.
INFANT	GROUND	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03
INFANT	CLOUD	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.15E-03	9.06E-02	7.15E-03	3.87E-04	1.87E-02	7.15E-03
INFANT	TOTALS	1.92E-02	2.33E-01	8.68E-01	4.90E-03	5.52E-02	1.11E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.21E-04	3.25E-02	0.
CHILD	GROUND	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03
CHILD	CLOUD	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
CHILD	VEG.ING.	3.59E-03	5.54E-02	3.59E-03	1.04E-03	1.08E-02	3.59E-03
CHILD	MEAT ING	3.94E-04	5.98E-03	3.94E-04	2.20E-04	1.80E-03	3.94E-04
CHILD	MILK ING	4.45E-03	6.79E-02	4.45E-03	2.80E-04	1.08E-02	4.45E-03
CHILD	TOTALS	2.05E-02	2.71E-01	8.69E-01	6.06E-03	5.95E-02	1.24E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.21E-04	3.25E-02	0.
TEENAGER	GROUND	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03
TEENAGER	CLOUD	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
TEENAGER	VEG.ING.	2.17E-03	3.31E-02	2.17E-03	7.77E-04	8.51E-03	2.17E-03
TEENAGER	MEAT ING	2.38E-04	3.58E-03	2.38E-04	1.59E-04	1.08E-03	2.38E-04
TEENAGER	MILK ING	1.91E-03	2.86E-02	1.91E-03	1.47E-04	6.07E-03	1.91E-03
TEENAGER	TOTALS	1.64E-02	2.07E-01	8.65E-01	5.60E-03	5.22E-02	8.31E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.21E-04	3.25E-02	0.
ADULT	GROUND	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03
ADULT	CLOUD	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
ADULT	VEG.ING.	2.26E-03	3.43E-02	2.26E-03	8.51E-04	8.31E-03	2.26E-03
ADULT	MEAT ING	3.21E-04	4.81E-03	3.21E-04	2.20E-04	1.34E-03	3.21E-04
ADULT	MILK ING	7.60E-04	1.12E-02	7.60E-04	6.12E-05	2.24E-03	7.60E-04
ADULT	TOTALS	1.54E-02	1.92E-01	8.64E-01	5.65E-03	4.84E-02	7.34E-03

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 3 NAME=SOUTHEAST BOUNDARY X= 1.2KM, Y= -1.4KM, Z= 36.6M, DIST= 1.8KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.50E-04	3.26E-02	1.30E+00
INFANT	GROUND	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03
INFANT	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	7.16E-03	9.07E-02	7.16E-03	4.02E-04	1.87E-02	7.16E-03
INFANT	TOTALS	2.82E-02	2.42E-01	8.77E-01	1.39E-02	6.43E-02	1.32E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.50E-04	3.26E-02	1.30E+00
CHILD	GROUND	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03
CHILD	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
CHILD	VEG.ING.	3.60E-03	5.56E-02	3.60E-03	1.08E-03	1.09E-02	3.60E-03
CHILD	MEAT ING	3.95E-04	6.01E-03	3.95E-04	2.28E-04	1.43E-03	3.95E-04
CHILD	MILK ING	4.45E-03	6.79E-02	4.45E-03	2.90E-04	1.08E-02	4.45E-03
CHILD	TOTALS	2.95E-02	2.81E-01	8.78E-01	1.51E-02	6.87E-02	1.32E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.50E-04	3.26E-02	1.30E+00
TEENAGER	GROUND	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03
TEENAGER	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
TEENAGER	VEG.ING.	2.17E-03	3.31E-02	2.17E-03	8.06E-04	8.61E-03	2.17E-03
TEENAGER	MEAT ING	2.39E-04	3.60E-03	2.39E-04	1.65E-04	1.10E-03	2.39E-04
TEENAGER	MILK ING	1.91E-03	2.86E-02	1.91E-03	1.53E-04	6.08E-03	1.91E-03
TEENAGER	TOTALS	2.54E-02	2.16E-01	8.74E-01	1.46E-02	6.14E-02	1.32E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	8.09E-03	1.38E-01	8.57E-01	5.50E-04	3.26E-02	1.30E+00
ADULT	GROUND	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03	6.21E-03
ADULT	CLOUD	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03	6.76E-03
ADULT	VEG.ING.	2.26E-03	3.44E-02	2.26E-03	8.83E-04	8.40E-03	2.26E-03
ADULT	MEAT ING	3.22E-04	4.83E-03	3.22E-04	2.28E-04	1.36E-03	3.22E-04
ADULT	MILK ING	7.60E-04	1.17E-02	7.60E-04	6.36E-05	2.25E-03	7.60E-04
ADULT	TOTALS	2.44E-02	2.01E-01	8.73E-01	1.47E-02	5.76E-02	1.32E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.59E-03	1.50E-01	0.
INFANT	GROUND	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02
INFANT	CLOUD	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.03E-02	3.93E-01	3.03E-02	4.24E-04	8.24E-02	3.03E-02
INFANT	TOTALS	8.65E-02	1.05E+00	4.08E+00	2.04E-02	2.51E-01	4.87E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.59E-03	1.50E-01	0.
CHILD	GROUND	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02
CHILD	CLOUD	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07
CHILD	VEG.ING.	1.40E-02	2.25E-01	1.40E-02	1.14E-03	3.85E-02	1.40E-02
CHILD	MEAT ING	1.42E-03	2.26E-02	1.42E-03	2.40E-04	4.12E-03	1.42E-03
CHILD	MILK ING	1.80E-02	2.90E-01	1.80E-02	3.06E-04	4.68E-02	1.80E-02
CHILD	TOTALS	8.96E-02	1.19E+00	4.09E+00	2.16E-02	2.58E-01	5.18E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.59E-03	1.50E-01	0.
TEENAGER	GROUND	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02
TEENAGER	CLOUD	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07
TEENAGER	VEG.ING.	8.01E-03	1.28E-01	8.01E-03	8.53E-04	3.04E-02	8.01E-03
TEENAGER	MEAT ING	8.03E-04	1.27E-02	8.03E-04	1.74E-04	3.19E-03	8.03E-04
TEENAGER	MILK ING	7.35E-03	1.17E-01	7.35E-03	1.61E-04	2.64E-02	7.35E-03
TEENAGER	TOTALS	7.23E-02	9.14E-01	4.07E+00	2.11E-02	2.28E-01	3.45E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.59E-03	1.50E-01	0.
ADULT	GROUND	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02
ADULT	CLOUD	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07	1.79E-07
ADULT	VEG.ING.	7.97E-03	1.27E-01	7.97E-03	9.38E-04	2.95E-02	7.97E-03
ADULT	MEAT ING	1.02E-03	1.61E-02	1.02E-03	2.41E-04	3.91E-03	1.02E-03
ADULT	MILK ING	2.79E-03	4.42E-02	2.79E-03	6.70E-05	9.74E-03	2.79E-03
ADULT	TOTALS	6.80E-02	8.44E-01	4.06E+00	2.12E-02	2.11E-01	3.02E-02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 4 NAME=SOUTHWEST BOUNDARY X= -.5KM, Y= -1.4KM, Z= -6.1M, DIST= 1.5KM, TRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.67E-03	1.50E-01	4.92E+00
INFANT	GROUND	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02
INFANT	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.03E-02	3.93E-01	3.03E-02	4.69E-04	8.25E-02	3.03E-02
INFANT	TOTALS	1.14E-01	1.08E+00	4.11E+00	4.76E-02	2.78E-01	5.00E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.67E-03	1.50E-01	4.92E+00
CHILD	GROUND	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02
CHILD	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
CHILD	VEG.ING.	1.40E-02	2.26E-01	1.40E-02	1.26E-03	3.89E-02	1.40E-02
CHILD	MEAT ING	1.42E-03	2.26E-02	1.42E-03	2.66E-04	4.20E-03	1.42E-03
CHILD	MILK ING	1.81E-02	2.90E-01	1.81E-02	3.38E-04	4.69E-02	1.81E-02
CHILD	TOTALS	1.17E-01	1.22E+00	4.11E+00	4.90E-02	2.85E-01	5.00E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.67E-03	1.50E-01	4.92E+00
TEENAGER	GROUND	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02
TEENAGER	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
TEENAGER	VEG.ING.	8.02E-03	1.28E-01	8.02E-03	9.39E-04	3.07E-02	8.02E-03
TEENAGER	MEAT ING	8.05E-04	1.27E-02	8.05E-04	1.93E-04	3.25E-03	8.05E-04
TEENAGER	MILK ING	7.36E-03	1.17E-01	7.36E-03	1.78E-04	2.64E-02	7.36E-03
TEENAGER	TOTALS	9.94E-02	9.41E-01	4.10E+00	4.84E-02	2.56E-01	4.99E+00
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.78E-02	6.38E-01	4.03E+00	1.67E-03	1.50E-01	4.92E+00
ADULT	GROUND	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02
ADULT	CLOUD	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02
ADULT	VEG.ING.	7.98E-03	1.27E-01	7.98E-03	1.03E-03	2.98E-02	7.98E-03
ADULT	MEAT ING	1.03E-03	1.62E-02	1.03E-03	2.66E-04	3.99E-03	1.03E-03
ADULT	MILK ING	2.79E-03	4.42E-02	2.79E-03	7.41E-05	9.76E-03	2.79E-03
ADULT	TOTALS	9.51E-02	8.72E-01	4.09E+00	4.85E-02	2.39E-01	4.98E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	0.
INFANT	GROUND	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01
INFANT	CLOUD	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.08E-01	5.27E+00	4.08E-01	9.04E-03	1.10E+00	4.08E-01
INFANT	TOTALS	1.15E+00	1.39E+01	5.39E+01	2.75E-01	3.33E+00	6.52E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	0.
CHILD	GROUND	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01
CHILD	CLOUD	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06
CHILD	VEG.ING.	1.92E-01	3.06E+00	1.92E-01	2.43E-02	5.39E-01	1.92E-01
CHILD	MEAT ING	1.98E-02	3.11E-01	1.98E-02	5.13E-03	6.05E-02	1.98E-02
CHILD	MILK ING	2.45E-01	3.89E+00	2.45E-01	6.53E-03	6.27E-01	2.45E-01
CHILD	TOTALS	1.20E+00	(1.60E+01	(5.39E+01)	3.02E-01	3.45E+00	7.01E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	0.
TEENAGER	GROUND	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01
TEENAGER	CLOUD	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06
TEENAGER	VEG.ING.	1.11E-01	1.75E+00	1.11E-01	1.82E-02	4.25E-01	1.11E-01
TEENAGER	MEAT ING	1.14E-02	1.78E-01	1.14E-02	3.72E-03	4.68E-02	1.14E-02
TEENAGER	MILK ING	1.01E-01	1.58E+00	1.01E-01	3.44E-03	3.53E-01	1.01E-01
TEENAGER	TOTALS	9.66E-01	1.22E+01	5.37E+01	2.91E-01	3.05E+00	4.67E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	0.
ADULT	GROUND	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01	2.43E-01
ADULT	CLOUD	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06	2.36E-06
ADULT	VEG.ING.	1.12E-01	1.76E+00	1.12E-01	1.99E-02	4.13E-01	1.12E-01
ADULT	MEAT ING	1.47E-02	2.29E-01	1.47E-02	5.13E-03	5.75E-02	1.47E-02
ADULT	MILK ING	3.88E-02	6.04E-01	3.88E-02	1.43E-03	1.31E-01	3.88E-02
ADULT	TOTALS	9.08E-01	1.13E+01	5.36E+01	2.92E-01	2.83E+00	4.09E-01

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

NUMBER 5 NAME=NEAREST RESIDENT X= .1KM, Y= .5KM, Z= 48.8M, DIST= .5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	6.47E+01
INFANT	GROUND	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01
INFANT	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	4.08E-01	5.27E+00	4.08E-01	9.06E-03	1.10E+00	4.08E-01
INFANT	TOTALS	1.27E+00	1.41E+01	5.40E+01	3.90E-01	3.44E+00	6.55E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	6.47E+01
CHILD	GROUND	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01
CHILD	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
CHILD	VEG.ING.	1.92E-01	3.06E+00	1.92E-01	2.44E-02	5.39E-01	1.92E-01
CHILD	MEAT ING	1.98E-02	3.12E-01	1.98E-02	5.14E-03	6.06E-02	1.98E-02
CHILD	MILK ING	2.45E-01	3.89E+00	2.45E-01	6.54E-03	6.27E-01	2.45E-01
CHILD	TOTALS	1.31E+00	1.61E+01	5.40E+01	4.17E-01	3.57E+00	6.55E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	6.47E+01
TEENAGER	GROUND	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01
TEENAGER	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
TEENAGER	VEG.ING.	1.11E-01	1.75E+00	1.11E-01	1.82E-02	4.25E-01	1.11E-01
TEENAGER	MEAT ING	1.14E-02	1.78E-01	1.14E-02	3.73E-03	4.68E-02	1.14E-02
TEENAGER	MILK ING	1.01E-01	1.58E+00	1.01E-01	3.44E-03	3.53E-01	1.01E-01
TEENAGER	TOTALS	1.08E+00	1.23E+01	5.38E+01	4.06E-01	3.17E+00	6.53E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.99E-01	8.44E+00	5.32E+01	2.25E-02	1.98E+00	6.47E+01
ADULT	GROUND	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01	3.08E-01
ADULT	CLOUD	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02	5.04E-02
ADULT	VEG.ING.	1.12E-01	1.76E+00	1.12E-01	2.00E-02	4.13E-01	1.12E-01
ADULT	MEAT ING	1.47E-02	2.29E-01	1.47E-02	5.14E-03	5.75E-02	1.47E-02
ADULT	MILK ING	3.88E-02	6.04E-01	3.88E-02	1.43E-03	1.31E-01	3.88E-02
ADULT	TOTALS	1.02E+00	1.14E+01	5.37E+01	4.07E-01	2.94E+00	6.52E+01

REGION=UNC MILL RUN 8 CODE=MILDOS,REV0 (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 87
TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	0.
INFANT	GROUND	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01
INFANT	CLOUD	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.90E-01	2.42E+00	1.90E-01	8.22E-03	5.00E-01	1.90E-01
INFANT	TOTALS	5.18E-01	6.26E+00	2.37E+01	1.29E-01	1.49E+00	2.98E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	0.
CHILD	GROUND	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01
CHILD	CLOUD	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06
CHILD	VEG.ING.	9.32E-02	1.45E+00	9.32E-02	2.22E-02	2.74E-01	9.32E-02
CHILD	MEAT ING	1.00E-02	1.54E-01	1.00E-02	4.67E-03	3.42E-02	1.00E-02
CHILD	MILK ING	1.17E-01	1.80E+00	1.17E-01	5.95E-03	2.87E-01	1.17E-01
CHILD	TOTALS	5.48E-01	7.26E+00	2.37E+01	1.53E-01	1.58E+00	3.28E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	0.
TEENAGER	GROUND	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01
TEENAGER	CLOUD	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06
TEENAGER	VEG.ING.	5.55E-02	8.56E-01	5.55E-02	1.65E-02	2.16E-01	5.55E-02
TEENAGER	MEAT ING	5.97E-03	9.08E-02	5.97E-03	3.39E-03	2.63E-02	5.97E-03
TEENAGER	MILK ING	4.95E-02	7.50E-01	4.95E-02	3.13E-03	1.62E-01	4.95E-02
TEENAGER	TOTALS	4.39E-01	5.54E+00	2.36E+01	1.44E-01	1.39E+00	2.19E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	0.
ADULT	GROUND	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01
ADULT	CLOUD	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06	1.04E-06
ADULT	VEG.ING.	5.72E-02	8.79E-01	5.72E-02	1.81E-02	2.11E-01	5.72E-02
ADULT	MEAT ING	7.94E-03	1.20E-01	7.94E-03	4.67E-03	3.25E-02	7.94E-03
ADULT	MILK ING	1.94E-02	2.91E-01	1.94E-02	1.30E-03	5.99E-02	1.94E-02
ADULT	TOTALS	4.13E-01	5.14E+00	2.36E+01	1.45E-01	1.29E+00	1.93E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 6 NAME=ENV MONITOR STA A X= .2KM, Y= .7KM, Z= 47.2M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	4.69E+01
INFANT	GROUND	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01
INFANT	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.90E-01	2.42E+00	1.90E-01	8.26E-03	5.00E-01	1.90E-01
INFANT	TOTALS	6.31E-01	6.38E+00	2.38E+01	2.42E-01	1.60E+00	4.74E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	4.69E+01
CHILD	GROUND	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01
CHILD	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
CHILD	VEG.ING.	9.32E-02	1.45E+00	9.32E-02	2.22E-02	2.74E-01	9.32E-02
CHILD	MEAT ING	1.00E-02	1.54E-01	1.00E-02	4.69E-03	3.42E-02	1.00E-02
CHILD	MILK ING	1.17E-01	1.80E+00	1.17E-01	5.97E-03	2.87E-01	1.17E-01
CHILD	TOTALS	6.61E-01	7.37E+00	2.38E+01	2.66E-01	1.70E+00	4.74E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	4.69E+01
TEENAGER	GROUND	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01
TEENAGER	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
TEENAGER	VEG.ING.	5.55E-02	8.56E-01	5.55E-02	1.66E-02	2.16E-01	5.55E-02
TEENAGER	MEAT ING	5.97E-03	9.08E-02	5.97E-03	3.40E-03	2.64E-02	5.97E-03
TEENAGER	MILK ING	4.95E-02	7.50E-01	4.95E-02	3.14E-03	1.62E-01	4.95E-02
TEENAGER	TOTALS	5.52E-01	5.66E+00	2.37E+01	2.57E-01	1.51E+00	4.73E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.20E-01	3.74E+00	2.34E+01	1.24E-02	8.80E-01	4.69E+01
ADULT	GROUND	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01
ADULT	CLOUD	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02	6.09E-02
ADULT	VEG.ING.	5.73E-02	8.79E-01	5.73E-02	1.82E-02	2.11E-01	5.73E-02
ADULT	MEAT ING	7.95E-03	1.20E-01	7.95E-03	4.69E-03	3.26E-02	7.95E-03
ADULT	MILK ING	1.94E-02	2.91E-01	1.94E-02	1.31E-03	5.99E-02	1.94E-02
ADULT	TOTALS	5.26E-01	5.25E+00	2.37E+01	2.58E-01	1.40E+00	4.73E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS TS... 15.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.64E-02	4.58E-01	2.75E+00	2.75E-03	1.09E-01	0.
INFANT	GROUND	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02
INFANT	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.70E-02	3.32E-01	2.70E-02	2.92E-03	6.65E-02	2.70E-02
INFANT	TOTALS	6.68E-02	8.03E-01	2.79E+00	1.90E-02	1.88E-01	4.04E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.64E-02	4.58E-01	2.75E+00	2.75E-03	1.09E-01	0.
CHILD	GROUND	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02
CHILD	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
CHILD	VEG.ING.	1.50E-02	2.21E-01	1.50E-02	7.88E-03	4.94E-02	1.50E-02
CHILD	MEAT ING	1.79E-03	2.59E-02	1.79E-03	1.66E-03	7.50E-03	1.79E-03
CHILD	MILK ING	1.78E-02	2.54E-01	1.78E-02	2.11E-03	3.93E-02	1.78E-02
CHILD	TOTALS	7.43E-02	9.72E-01	2.80E+00	2.78E-02	2.18E-01	4.80E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.64E-02	4.58E-01	2.75E+00	2.75E-03	1.09E-01	0.
TEENAGER	GROUND	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02
TEENAGER	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
TEENAGER	VEG.ING.	9.60E-03	1.40E-01	9.60E-03	5.87E-03	3.90E-02	9.60E-03
TEENAGER	MEAT ING	1.15E-03	1.65E-02	1.15E-03	1.20E-03	5.76E-03	1.15E-03
TEENAGER	MILK ING	8.14E-03	1.13E-01	8.14E-03	1.11E-03	2.21E-02	8.14E-03
TEENAGER	TOTALS	5.86E-02	7.40E-01	2.78E+00	2.43E-02	1.89E-01	3.23E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.64E-02	4.58E-01	2.75E+00	2.75E-03	1.09E-01	0.
ADULT	GROUND	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02
ADULT	CLOUD	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07	1.22E-07
ADULT	VEG.ING.	1.05E-02	1.52E-01	1.05E-02	6.43E-03	3.83E-02	1.05E-02
ADULT	MEAT ING	1.62E-03	2.33E-02	1.62E-03	1.66E-03	7.16E-03	1.62E-03
ADULT	MILK ING	3.39E-03	4.62E-02	3.39E-03	4.63E-04	8.20E-03	3.39E-03
ADULT	TOTALS	5.52E-02	6.92E-01	2.78E+00	2.47E-02	1.76E-01	2.89E-02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 7 NAME=NEAREST DOWNWIND RES X= 2.6KM, Y= 2.0KM, Z= 18.3M, DIST= 3.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.64E-02	4.59E-01	2.75E+00	3.05E-03	1.10E-01	3.15E+00
INFANT	GROUND	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02
INFANT	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.71E-02	3.32E-01	2.71E-02	3.08E-03	6.69E-02	2.71E-02
INFANT	TOTALS	1.11E-01	8.49E-01	2.84E+00	6.41E-02	2.35E-01	3.23E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.64E-02	4.59E-01	2.75E+00	3.05E-03	1.10E-01	3.15E+00
CHILD	GROUND	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02
CHILD	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
CHILD	VEG.ING.	1.51E-02	2.22E-01	1.51E-02	8.29E-03	5.06E-02	1.51E-02
CHILD	MEAT ING	1.81E-03	2.62E-02	1.81E-03	1.75E-03	7.77E-03	1.81E-03
CHILD	MILK ING	1.78E-02	2.54E-01	1.78E-02	2.23E-03	3.97E-02	1.78E-02
CHILD	TOTALS	1.19E-01	1.02E+00	2.84E+00	7.33E-02	2.66E-01	3.24E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.64E-02	4.59E-01	2.75E+00	3.05E-03	1.10E-01	3.15E+00
TEENAGER	GROUND	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02
TEENAGER	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
TEENAGER	VEG.ING.	9.64E-03	1.41E-01	9.64E-03	6.17E-03	4.00E-02	9.64E-03
TEENAGER	MEAT ING	1.16E-03	1.67E-02	1.16E-03	1.27E-03	5.97E-03	1.16E-03
TEENAGER	MILK ING	8.14E-03	1.13E-01	8.14E-03	1.17E-03	2.23E-02	8.14E-03
TEENAGER	TOTALS	1.03E-01	7.88E-01	2.83E+00	6.97E-02	2.36E-01	3.23E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.64E-02	4.59E-01	2.75E+00	3.05E-03	1.10E-01	3.15E+00
ADULT	GROUND	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02
ADULT	CLOUD	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02	3.01E-02
ADULT	VEG.ING.	1.05E-02	1.53E-01	1.05E-02	6.76E-03	3.93E-02	1.05E-02
ADULT	MEAT ING	1.63E-03	2.35E-02	1.63E-03	1.75E-03	7.42E-03	1.63E-03
ADULT	MILK ING	3.39E-03	4.63E-02	3.39E-03	4.88E-04	8.28E-03	3.39E-03
ADULT	TOTALS	9.99E-02	7.39E-01	2.83E+00	7.00E-02	2.23E-01	3.22E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.20E-03	2.03E-02	1.27E-01	6.68E-05	4.79E-03	0.
INFANT	GROUND	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04
INFANT	CLOUD	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.00E-03	1.29E-02	1.00E-03	3.31E-05	2.67E-03	1.00E-03
INFANT	TOTALS	2.78E-03	3.38E-02	1.29E-01	6.85E-04	8.04E-03	1.59E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.20E-03	2.03E-02	1.27E-01	6.68E-05	4.79E-03	0.
CHILD	GROUND	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04
CHILD	CLOUD	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09
CHILD	VEG.ING.	4.82E-04	7.60E-03	4.82E-04	8.91E-05	1.39E-03	4.82E-04
CHILD	MEAT ING	5.08E-05	7.90E-04	5.08E-05	1.88E-05	1.65E-04	5.08E-05
CHILD	MILK ING	6.10E-04	9.54E-03	6.10E-04	2.39E-05	1.53E-03	6.10E-04
CHILD	TOTALS	2.93E-03	3.89E-02	1.29E-01	7.84E-04	8.45E-03	1.73E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.20E-03	2.03E-02	1.27E-01	6.68E-05	4.79E-03	0.
TEENAGER	GROUND	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04
TEENAGER	CLOUD	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09
TEENAGER	VEG.ING.	2.83E-04	4.42E-03	2.83E-04	6.65E-05	1.09E-03	2.83E-04
TEENAGER	MEAT ING	2.98E-05	4.59E-04	2.98E-05	1.36E-05	1.27E-04	2.98E-05
TEENAGER	MILK ING	2.55E-04	3.93E-03	2.55E-04	1.26E-05	8.62E-04	2.55E-04
TEENAGER	TOTALS	2.35E-03	2.97E-02	1.28E-01	7.44E-04	7.46E-03	1.15E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.20E-03	2.03E-02	1.27E-01	6.68E-05	4.79E-03	0.
ADULT	GROUND	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04	5.85E-04
ADULT	CLOUD	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09	5.64E-09
ADULT	VEG.ING.	2.89E-04	4.49E-03	2.89E-04	7.29E-05	1.07E-03	2.89E-04
ADULT	MEAT ING	3.91E-05	6.00E-04	3.91E-05	1.88E-05	1.57E-04	3.91E-05
ADULT	MILK ING	9.91E-05	1.51E-03	9.91E-05	5.24E-06	3.19E-04	9.91E-05
ADULT	TOTALS	2.21E-03	2.75E-02	1.28E-01	7.49E-04	6.91E-03	1.01E-03

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 8 NAME=NEAREST COMMUNITY X= 5.4KM, Y= -5.2KM, Z= 1.2M, DIST= 7.5KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.21E-03	2.06E-02	1.27E-01	1.38E-04	5.02E-03	1.34E-01
INFANT	GROUND	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04
INFANT	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.01E-03	1.30E-02	1.01E-03	7.04E-05	2.78E-03	1.01E-03
INFANT	TOTALS	5.03E-03	3.64E-02	1.31E-01	3.03E-03	1.06E-02	1.38E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.21E-03	2.06E-02	1.27E-01	1.38E-04	5.02E-03	1.34E-01
CHILD	GROUND	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04
CHILD	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
CHILD	VEG.ING.	4.99E-04	7.93E-03	4.99E-04	1.87E-04	1.68E-03	4.99E-04
CHILD	MEAT ING	5.43E-05	8.61E-04	5.43E-05	4.01E-05	2.30E-04	5.43E-05
CHILD	MILK ING	6.14E-04	9.64E-03	6.14E-04	5.10E-05	1.61E-03	6.14E-04
CHILD	TOTALS	5.19E-03	4.19E-02	1.31E-01	3.24E-03	1.14E-02	1.38E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.21E-03	2.06E-02	1.27E-01	1.38E-04	5.02E-03	1.34E-01
TEENAGER	GROUND	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04
TEENAGER	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
TEENAGER	VEG.ING.	2.92E-04	4.62E-03	2.92E-04	1.38E-04	1.33E-03	2.92E-04
TEENAGER	MEAT ING	3.17E-05	5.03E-04	3.17E-05	2.90E-05	1.77E-04	3.17E-05
TEENAGER	MILK ING	2.57E-04	3.97E-03	2.57E-04	2.69E-05	9.07E-04	2.57E-04
TEENAGER	TOTALS	4.61E-03	3.25E-02	1.31E-01	3.15E-03	1.02E-02	1.38E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.21E-03	2.06E-02	1.27E-01	1.38E-04	5.02E-03	1.34E-01
ADULT	GROUND	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04	7.93E-04
ADULT	CLOUD	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03	2.03E-03
ADULT	VEG.ING.	2.98E-04	4.73E-03	2.98E-04	1.51E-04	1.29E-03	2.98E-04
ADULT	MEAT ING	4.17E-05	6.64E-04	4.17E-05	3.99E-05	2.18E-04	4.17E-05
ADULT	MILK ING	9.98E-05	1.53E-03	9.98E-05	1.12E-05	3.36E-04	9.98E-05
ADULT	TOTALS	4.47E-03	3.04E-02	1.31E-01	3.16E-03	9.69E-03	1.37E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.77E-04	6.54E-03	3.95E-02	3.83E-05	1.55E-03	0.
INFANT	GROUND	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04
INFANT	CLOUD	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.53E-04	4.41E-03	3.53E-04	2.82E-05	8.96E-04	3.53E-04
INFANT	TOTALS	9.17E-04	1.11E-02	4.00E-02	2.53E-04	2.64E-03	5.40E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.77E-04	6.54E-03	3.95E-02	3.83E-05	1.55E-03	0.
CHILD	GROUND	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04
CHILD	CLOUD	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09
CHILD	VEG.ING.	1.86E-04	2.81E-03	1.86E-04	7.60E-05	5.86E-04	1.86E-04
CHILD	MEAT ING	2.13E-05	3.16E-04	2.13E-05	1.60E-05	8.30E-05	2.13E-05
CHILD	MILK ING	2.26E-04	3.33E-03	2.26E-04	2.04E-05	5.23E-04	2.26E-04
CHILD	TOTALS	9.97E-04	1.32E-02	4.01E-02	3.37E-04	2.93E-03	6.20E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.77E-04	6.54E-03	3.95E-02	3.83E-05	1.55E-03	0.
TEENAGER	GROUND	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04
TEENAGER	CLOUD	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09
TEENAGER	VEG.ING.	1.16E-04	1.73E-03	1.16E-04	5.66E-05	4.63E-04	1.16E-04
TEENAGER	MEAT ING	1.33E-05	1.96E-04	1.33E-05	1.16E-05	6.39E-05	1.33E-05
TEENAGER	MILK ING	1.00E-04	1.44E-03	1.00E-04	1.07E-05	2.95E-04	1.00E-04
TEENAGER	TOTALS	7.93E-04	1.01E-02	3.99E-02	3.04E-04	2.56E-03	4.16E-04

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.77E-04	6.54E-03	3.95E-02	3.83E-05	1.55E-03	0.
ADULT	GROUND	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04	1.86E-04
ADULT	CLOUD	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09	1.75E-09
ADULT	VEG.ING.	1.24E-04	1.83E-03	1.24E-04	6.21E-05	4.53E-04	1.24E-04
ADULT	MEAT ING	1.84E-05	2.69E-04	1.84E-05	1.60E-05	7.91E-05	1.84E-05
ADULT	MILK ING	4.07E-05	5.77E-04	4.07E-05	4.47E-06	1.09E-04	4.07E-05
ADULT	TOTALS	7.46E-04	9.41E-03	3.99E-02	3.07E-04	2.38E-03	3.69E-04

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 9 NAME=NEAREST DOWNWIND COM X= 31.8KM, Y= 4.0KM, Z= -18.3M, DIST= 32.1KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	4.27E-04	8.09E-03	3.99E-02	4.31E-04	2.84E-03	1.09E-01
INFANT	GROUND	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04
INFANT	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	3.85E-04	4.98E-03	3.85E-04	2.33E-04	1.47E-03	3.85E-04
INFANT	TOTALS	3.07E-03	1.53E-02	4.25E-02	2.92E-03	6.56E-03	1.12E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	4.27E-04	8.09E-03	3.99E-02	4.31E-04	2.84E-03	1.09E-01
CHILD	GROUND	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04
CHILD	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
CHILD	VEG.ING.	2.77E-04	4.61E-03	2.77E-04	6.15E-04	2.22E-03	2.77E-04
CHILD	MEAT ING	4.10E-05	7.07E-04	4.10E-05	1.33E-04	4.37E-04	4.10E-05
CHILD	MILK ING	2.51E-04	3.83E-03	2.51E-04	1.69E-04	9.75E-04	2.51E-04
CHILD	TOTALS	3.25E-03	1.95E-02	4.27E-02	3.61E-03	8.73E-03	1.12E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	4.27E-04	8.09E-03	3.99E-02	4.31E-04	2.84E-03	1.09E-01
TEENAGER	GROUND	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04
TEENAGER	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
TEENAGER	VEG.ING.	1.66E-04	2.85E-03	1.66E-04	4.52E-04	1.73E-03	1.66E-04
TEENAGER	MEAT ING	2.40E-05	4.37E-04	2.40E-05	9.61E-05	3.34E-04	2.40E-05
TEENAGER	MILK ING	1.10E-04	1.67E-03	1.10E-04	8.91E-05	5.45E-04	1.10E-04
TEENAGER	TOTALS	2.99E-03	1.53E-02	4.25E-02	3.33E-03	7.70E-03	1.12E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	4.27E-04	8.09E-03	3.99E-02	4.31E-04	2.84E-03	1.09E-01
ADULT	GROUND	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04
ADULT	CLOUD	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
ADULT	VEG.ING.	1.77E-04	3.14E-03	1.77E-04	4.92E-04	1.70E-03	1.77E-04
ADULT	MEAT ING	3.26E-05	6.24E-04	3.26E-05	1.32E-04	4.16E-04	3.26E-05
ADULT	MILK ING	4.47E-05	6.77E-04	4.47E-05	3.71E-05	2.04E-04	4.47E-05
ADULT	TOTALS	2.94E-03	1.48E-02	4.24E-02	3.35E-03	7.41E-03	1.12E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.85E-02	0.
INFANT	GROUND	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02
INFANT	CLOUD	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.21E-02	2.72E-01	2.21E-02	2.23E-03	5.47E-02	2.21E-02
INFANT	TOTALS	5.49E-02	6.57E-01	2.32E+00	1.51E-02	1.54E-01	3.32E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.85E-02	0.
CHILD	GROUND	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02
CHILD	CLOUD	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07
CHILD	VEG.ING.	1.21E-02	1.79E-01	1.21E-02	6.02E-03	3.94E-02	1.21E-02
CHILD	MEAT ING	1.43E-03	2.08E-02	1.43E-03	1.27E-03	5.89E-03	1.43E-03
CHILD	MILK ING	1.44E-02	2.08E-01	1.44E-02	1.62E-03	3.23E-02	1.44E-02
CHILD	TOTALS	6.08E-02	7.93E-01	2.32E+00	2.18E-02	1.77E-01	3.91E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.85E-02	0.
TEENAGER	GROUND	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02
TEENAGER	CLOUD	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07
TEENAGER	VEG.ING.	7.70E-03	1.13E-01	7.70E-03	4.49E-03	3.11E-02	7.70E-03
TEENAGER	MEAT ING	9.11E-04	1.32E-02	9.11E-04	9.20E-04	4.53E-03	9.11E-04
TEENAGER	MILK ING	6.55E-03	9.19E-02	6.55E-03	8.51E-04	1.82E-02	6.55E-03
TEENAGER	TOTALS	4.80E-02	6.03E-01	2.31E+00	1.92E-02	1.53E-01	2.62E-02

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.85E-02	0.
ADULT	GROUND	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02
ADULT	CLOUD	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07	1.02E-07
ADULT	VEG.ING.	8.36E-03	1.22E-01	8.36E-03	4.91E-03	3.06E-02	8.36E-03
ADULT	MEAT ING	1.28E-03	1.85E-02	1.28E-03	1.27E-03	5.62E-03	1.28E-03
ADULT	MILK ING	2.71E-03	3.73E-02	2.71E-03	3.54E-04	6.73E-03	2.71E-03
ADULT	TOTALS	4.52E-02	5.63E-01	2.31E+00	1.95E-02	1.43E-01	2.34E-02

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 10 NAME=NEAREST GRAZING AREA X= .3KM, Y= -.6KM, Z= -18.3M, DIST= .7KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.86E-02	2.38E+00
INFANT	GROUND	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02
INFANT	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.21E-02	2.72E-01	2.21E-02	2.23E-03	5.47E-02	2.21E-02
INFANT	TOTALS	6.82E-02	6.71E-01	2.33E+00	2.84E-02	1.68E-01	2.42E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.86E-02	2.38E+00
CHILD	GROUND	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02
CHILD	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
CHILD	VEG.ING.	1.21E-02	1.79E-01	1.21E-02	6.02E-03	3.94E-02	1.21E-02
CHILD	MEAT ING	1.43E-03	2.08E-02	1.43E-03	1.27E-03	5.90E-03	1.43E-03
CHILD	MILK ING	1.44E-02	2.08E-01	1.44E-02	1.62E-03	3.23E-02	1.44E-02
CHILD	TOTALS	7.41E-02	8.06E-01	2.34E+00	3.51E-02	1.91E-01	2.43E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.86E-02	2.38E+00
TEENAGER	GROUND	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02
TEENAGER	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
TEENAGER	VEG.ING.	7.70E-03	1.13E-01	7.70E-03	4.49E-03	3.11E-02	7.70E-03
TEENAGER	MEAT ING	9.11E-04	1.32E-02	9.11E-04	9.21E-04	4.53E-03	9.11E-04
TEENAGER	MILK ING	6.55E-03	9.19E-02	6.55E-03	8.51E-04	1.82E-02	6.55E-03
TEENAGER	TOTALS	6.13E-02	6.16E-01	2.33E+00	3.24E-02	1.67E-01	2.42E+00

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.18E-02	3.74E-01	2.29E+00	1.82E-03	8.86E-02	2.38E+00
ADULT	GROUND	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02	2.21E-02
ADULT	CLOUD	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
ADULT	VEG.ING.	8.36E-03	1.22E-01	8.36E-03	4.92E-03	3.06E-02	8.36E-03
ADULT	MEAT ING	1.28E-03	1.85E-02	1.28E-03	1.27E-03	5.63E-03	1.28E-03
ADULT	MILK ING	2.71E-03	3.73E-02	2.71E-03	3.54E-04	6.73E-03	2.71E-03
ADULT	TOTALS	5.85E-02	5.76E-01	2.32E+00	3.27E-02	1.56E-01	2.41E+00

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.53E-04	4.27E-03	2.70E-02	1.07E-05	1.00E-03	0.
INFANT	GROUND	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04
INFANT	CLOUD	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.00E-04	2.60E-03	2.00E-04	1.68E-06	5.47E-04	2.00E-04
INFANT	TOTALS	5.76E-04	7.00E-03	2.73E-02	1.35E-04	1.67E-03	3.23E-04
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.53E-04	4.27E-03	2.70E-02	1.07E-05	1.00E-03	0.
CHILD	GROUND	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04
CHILD	CLOUD	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09
CHILD	VEG.ING.	9.14E-05	1.48E-03	9.14E-05	4.52E-06	2.48E-04	9.14E-05
CHILD	MEAT ING	9.11E-06	1.46E-04	9.11E-06	9.51E-07	2.55E-05	9.11E-06
CHILD	MILK ING	1.18E-04	1.91E-03	1.18E-04	1.21E-06	3.10E-04	1.18E-04
CHILD	TOTALS	5.95E-04	7.93E-03	2.74E-02	1.40E-04	1.71E-03	3.41E-04
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.53E-04	4.27E-03	2.70E-02	1.07E-05	1.00E-03	0.
TEENAGER	GROUND	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04
TEENAGER	CLOUD	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09
TEENAGER	VEG.ING.	5.17E-05	8.32E-04	5.17E-05	3.39E-06	1.96E-04	5.17E-05
TEENAGER	MEAT ING	5.11E-06	8.14E-05	5.11E-06	6.91E-07	1.98E-05	5.11E-06
TEENAGER	MILK ING	4.78E-05	7.66E-04	4.78E-05	6.38E-07	1.75E-04	4.78E-05
TEENAGER	TOTALS	4.80E-04	6.08E-03	2.72E-02	1.38E-04	1.52E-03	2.27E-04
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.53E-04	4.27E-03	2.70E-02	1.07E-05	1.00E-03	0.
ADULT	GROUND	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04
ADULT	CLOUD	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09
ADULT	VEG.ING.	5.11E-05	8.21E-04	5.11E-05	3.74E-06	1.89E-04	5.11E-05
ADULT	MEAT ING	6.44E-06	1.02E-04	6.44E-06	9.55E-07	2.42E-05	6.44E-06
ADULT	MILK ING	1.80E-05	2.89E-04	1.80E-05	2.65E-07	6.45E-05	1.80E-05
ADULT	TOTALS	4.51E-04	5.61E-03	2.72E-02	1.38E-04	1.40E-03	1.98E-04

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 11 NAME=GALLUP X= -20.4KM, Y= -14.8KM, Z= 0.0M, DIST= 25.2KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.19E-04	6.32E-03	2.76E-02	5.33E-04	2.71E-03	1.78E-01
INFANT	GROUND	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04
INFANT	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.42E-04	3.36E-03	2.42E-04	2.74E-04	1.30E-03	2.42E-04
INFANT	TOTALS	3.87E-03	1.30E-02	3.11E-02	4.12E-03	7.32E-03	1.81E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.19E-04	6.32E-03	2.76E-02	5.33E-04	2.71E-03	1.78E-01
CHILD	GROUND	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04
CHILD	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
CHILD	VEG.ING.	2.11E-04	3.87E-03	2.11E-04	7.20E-04	2.42E-03	2.11E-04
CHILD	MEAT ING	3.52E-05	6.66E-04	3.52E-05	1.56E-04	4.96E-04	3.52E-05
CHILD	MILK ING	1.52E-04	2.58E-03	1.52E-04	1.99E-04	9.09E-04	1.52E-04
CHILD	TOTALS	4.03E-03	1.68E-02	3.13E-02	4.92E-03	9.84E-03	1.81E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.19E-04	6.32E-03	2.76E-02	5.33E-04	2.71E-03	1.78E-01
TEENAGER	GROUND	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04
TEENAGER	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
TEENAGER	VEG.ING.	1.18E-04	2.33E-03	1.18E-04	5.29E-04	1.88E-03	1.18E-04
TEENAGER	MEAT ING	1.93E-05	4.02E-04	1.93E-05	1.13E-04	3.79E-04	1.93E-05
TEENAGER	MILK ING	6.10E-05	1.06E-03	6.10E-05	1.05E-04	5.08E-04	6.10E-05
TEENAGER	TOTALS	3.83E-03	1.34E-02	3.11E-02	4.59E-03	8.78E-03	1.81E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.19E-04	6.32E-03	2.76E-02	5.33E-04	2.71E-03	1.78E-01
ADULT	GROUND	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04	1.96E-04
ADULT	CLOUD	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
ADULT	VEG.ING.	1.21E-04	2.56E-03	1.21E-04	5.75E-04	1.84E-03	1.21E-04
ADULT	MEAT ING	2.54E-05	5.74E-04	2.54E-05	1.55E-04	4.71E-04	2.54E-05
ADULT	MILK ING	2.34E-05	4.21E-04	2.34E-05	4.36E-05	1.90E-04	2.34E-05
ADULT	TOTALS	3.80E-03	1.32E-02	3.11E-02	4.62E-03	8.52E-03	1.81E-01

REGION=UNC MILL RUN 8 CODE=MILDOS,REVO (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 99

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.08E-03	5.19E-02	3.29E-01	1.17E-04	1.22E-02	0.
INFANT	GROUND	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03
INFANT	CLOUD	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.42E-03	3.16E-02	2.42E-03	1.42E-05	6.64E-03	2.42E-03
INFANT	TOTALS	6.99E-03	8.49E-02	3.33E-01	1.62E-03	2.03E-02	3.91E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.08E-03	5.19E-02	3.29E-01	1.17E-04	1.22E-02	0.
CHILD	GROUND	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03
CHILD	CLOUD	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08
CHILD	VEG.ING.	1.10E-03	1.79E-02	1.10E-03	3.80E-05	2.97E-03	1.10E-03
CHILD	MEAT ING	1.09E-04	1.76E-03	1.09E-04	7.99E-06	3.00E-04	1.09E-04
CHILD	MILK ING	1.43E-03	2.32E-02	1.43E-03	1.02E-05	3.76E-03	1.43E-03
CHILD	TOTALS	7.21E-03	9.62E-02	3.33E-01	1.67E-03	2.07E-02	4.13E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.08E-03	5.19E-02	3.29E-01	1.17E-04	1.22E-02	0.
TEENAGER	GROUND	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03
TEENAGER	CLOUD	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08
TEENAGER	VEG.ING.	6.21E-04	1.00E-02	6.21E-04	2.86E-05	2.34E-03	6.21E-04
TEENAGER	MEAT ING	6.08E-05	9.73E-04	6.08E-05	5.82E-06	2.32E-04	6.08E-05
TEENAGER	MILK ING	5.76E-04	9.26E-03	5.76E-04	5.37E-06	2.12E-03	5.76E-04
TEENAGER	TOTALS	5.83E-03	7.36E-02	3.32E-01	1.65E-03	1.84E-02	2.75E-03

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.08E-03	5.19E-02	3.29E-01	1.17E-04	1.22E-02	0.
ADULT	GROUND	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03
ADULT	CLOUD	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08	1.46E-08
ADULT	VEG.ING.	6.11E-04	9.86E-03	6.11E-04	3.16E-05	2.26E-03	6.11E-04
ADULT	MEAT ING	7.63E-05	1.22E-03	7.63E-05	8.04E-06	2.84E-04	7.63E-05
ADULT	MILK ING	2.16E-04	3.48E-03	2.16E-04	2.23E-06	7.83E-04	2.16E-04
ADULT	TOTALS	5.48E-03	6.79E-02	3.31E-01	1.65E-03	1.70E-02	2.40E-03

TIME STEP NUMBER 2, AFTER 20 YEARS   DURATION IN YRS IS... 15.0

NUMBER 12 NAME=SPRINGSTEAD TR. PARK X= -6.3KM, Y= -7.7KM, Z= -48.8M, DIST= 9.9KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	3.11E-03	5.28E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
INFANT	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
INFANT	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	2.44E-03	3.19E-02	2.44E-03	1.32E-04	6.97E-03	2.44E-03
INFANT	TOTALS	1.14E-02	9.06E-02	3.38E-01	6.37E-03	2.58E-02	2.63E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	3.11E-03	5.28E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
CHILD	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
CHILD	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
CHILD	VEG.ING.	1.15E-03	1.89E-02	1.15E-03	3.47E-04	3.90E-03	1.15E-03
CHILD	MEAT ING	1.20E-04	1.98E-03	1.20E-04	7.52E-05	5.04E-04	1.20E-04
CHILD	MILK ING	1.44E-03	2.35E-02	1.44E-03	9.58E-05	4.02E-03	1.44E-03
CHILD	TOTALS	1.17E-02	1.03E-01	3.38E-01	6.76E-03	2.72E-02	2.63E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	3.11E-03	5.28E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
TEENAGER	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
TEENAGER	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
TEENAGER	VEG.ING.	6.50E-04	1.07E-02	6.50E-04	2.56E-04	3.07E-03	6.50E-04
TEENAGER	MEAT ING	6.70E-05	1.11E-03	6.70E-05	5.44E-05	3.88E-04	6.70E-05
TEENAGER	MILK ING	5.81E-04	9.39E-03	5.81E-04	5.04E-05	2.26E-03	5.81E-04
TEENAGER	TOTALS	1.03E-02	7.98E-02	3.37E-01	6.60E-03	2.45E-02	2.62E-01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	3.11E-03	5.28E-02	3.29E-01	3.43E-04	1.29E-02	2.55E-01
ADULT	GROUND	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03	1.69E-03
ADULT	CLOUD	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03	4.21E-03
ADULT	VEG.ING.	6.41E-04	1.06E-02	6.41E-04	2.79E-04	2.98E-03	6.41E-04
ADULT	MEAT ING	8.45E-05	1.42E-03	8.45E-05	7.48E-05	4.78E-04	8.45E-05
ADULT	MILK ING	2.19E-04	3.54E-03	2.19E-04	2.10E-05	8.37E-04	2.19E-04
ADULT	TOTALS	9.95E-03	7.43E-02	3.36E-01	6.61E-03	2.31E-02	2.61E-01

REGION=UNC MILL RUN 8 CODE=MILDOS,REVO (7/79) DATE= 15/12/81
METSET=GALLUP, 76-80 PAGE NO. 101

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	0.
INFANT	GROUND	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02
INFANT	CLOUD	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.75E-01	2.12E+00	1.75E-01	2.20E-02	4.21E-01	1.75E-01
INFANT	TOTALS	4.18E-01	5.00E+00	1.70E+01	1.23E-01	1.17E+00	2.58E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	0.
CHILD	GROUND	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02
CHILD	CLOUD	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07
CHILD	VEG.ING.	1.00E-01	1.45E+00	1.00E-01	5.94E-02	3.38E-01	1.00E-01
CHILD	MEAT ING	1.22E-02	1.75E-01	1.22E-02	1.25E-02	5.32E-02	1.22E-02
CHILD	MILK ING	1.17E-01	1.64E+00	1.17E-01	1.59E-02	2.51E-01	1.17E-01
CHILD	TOTALS	4.73E-01	6.14E+00	1.70E+01	1.89E-01	1.39E+00	3.13E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	0.
TEENAGER	GROUND	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02
TEENAGER	CLOUD	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07
TEENAGER	VEG.ING.	6.52E-02	9.36E-01	6.52E-02	4.43E-02	2.67E-01	6.52E-02
TEENAGER	MEAT ING	7.96E-03	1.13E-01	7.96E-03	9.08E-03	4.09E-02	7.96E-03
TEENAGER	MILK ING	5.46E-02	7.44E-01	5.46E-02	8.39E-03	1.41E-01	5.46E-02
TEENAGER	TOTALS	3.71E-01	4.67E+00	1.69E+01	1.63E-01	1.20E+00	2.10E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	0.
ADULT	GROUND	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02
ADULT	CLOUD	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07	7.41E-07
ADULT	VEG.ING.	7.20E-02	1.03E+00	7.20E-02	4.85E-02	2.63E-01	7.20E-02
ADULT	MEAT ING	1.13E-02	1.62E-01	1.13E-02	1.25E-02	5.08E-02	1.13E-02
ADULT	MILK ING	2.30E-02	3.07E-01	2.30E-02	3.49E-03	5.24E-02	2.30E-02
ADULT	TOTALS	3.50E-01	4.30E+00	1.69E+01	1.65E-01	1.11E+00	1.89E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 13 NAME=NAVAJO GRAZING AREA X= .7KM, Y= .7KM, Z= 0.0M, DIST= 1.0KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	2.20E+01
INFANT	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
INFANT	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.75E-01	2.12E+00	1.75E-01	2.21E-02	4.21E-01	1.75E-01
INFANT	TOTALS	5.67E-01	5.15E+00	1.71E+01	2.72E-01	1.32E+00	2.24E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	2.20E+01
CHILD	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
CHILD	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
CHILD	VEG.ING.	1.00E-01	1.45E+00	1.00E-01	5.95E-02	3.38E-01	1.00E-01
CHILD	MEAT ING	1.22E-02	1.75E-01	1.22E-02	1.25E-02	5.33E-02	1.22E-02
CHILD	MILK ING	1.17E-01	1.64E+00	1.17E-01	1.60E-02	2.51E-01	1.17E-01
CHILD	TOTALS	6.22E-01	6.29E+00	1.72E+01	3.38E-01	1.54E+00	2.25E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	2.20E+01
TEENAGER	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
TEENAGER	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
TEENAGER	VEG.ING.	6.52E-02	9.37E-01	6.52E-02	4.43E-02	2.67E-01	6.52E-02
TEENAGER	MEAT ING	7.96E-03	1.13E-01	7.96E-03	9.09E-03	4.09E-02	7.96E-03
TEENAGER	MILK ING	5.46E-02	7.44E-01	5.46E-02	8.41E-03	1.41E-01	5.46E-02
TEENAGER	TOTALS	5.20E-01	4.82E+00	1.71E+01	3.11E-01	1.35E+00	2.24E+01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	1.61E-01	2.80E+00	1.67E+01	1.81E-02	6.65E-01	2.20E+01
ADULT	GROUND	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01	1.91E-01
ADULT	CLOUD	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
ADULT	VEG.ING.	7.20E-02	1.03E+00	7.20E-02	4.86E-02	2.63E-01	7.20E-02
ADULT	MEAT ING	1.13E-02	1.62E-01	1.13E-02	1.25E-02	5.09E-02	1.13E-02
ADULT	MILK ING	2.30E-02	3.07E-01	2.30E-02	3.50E-03	5.25E-02	2.30E-02
ADULT	TOTALS	4.98E-01	4.53E+00	1.70E+01	3.19E-01	1.26E+00	2.23E+01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.06E-03	9.12E-01	0.
INFANT	GROUND	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01
INFANT	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.83E-01	2.38E+00	1.83E-01	1.73E-03	5.00E-01	1.83E-01
INFANT	TOTALS	5.25E-01	6.38E+00	2.49E+01	1.23E-01	1.52E+00	2.95E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.06E-03	9.12E-01	0.
CHILD	GROUND	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01
CHILD	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
CHILD	VEG.ING.	8.38E-02	1.35E+00	8.38E-02	4.65E-03	2.28E-01	8.38E-02
CHILD	MEAT ING	8.37E-03	1.34E-01	8.37E-03	9.80E-04	2.37E-02	8.37E-03
CHILD	MILK ING	1.08E-01	1.75E+00	1.08E-01	1.25E-03	2.83E-01	1.08E-01
CHILD	TOTALS	5.43E-01	(7.24E+00	(2.49E+01	1.28E-01	1.56E+00	3.12E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.06E-03	9.12E-01	0.
TEENAGER	GROUND	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01
TEENAGER	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
TEENAGER	VEG.ING.	4.75E-02	7.63E-01	4.75E-02	3.49E-03	1.80E-01	4.75E-02
TEENAGER	MEAT ING	4.70E-03	7.48E-02	4.70E-03	7.12E-04	1.83E-02	4.70E-03
TEENAGER	MILK ING	4.39E-02	7.01E-01	4.39E-02	6.57E-04	1.60E-01	4.39E-02
TEENAGER	TOTALS	4.38E-01	5.54E+00	2.48E+01	1.26E-01	1.38E+00	2.08E-01

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.06E-03	9.12E-01	0.
ADULT	GROUND	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01	1.12E-01
ADULT	CLOUD	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06	1.09E-06
ADULT	VEG.ING.	4.70E-02	7.54E-01	4.70E-02	3.84E-03	1.74E-01	4.70E-02
ADULT	MEAT ING	5.94E-03	9.44E-02	5.94E-03	9.83E-04	2.24E-02	5.94E-03
ADULT	MILK ING	1.66E-02	2.64E-01	1.66E-02	2.73E-04	5.90E-02	1.66E-02
ADULT	TOTALS	4.12E-01	5.11E+00	2.48E+01	1.26E-01	1.28E+00	1.81E-01

TIME STEP NUMBER 2, AFTER 20 YEARS DURATION IN YRS IS... 15.0

NUMBER 14 NAME=NEXT NEAREST RESIDEN X= -.0KM, Y= 1.3KM, Z= 12.2M, DIST= 1.3KM, IRTYPE=10

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.19E-03	9.12E-01	1.30E+01
INFANT	GROUND	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01
INFANT	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
INFANT	VEG.ING.	0.	0.	0.	0.	0.	0.
INFANT	MEAT ING	0.	0.	0.	0.	0.	0.
INFANT	MILK ING	1.83E-01	2.38E+00	1.83E-01	1.81E-03	5.00E-01	1.83E-01
INFANT	TOTALS	5.89E-01	6.44E+00	2.50E+01	1.87E-01	1.59E+00	1.33E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
CHILD	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.19E-03	9.12E-01	1.30E+01
CHILD	GROUND	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01
CHILD	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
CHILD	VEG.ING.	8.38E-02	1.35E+00	8.38E-02	4.84E-03	2.28E-01	8.38E-02
CHILD	MEAT ING	8.37E-03	1.34E-01	8.37E-03	1.02E-03	2.38E-02	8.37E-03
CHILD	MILK ING	1.08E-01	1.75E+00	1.08E-01	1.30E-03	2.83E-01	1.08E-01
CHILD	TOTALS	6.07E-01	7.30E+00	2.50E+01	1.92E-01	1.62E+00	1.33E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
TEENAGER	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.19E-03	9.12E-01	1.30E+01
TEENAGER	GROUND	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01
TEENAGER	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
TEENAGER	VEG.ING.	4.75E-02	7.63E-01	4.75E-02	3.63E-03	1.80E-01	4.75E-02
TEENAGER	MEAT ING	4.71E-03	7.49E-02	4.71E-03	7.42E-04	1.84E-02	4.71E-03
TEENAGER	MILK ING	4.39E-02	7.02E-01	4.39E-02	6.85E-04	1.60E-01	4.39E-02
TEENAGER	TOTALS	5.02E-01	5.60E+00	2.49E+01	1.90E-01	1.45E+00	1.32E+01
AGE	PATHWAY	WH.BODY	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
ADULT	INHAL.	2.31E-01	3.89E+00	2.46E+01	9.19E-03	9.12E-01	1.30E+01
ADULT	GROUND	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01
ADULT	CLOUD	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02
ADULT	VEG.ING.	4.70E-02	7.55E-01	4.70E-02	4.00E-03	1.74E-01	4.70E-02
ADULT	MEAT ING	5.95E-03	9.45E-02	5.95E-03	1.02E-03	2.25E-02	5.95E-03
ADULT	MILK ING	1.66E-02	2.64E-01	1.66E-02	2.85E-04	5.90E-02	1.66E-02
ADULT	TOTALS	4.76E-01	5.18E+00	2.49E+01	1.90E-01	1.34E+00	1.32E+01

ERROR SUMMARY

ERROR	TIMES
0115	0008

APPENDIX B

APPENDIX B

RESULTS OF OCCUPATIONAL, SOIL AND VEGETATION MONITORING

TABLE OF CONTENTS

	A-NORTH OF MILL SITE	B-1.5 MI. NE OF MILL (1977-1980); K-M ADMIN. BLDG. (1980-PRESENT)	C-E. BOUNDARY OF TAILINGS IMPOUNDMENT	D-SE MARGIN OF TAILINGS IMPOUNDMENT	E-S. END OF TAILINGS IMPOUNDMENT
1977					
Mean	4.3×10^{-13}	5.5×10^{-13}	3.8×10^{-13}	3.4×10^{-13}	3.6×10^{-13}
σ	7.0×10^{-13}	9.5×10^{-13}	5.0×10^{-13}	3.4×10^{-13}	3.5×10^{-13}
N	6	6	6	6	6
Net Conc.	0	0	0	0	0
% MPC	0	0	0	0	0
1978					
Mean	4.8×10^{-13}	2.1×10^{-13}	2.4×10^{-13}	2.3×10^{-13}	2.6×10^{-13}
σ	6.0×10^{-13}	1.7×10^{-13}	2.0×10^{-13}	2.4×10^{-13}	3.5×10^{-13}
N	13	12	12	12	12
Net Conc.	0	0	0	0	0
% MPC	0	0	0	0	0
1979					
Mean	2.1×10^{-13}	3.0×10^{-13}	2.8×10^{-13}	4.1×10^{-13}	2.8×10^{-13}
σ	8.4×10^{-14}	2.8×10^{-13}	1.6×10^{-13}	6.4×10^{-14}	1.6×10^{-13}
N	10	9	10	10	9
Net Conc.	0	0	0	0	0
% MPC	0	0	0	0	0
1980					
Mean	6.6×10^{-13}	4.3×10^{-13}	5.2×10^{-13}	4.1×10^{-13}	6.1×10^{-13}
σ	6.7×10^{-13}	4.7×10^{-13}	6.2×10^{-13}	4.7×10^{-13}	9.3×10^{-13}
N	10	10	10	10	11
Net Conc.	0	0	0	0	0
% MPC	0	0	0	0	0

MPC for unrestricted areas = 5×10^{-12} µCi/ml

TABLE B.1

Annual Statistics for Perimeter Air
At Five Major Sites
Uranium Concentration
(µCi/ml)

	A-NORTH OF MILL SITE	B-1.5 MI. NE OF MILL (1977-1980); K-M ADMIN. BLDG. (1980-PRESENT)	C-E. BOUNDARY OF TAILINGS IMPOUNDMENT	D-SE MARGIN OF TAILINGS IMPOUNDMENT	E-S. END OF TAILINGS IMPOUNDMENT
1977					
Mean	1.37×10^{-14}	1.3×10^{-14}	9.7×10^{-15}	3.7×10^{-15}	2.2×10^{-15}
σ	1.2×10^{-14}	1.7×10^{-14}	7.9×10^{-15}	3.0×10^{-15}	2.5×10^{-15}
N	6	6	6	6	6
Net Conc.	1.02×10^{-14}	9.5×10^{-15}	6.2×10^{-15}	2.0×10^{-16}	0
% MPC	0.34	0.32	0.21	0.006	0
1978					
Mean	3.7×10^{-14}	2.6×10^{-14}	1.4×10^{-14}	4.2×10^{-14}	1.8×10^{-13}
σ	4.1×10^{-14}	3.3×10^{-14}	1.3×10^{-14}	8.5×10^{-14}	5.5×10^{-13}
N	13	12	12	12	12
Net Conc.	3.4×10^{-14}	2.3×10^{-14}	1.1×10^{-14}	3.9×10^{-14}	1.8×10^{-13}
% MPC	1.1	0.8	0.4	1.3	6.0
1979					
Mean	2.7×10^{-14}	3.1×10^{-14}	3.3×10^{-14}	4.1×10^{-14}	2.8×10^{-14}
σ	2.9×10^{-14}	2.9×10^{-14}	3.3×10^{-14}	3.7×10^{-14}	3.1×10^{-14}
N	9	9	9	9	8
Net Conc.	2.4×10^{-14}	2.8×10^{-14}	3.0×10^{-14}	3.8×10^{-14}	2.5×10^{-14}
% MPC	0.8	0.9	1.0	1.3	0.8
1980					
Mean	1.9×10^{-14}	1.3×10^{-14}	2.0×10^{-14}	1.5×10^{-14}	1.1×10^{-14}
σ	1.4×10^{-14}	8.2×10^{-15}	1.9×10^{-14}	1.6×10^{-14}	5.4×10^{-15}
N	10	9	10	10	11
Net Conc.	1.6×10^{-14}	9.5×10^{-15}	1.7×10^{-14}	1.2×10^{-14}	7.5×10^{-15}
% MPC	0.5	0.3	0.6	0.4	0.3

MPC for unrestricted areas = 3×10^{-12} µCi/ml

TABLE B.2

Annual Statistics for Perimeter Air
At Five Major Sites
Ra-226 Concentrations
(µCi/ml)

	A-NORTH OF MILL SITE	B-1.5 MI. NE OF MILL (1977-1980); K-M ADMIN. BLDG. (1980-PRESENT)	C-E. BOUNDARY OF TAILINGS IMPOUNDMENT	D-SE MARGIN OF TAILINGS IMPOUNDMENT	E-S. END OF TAILINGS IMPOUNDMENT
1978					
Mean	2.2×10^{-14}	1.2×10^{-14}	1.1×10^{-14}	2.1×10^{-14}	2.1×10^{-14}
σ	2.3×10^{-14}	1.1×10^{-14}	6.0×10^{-15}	4.1×10^{-14}	2.9×10^{-14}
N	13	12	12	12	12
Net Conc.	1.6×10^{-14}	6.0×10^{-15}	5.0×10^{-15}	1.5×10^{-14}	1.5×10^{-14}
% MPC	20	7.5	6.3	18.8	18.8
1979					
Mean	2.2×10^{-14}	3.8×10^{-14}	2.9×10^{-14}	2.3×10^{-14}	3.6×10^{-14}
σ	1.5×10^{-14}	4.2×10^{-14}	2.7×10^{-14}	2.0×10^{-14}	4.0×10^{-14}
N	10	9	10	10	9
Net Conc.	1.6×10^{-14}	3.2×10^{-14}	2.3×10^{-14}	1.7×10^{-14}	3.0×10^{-14}
% MPC	20	40	28.8	21.3	37.5
1980					
Mean	2.3×10^{-14}	1.0×10^{-14}	1.9×10^{-14}	1.7×10^{-14}	1.2×10^{-14}
σ	2.9×10^{-14}	8.9×10^{-15}	2.0×10^{-14}	2.4×10^{-14}	8.1×10^{-15}
N	10	10	10	10	11
Net Conc.	1.7×10^{-14}	4.0×10^{-15}	1.3×10^{-14}	1.1×10^{-14}	6.0×10^{-15}
% MPC	21.3	5.0	16.3	13.8	7.5

MPC for unrestricted areas = 8×10^{-14} μCi/ml

TABLE B.3

Annual Statistics for Perimeter Air
At Five Major Sites
Th-230 Concentration
(μCi/ml)

SITE	GROSS ALPHA	GROSS BETA	URANIUM
	MEAN IN μCi/ml		
Sag Mill feed Platform	$4.3x10^{-12}$	$6.5x10^{-12}$	$6.3x10^{-12}$
Yellowcake Centrifuge	$5.5x10^{-11}$	$6.1x10^{-11}$	$6.9x10^{-11}$
Feed Belt Platform	$2.3x10^{-11}$	$4.9x10^{-11}$	$1.9x10^{-11}$
Below Primary Thickener	$1.5x10^{-11}$	$4.1x10^{-11}$	$2.4x10^{-11}$
Grizzly Sump	$7.6x10^{-12}$	$1.1x10^{-11}$	$7.2x10^{-12}$
Leach Platform	$2.1x10^{-12}$	$2.6x10^{-11}$	$1.2x10^{-11}$
Yellowcake Change Room	$9.9x10^{-11}$	$6.5x10^{-11}$	$1.8x10^{-10}$
Yellowcake Bin Platform	$2.1x10^{-11}$	$2.8x10^{-11}$	$3.8x10^{-11}$
Yellowcake Dryer (Open)	$0.9x10^{-10}$	$1.1x10^{-10}$	$1.0x10^{-10}$
Yellowcake Dryer (Closed)	$0.6x10^{-10}$	$0.5x10^{-10}$	$0.9x10^{-10}$
Yellowcake Packaging	$1.0x10^{-10}$	$7.2x10^{-11}$	$1.3x10^{-10}$

Table B.4

Mill Air Monitoring Statistics
From 1977 - 1981

SITE / YEAR	GRIZZLY SUMP	HALF-WAY UP CONVEYOR	SAG MILL FEED POINT	TROMMEL SCREEN	SAG MILL SUMP
1977					
Mean	1.11 E+00	1.78 E-01	2.76 E-02	2.20 E-02	1.63 E-02
σ	2.32 E+00	4.26 E-01	2.16 E-02	1.54 E-02	1.60 E-02
N	8	8	7	8	8
1978					
Mean	2.64 E-02	1.63 E-02	1.63 E-02	1.92 E-02	1.43 E-02
σ	1.85 E-02	1.11 E-02	1.13 E-02	2.60 E-02	1.66 E-02
N	12	11	12	12	12
1979					
Mean	1.72 E-02	8.40 E-03	3.61 E-02	2.05 E-02	9.00 E-03
σ	1.39 E-02	1.15 E-02	3.74 E-02	2.69 E-02	1.18 E-02
N	10	10	10	10	10
1980					
Mean	6.25 E-02	1.61 E-02	4.62 E-02	5.44 E-02	2.48 E-02
σ	1.14 E-01	1.77 E-02	5.11 E-02	4.62 E-02	3.94 E-02
N	12	13	13	10	13
1981					
Mean	3.14 E-02	1.82 E-02	5.50 E-03	4.0 E-03	5.20 E-03
σ	4.08 E-02	2.92 E-02	3.21 E-03		8.43 E-03
N	5	5	6	1	6

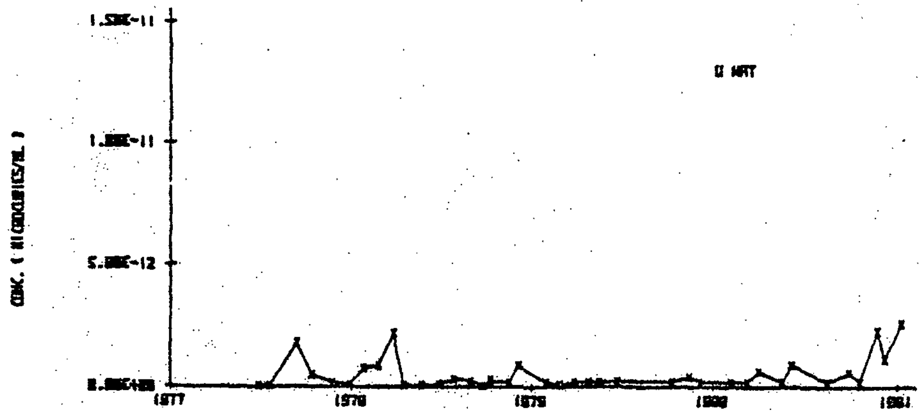
TABLE B.5

ANNUAL STATISTICS FOR WORKING LEVELS

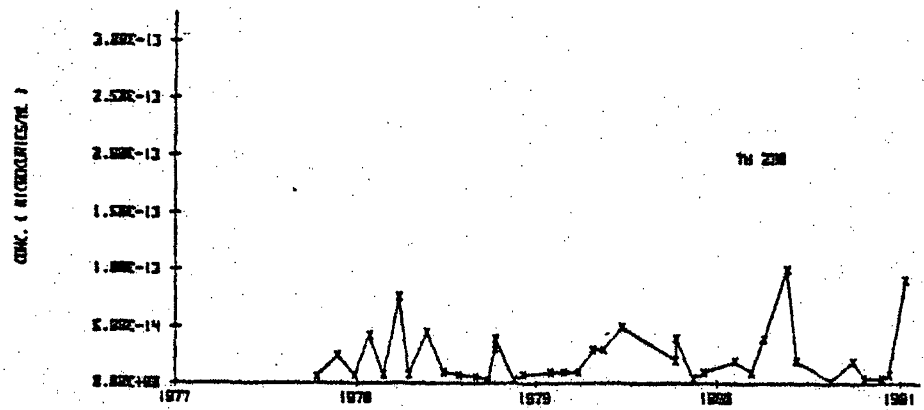
EMPLOYEES WITH THE HIGHEST INHALATION
EXPOSURE IN 1978
(% of Annual Limit)

Employee Number	1978	1979	1980
8023	37%	23%	9%
8034	21%	18%	9%
8033	18%	9%	-
8022	16%	11%	-
8132	14%	-	-
8143	13%	11%	-
8026	13%	3%	2%
8173	13%	11%	9%

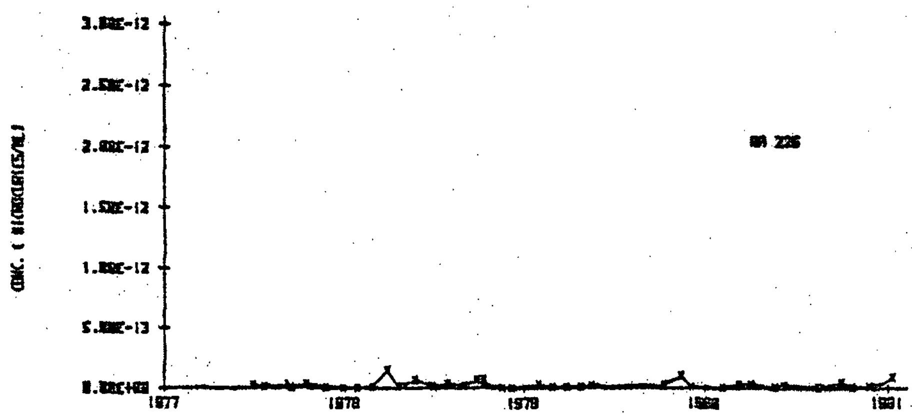
Table B.6



(a)

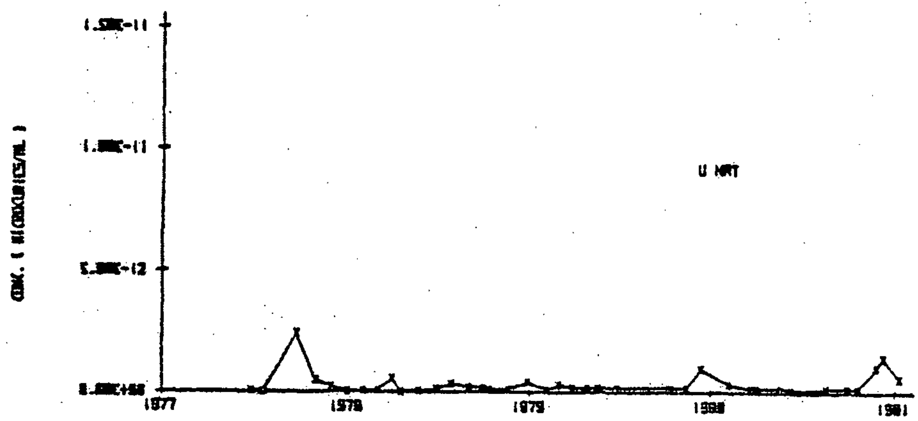


(b)

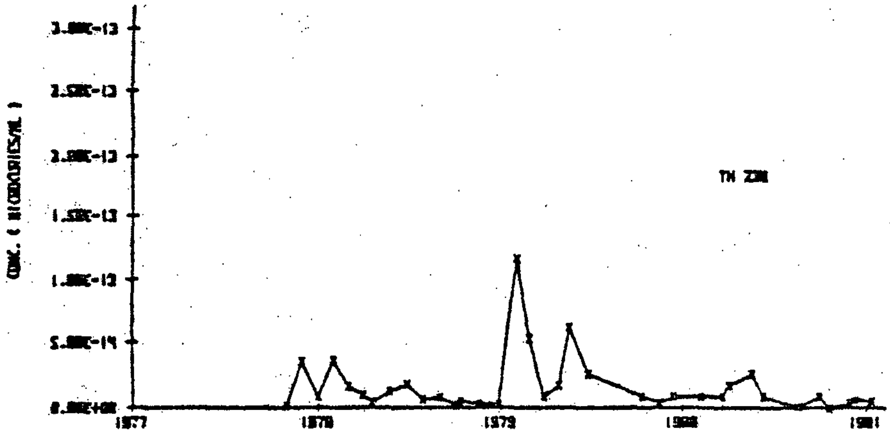


(c)

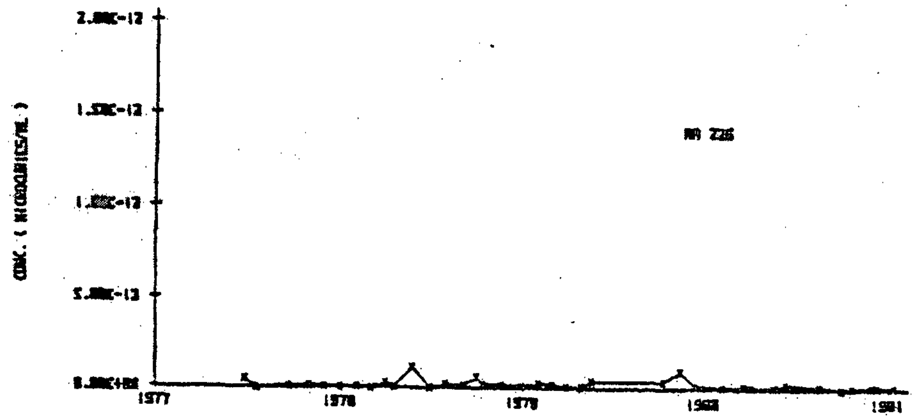
Figure B.1 Perimeter Air Site A - North of Mill Site at NECR Trailer Park



(a)



(b)



(c)

Figure B.2 Perimeter Air Site B-1.5 Mi. NE of Mill (1977-79); Site B1 Kerr-McGee Admin. Bldg. (1980-1981)

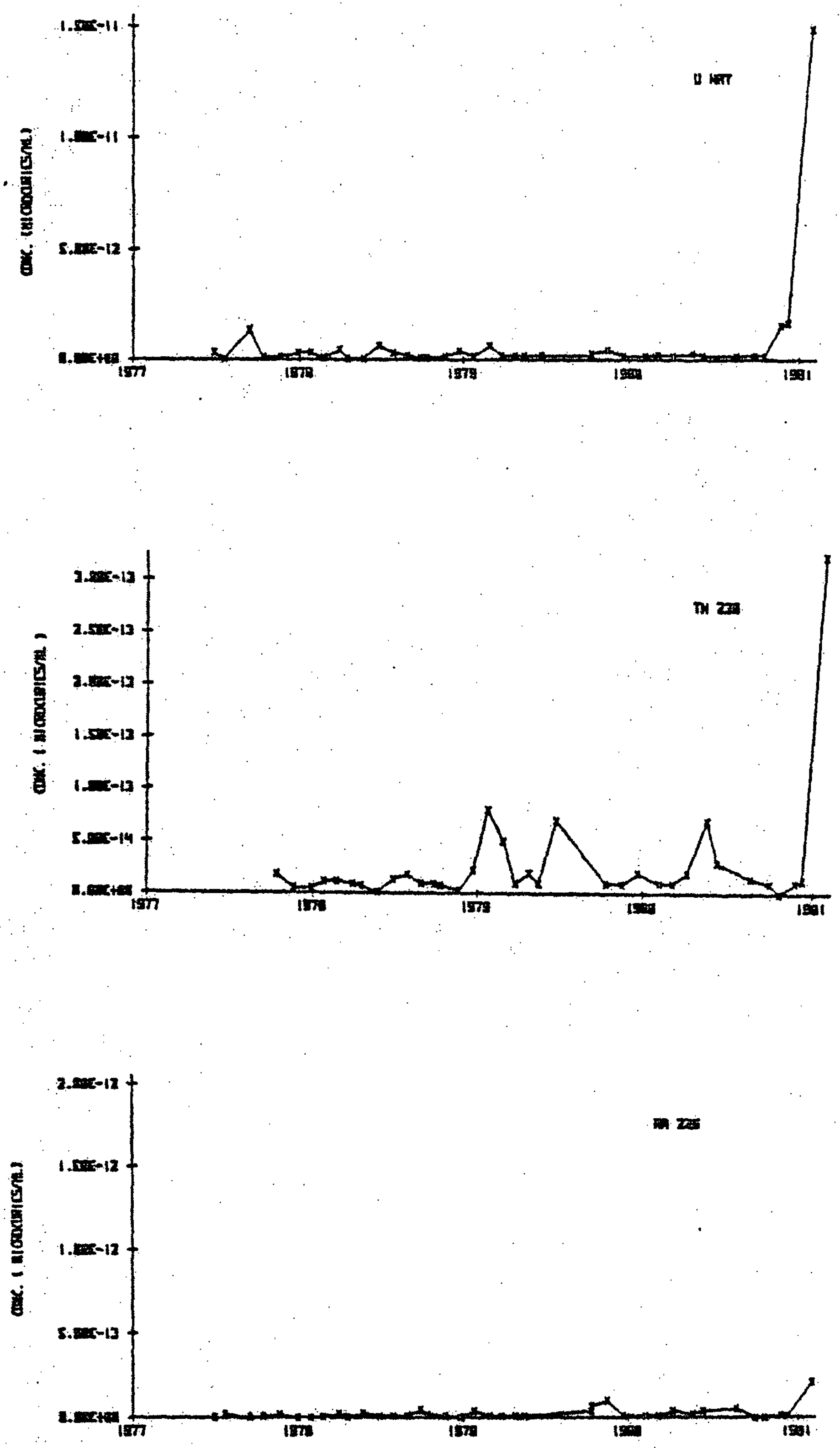


Figure B.3 Perimeter Air Site C - About 150' east of the Midpoint of the east boundary of the Tailings Impoundment

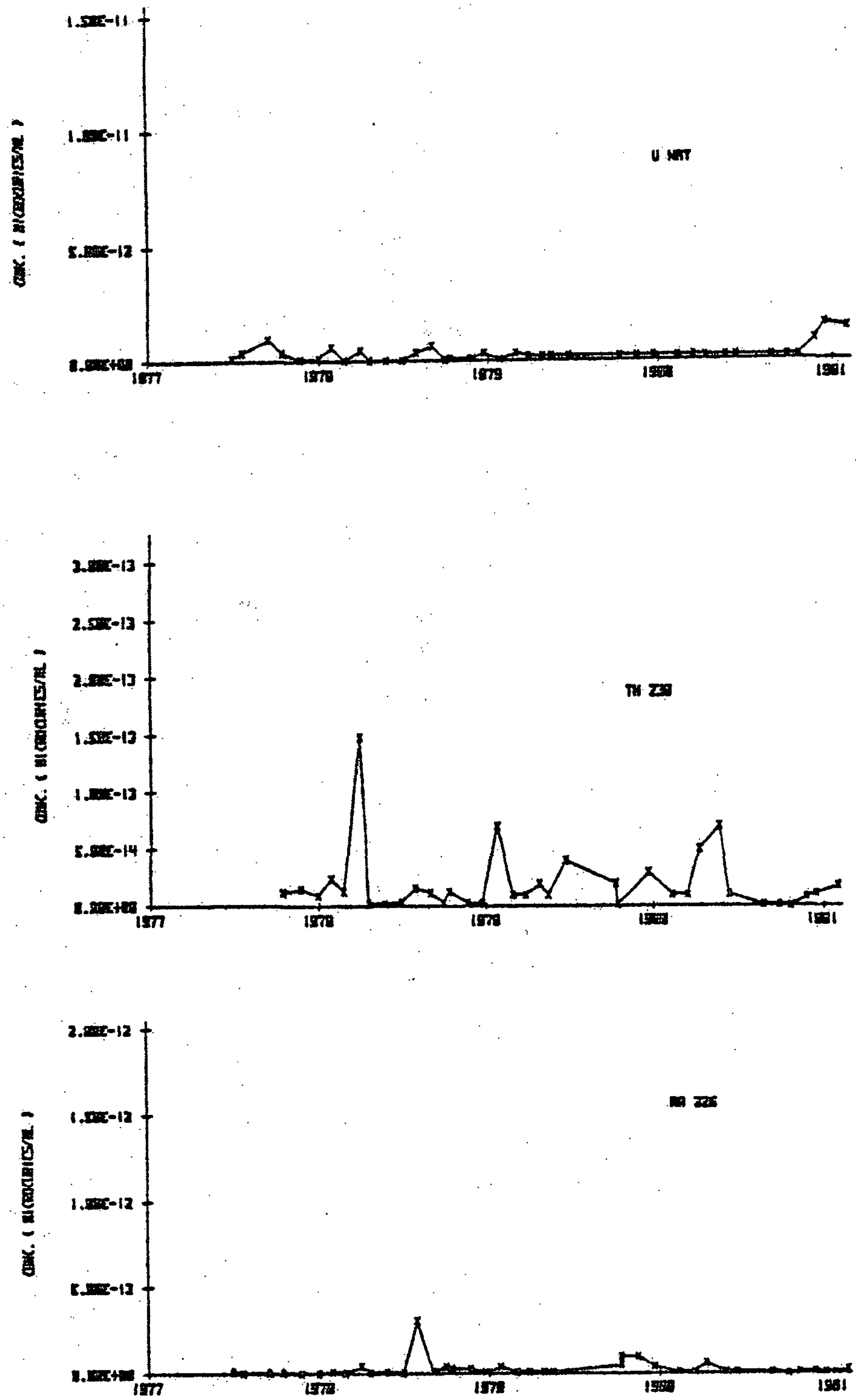
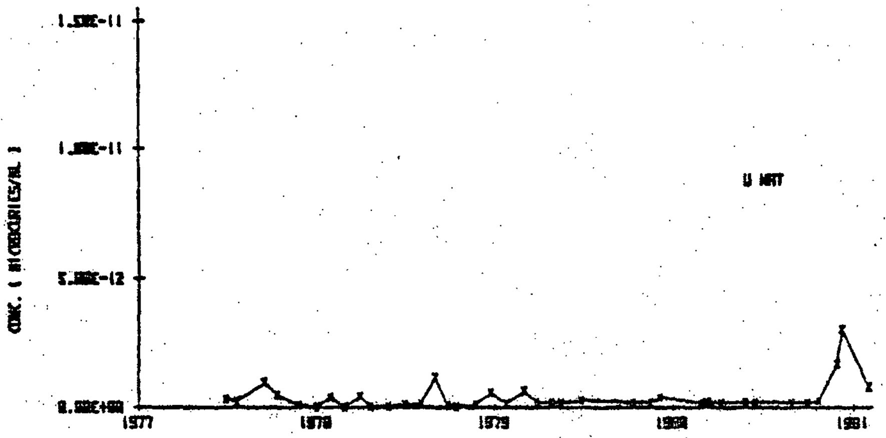
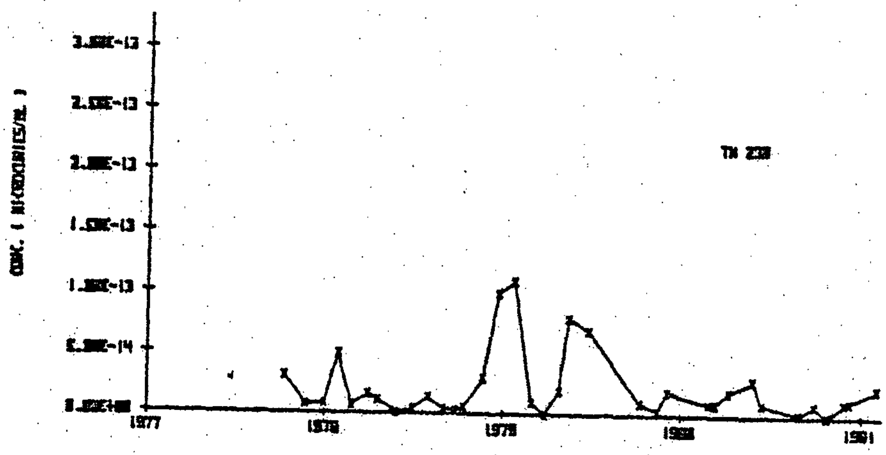


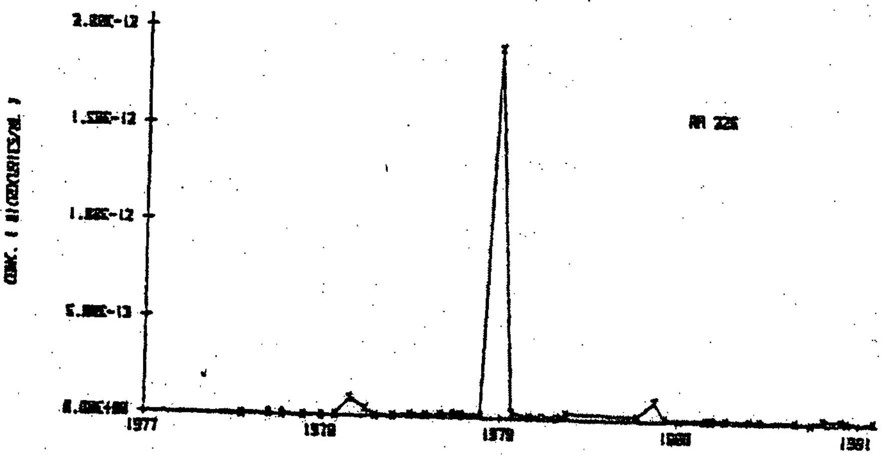
Figure B.4 Perimeter Air Site D - SE Margin of Tailings Impoundment of Access Road



(a)



(b)



(c)

Figure B.5 Perimeter Air Site E - Near South End of Tailings Impoundment

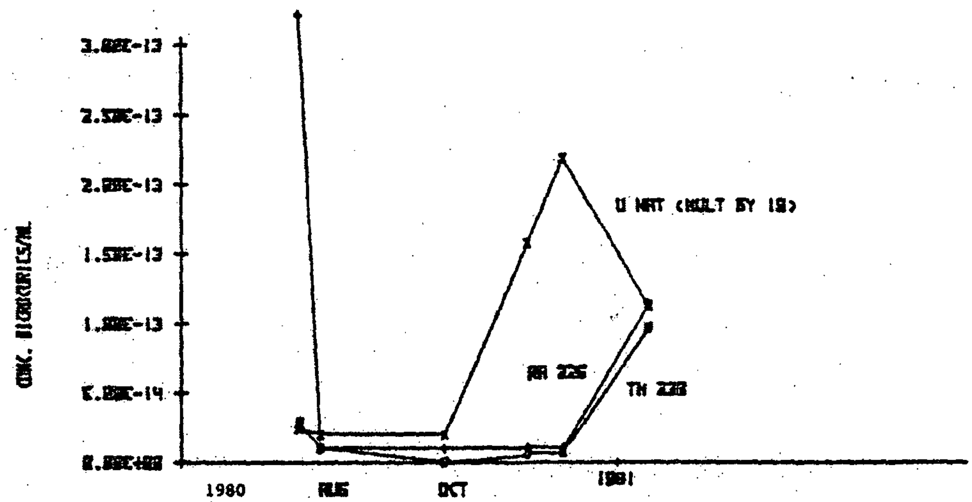


Figure B.6 Perimeter Air Site F - N. of Tailings Impoundment at Access Road

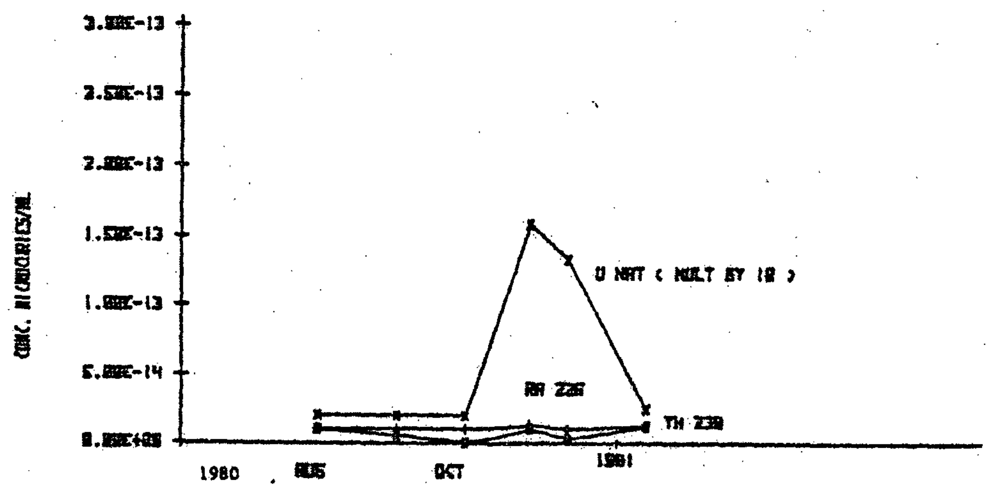


Figure B.7 Perimeter Air Site OCR/IX - S.W. Corner of Treatment Plant

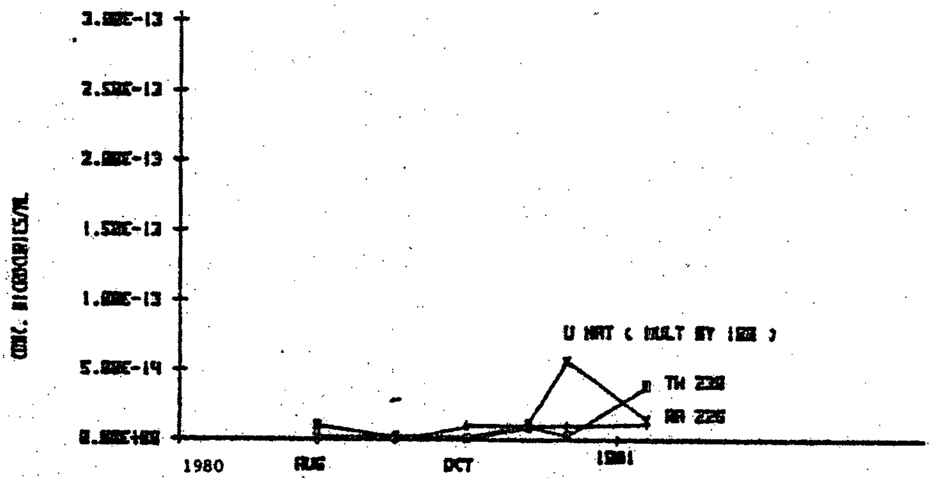


Figure B.8 Perimeter Air - Springstead, at Sewage Treatment Plant

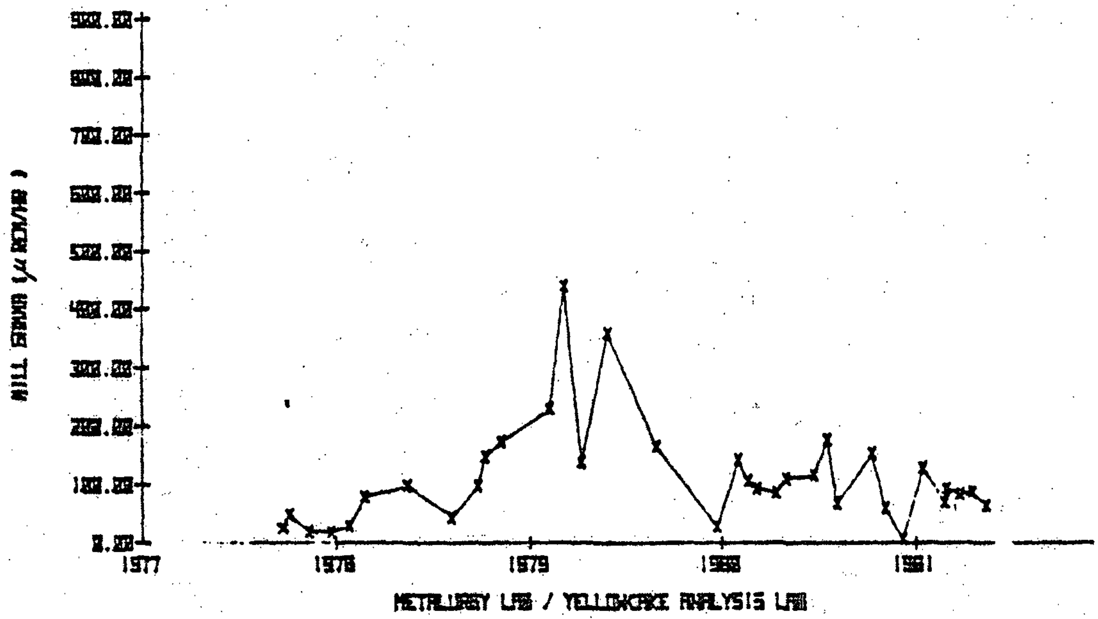


Figure B.9 Mill Gamma

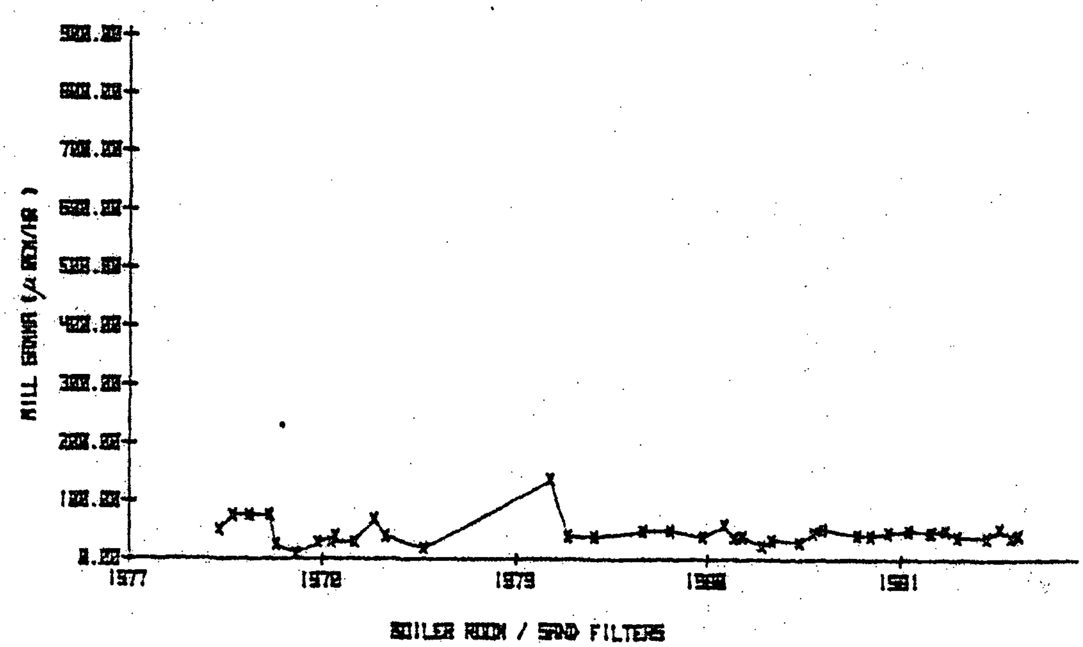


Figure B.10 Mill Gamma

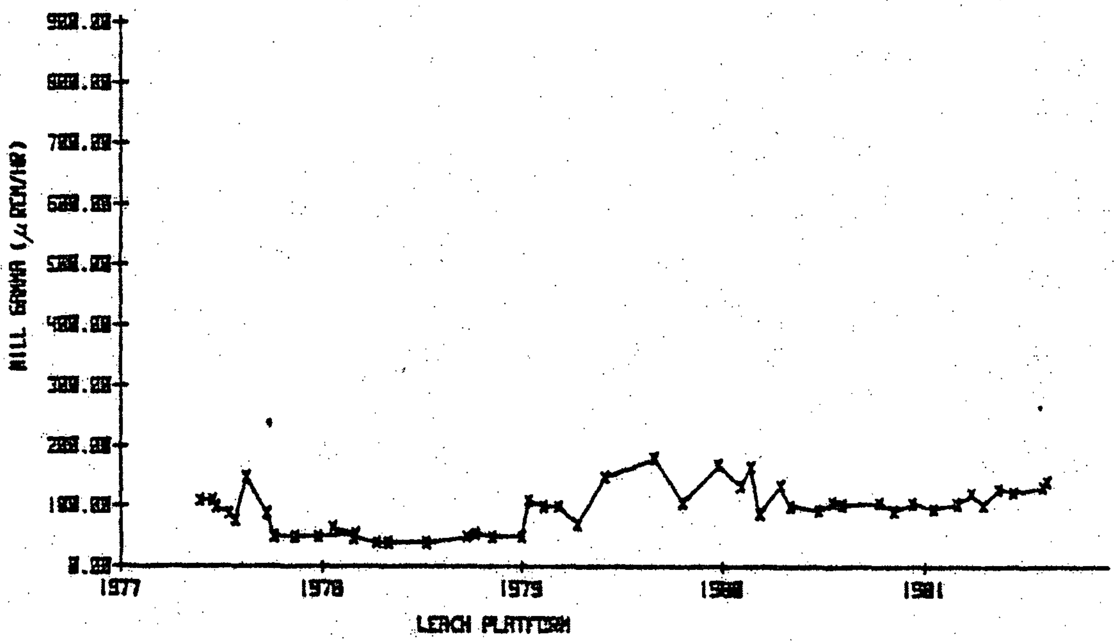


Figure B.11 Mill Gamma

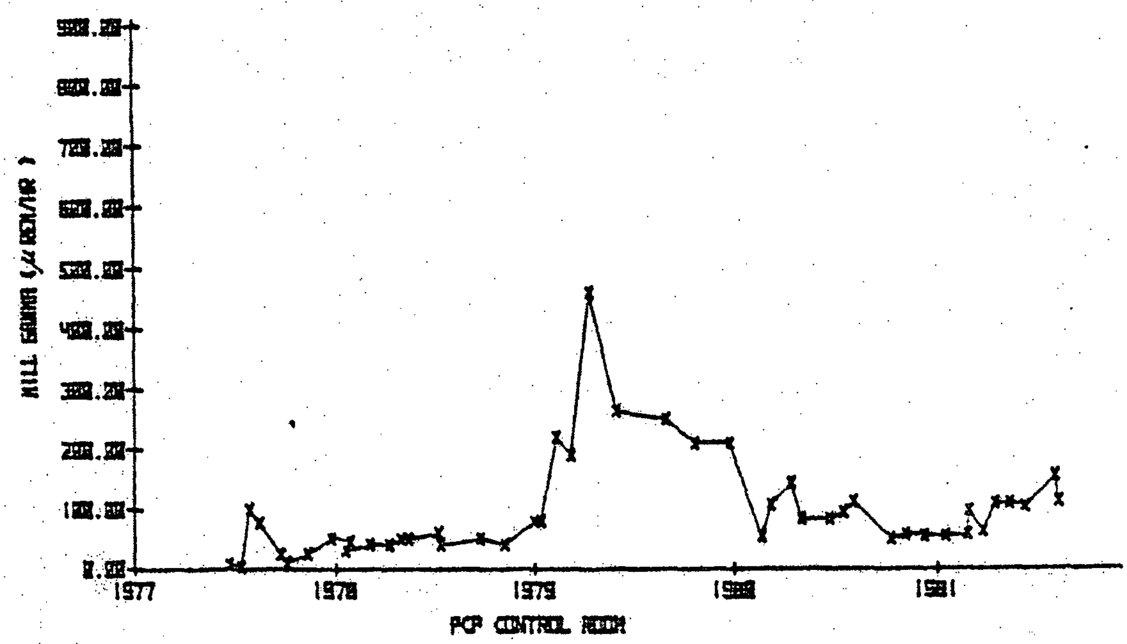


Figure B.12 Mill Gamma

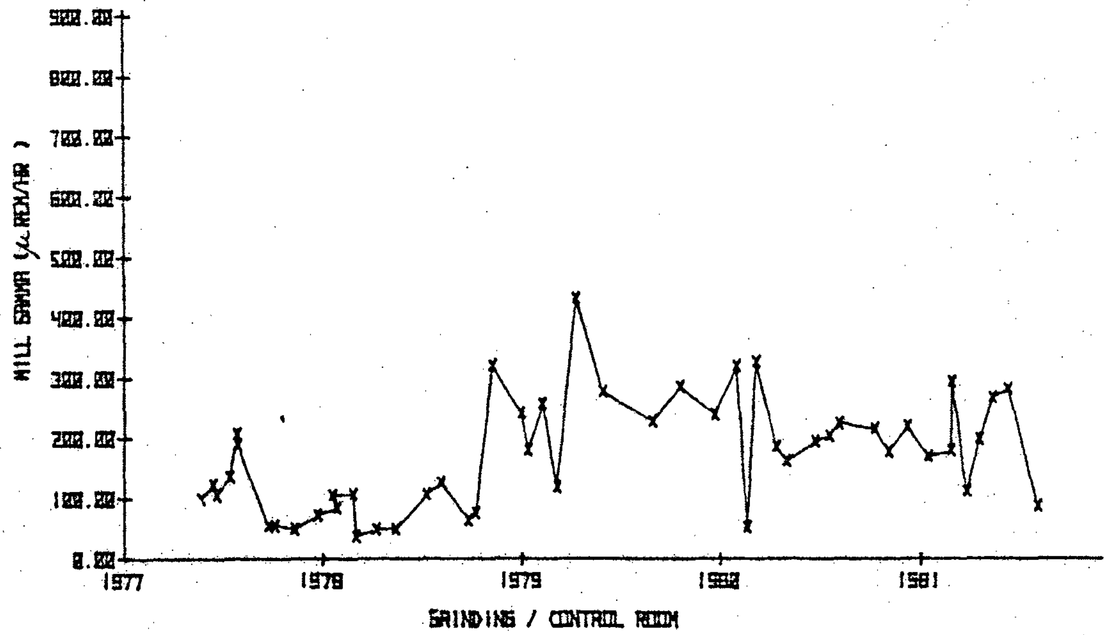


Figure B. 13 Mill Gamma

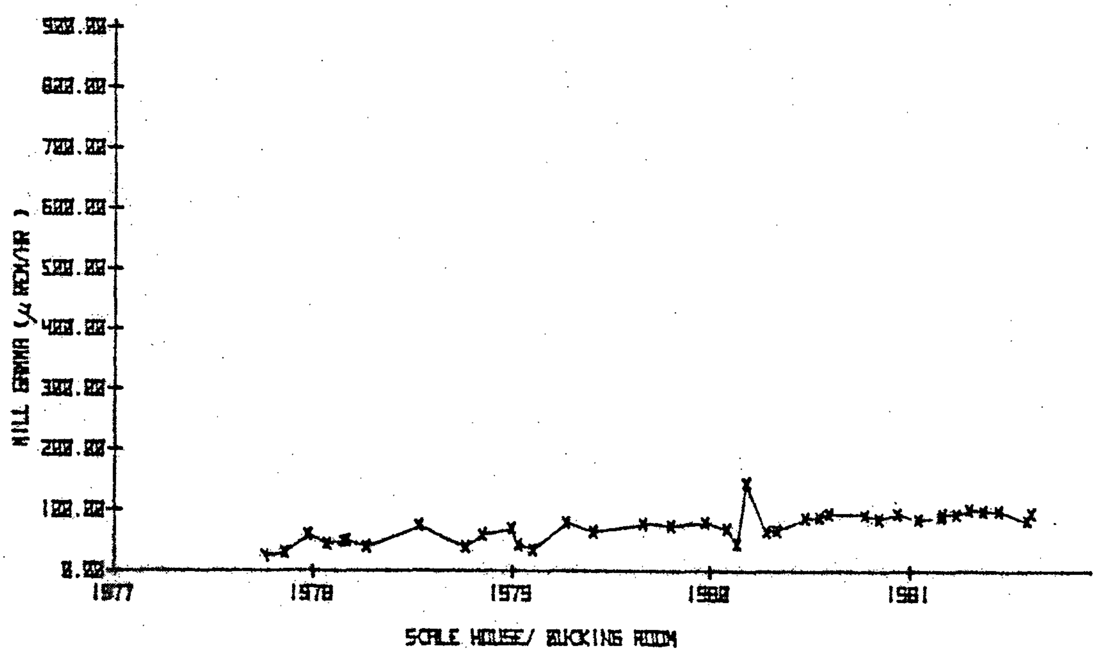


Figure B.14 Mill Gamma

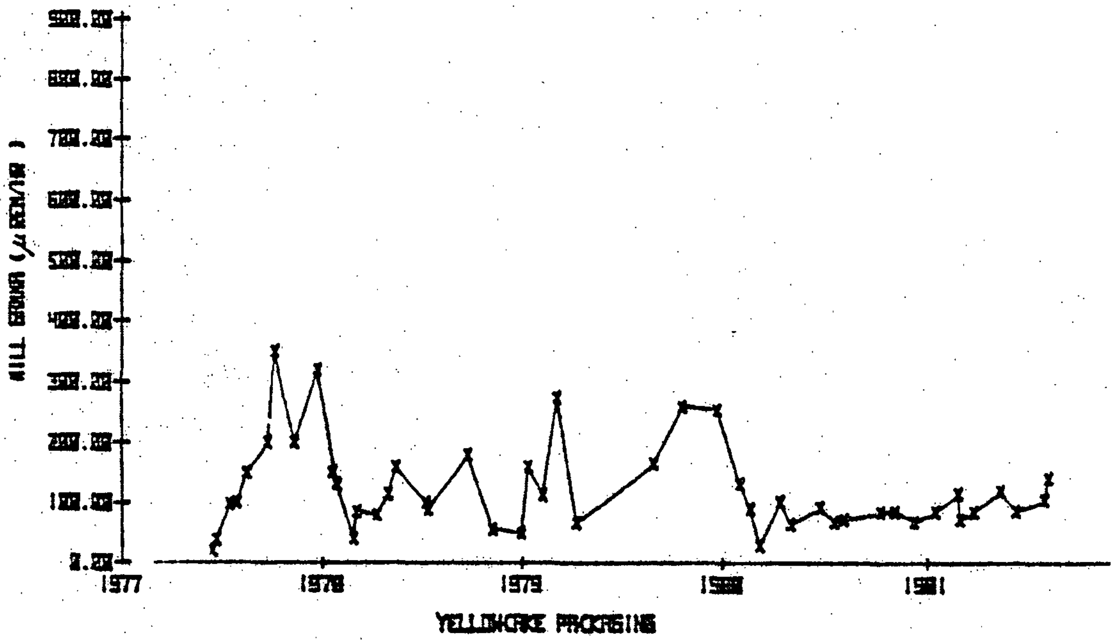


Figure B.15 Mill Gamma

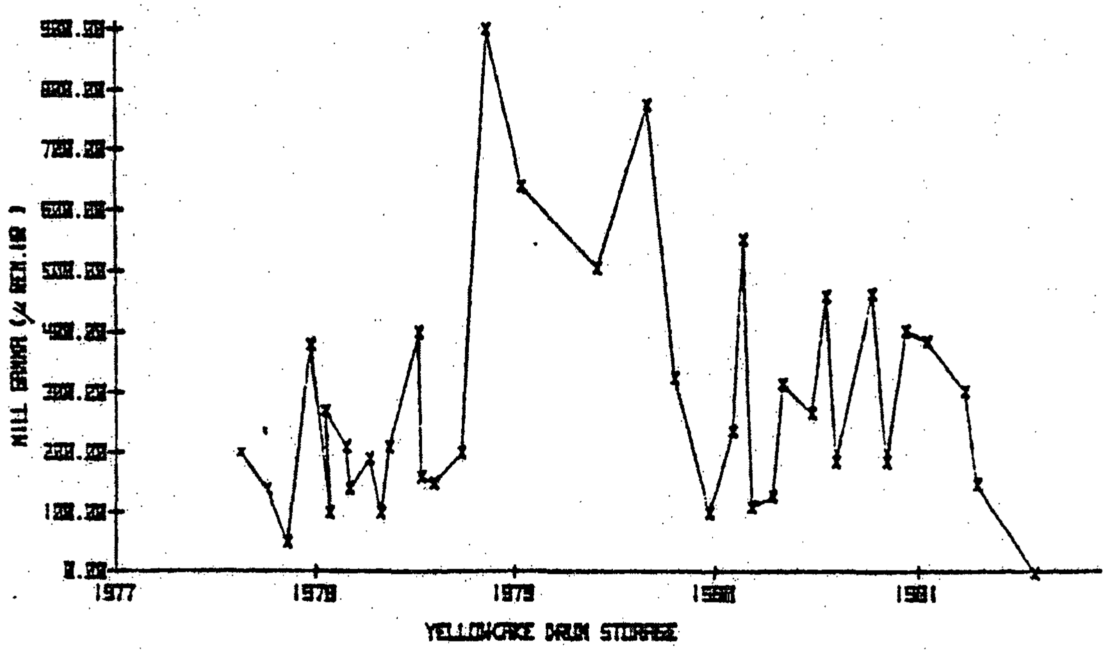


Figure B.16 Mill Gamma

4 OFF-SCALE MEASUREMENTS OF ORDER 1500 HAVE BEEN REMOVED FROM 1977 AND 1978 DATA.

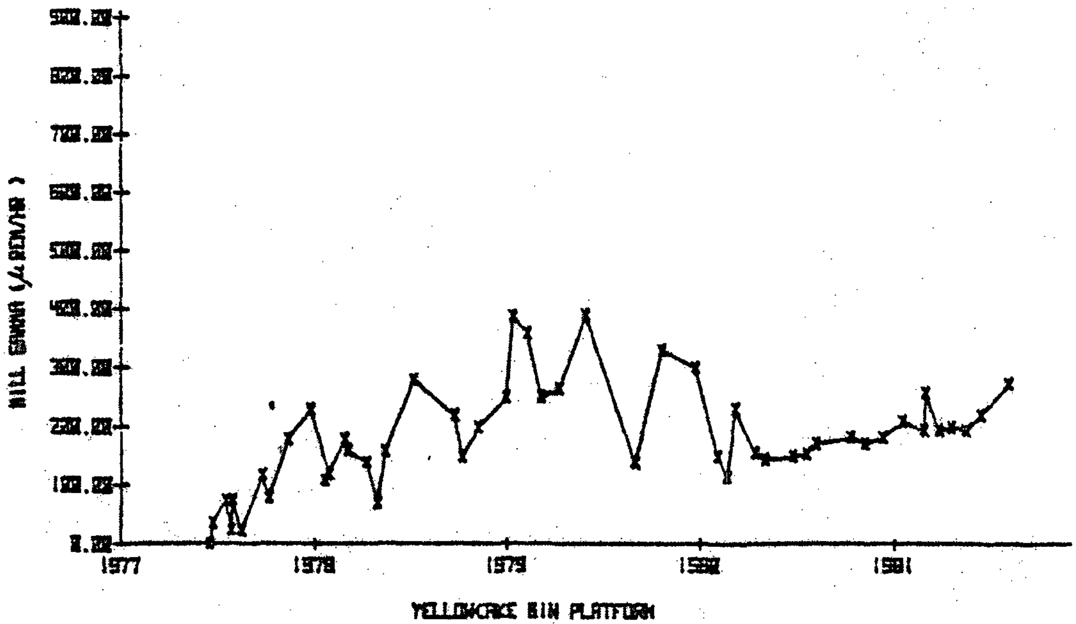


Figure B.17 Mill Gamma

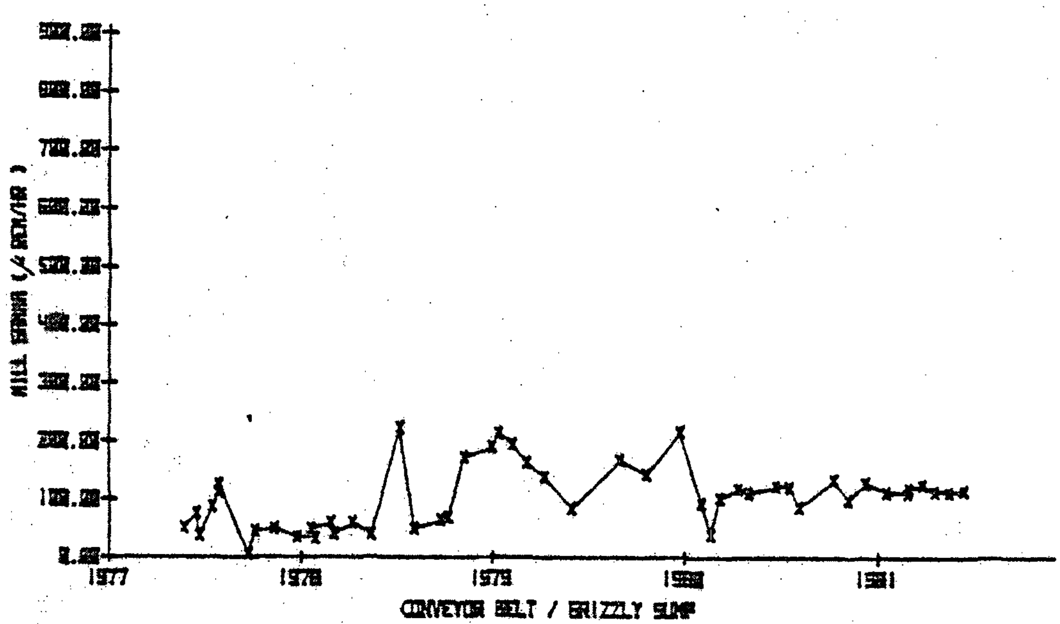


Figure B.18 Mill Gamma

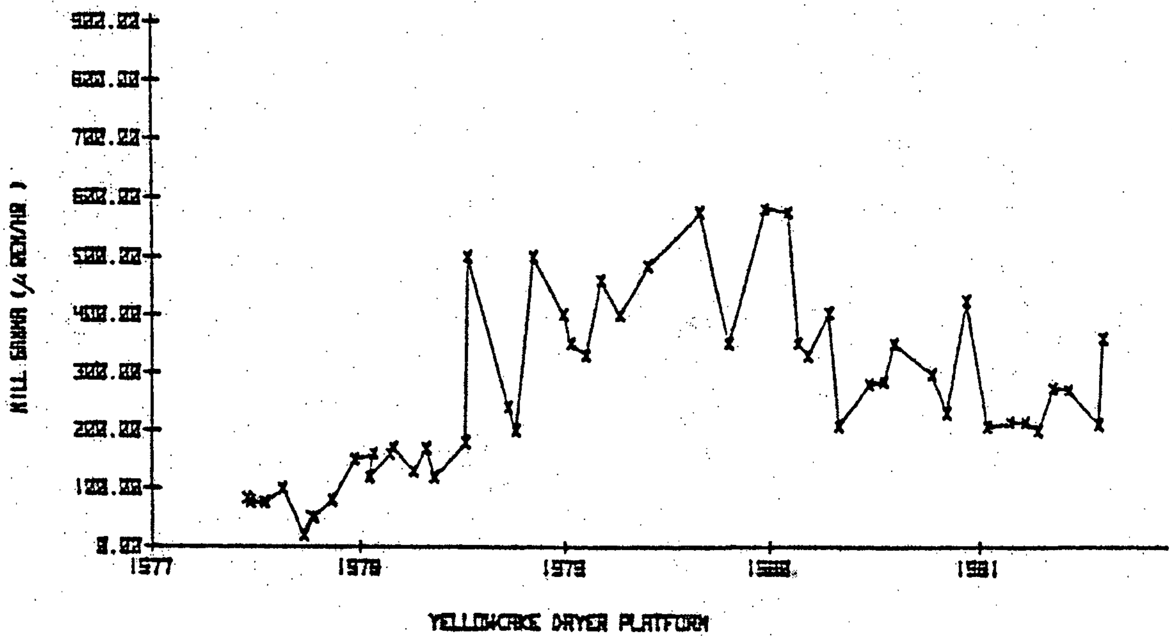


Figure B.19 Mill Gamma

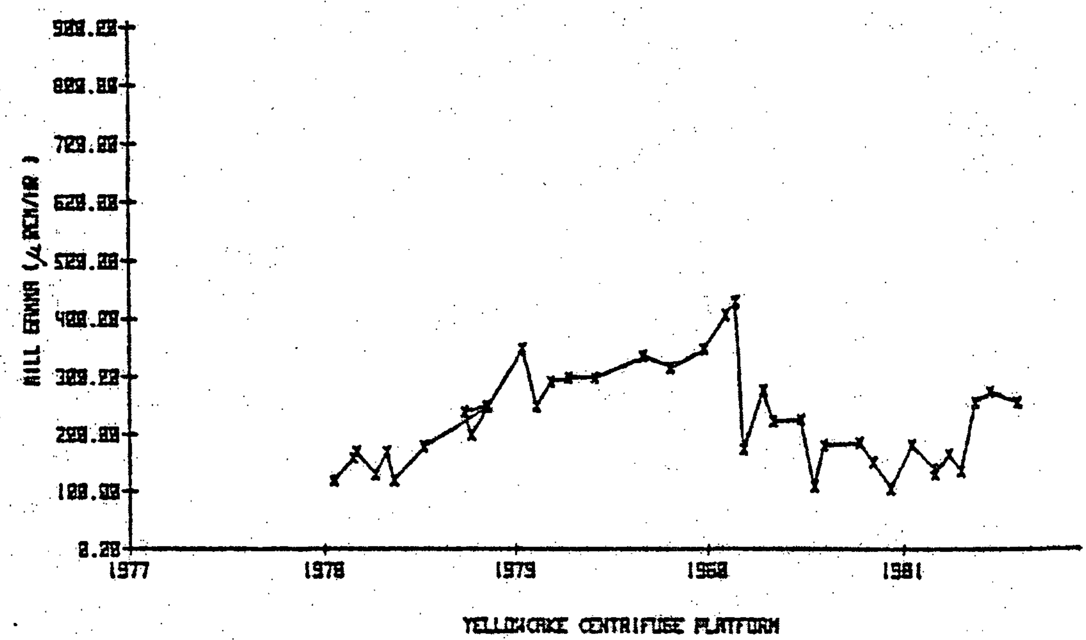


Figure B.20 Mill Gamma

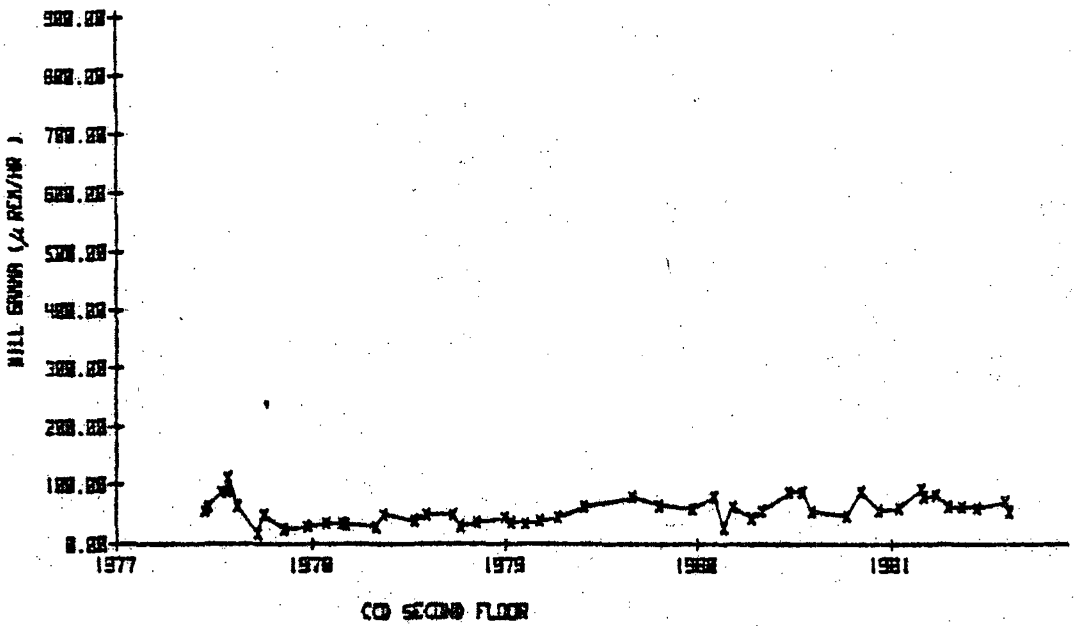


Figure B.21 Mill Gamma

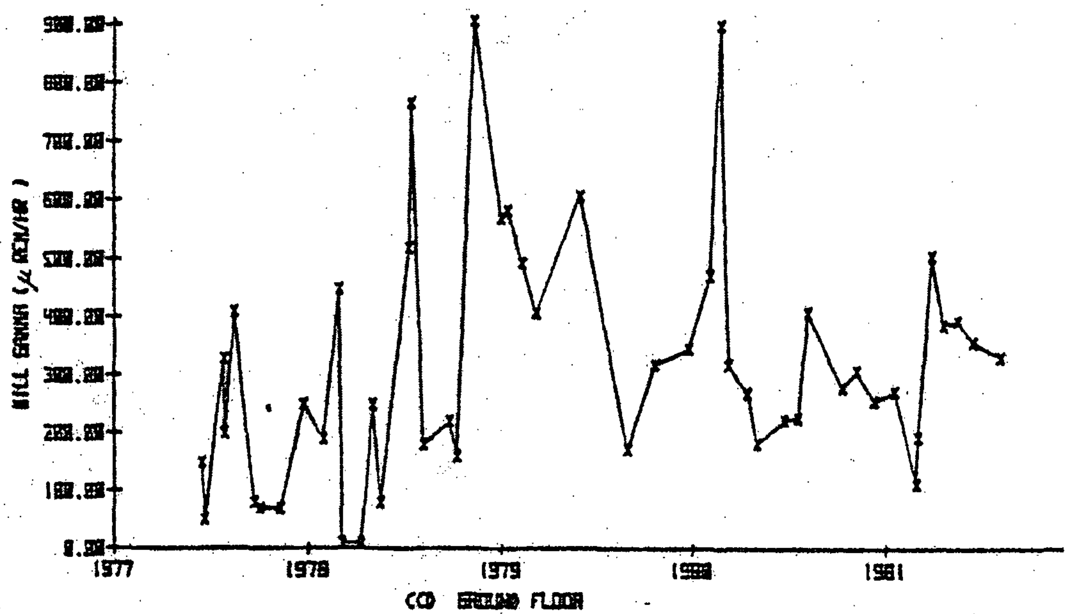


Figure B.22 Mill Gamma

OFF-SCALE MEASUREMENT OF 1198 DELETED FROM 1979 DATA

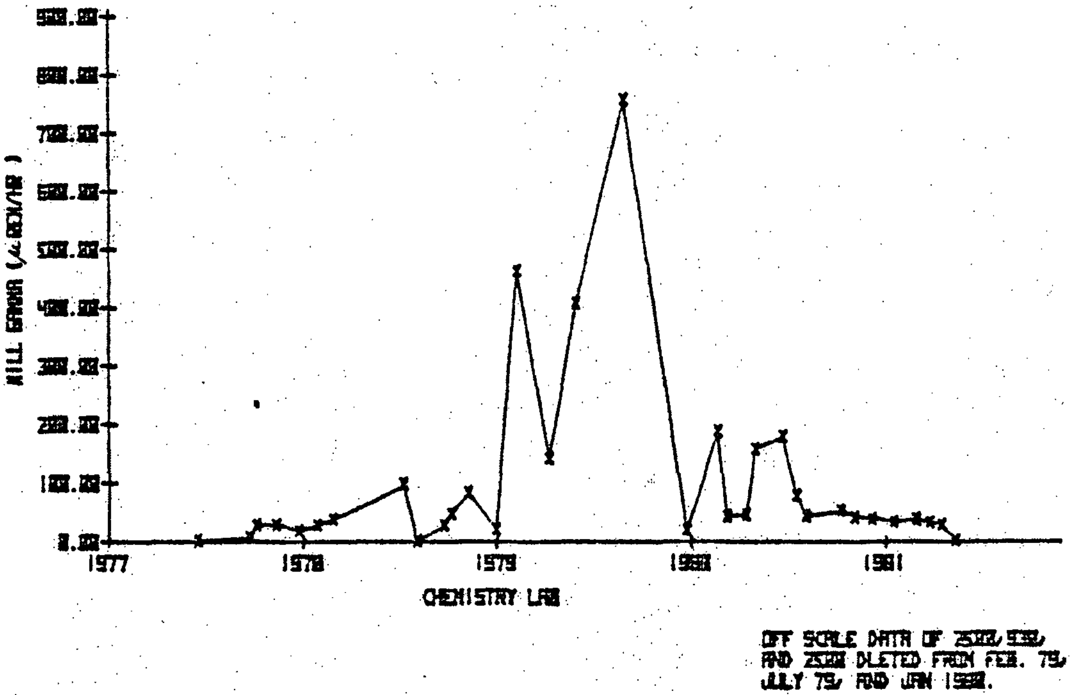


Figure B.23 Mill Gamma

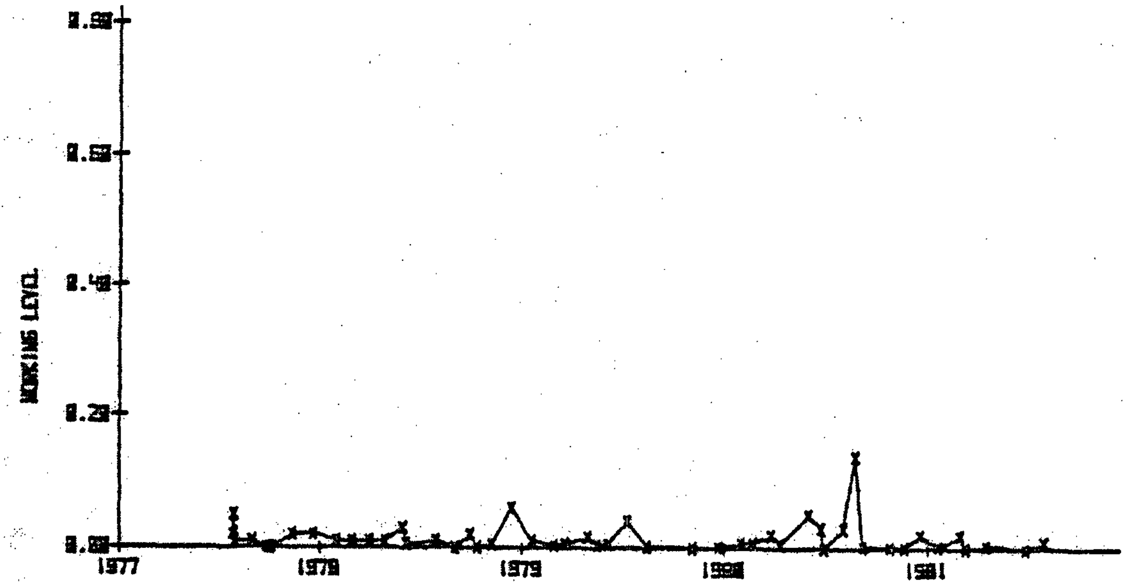


Figure B.24 Working Levels SAG Mill Sump

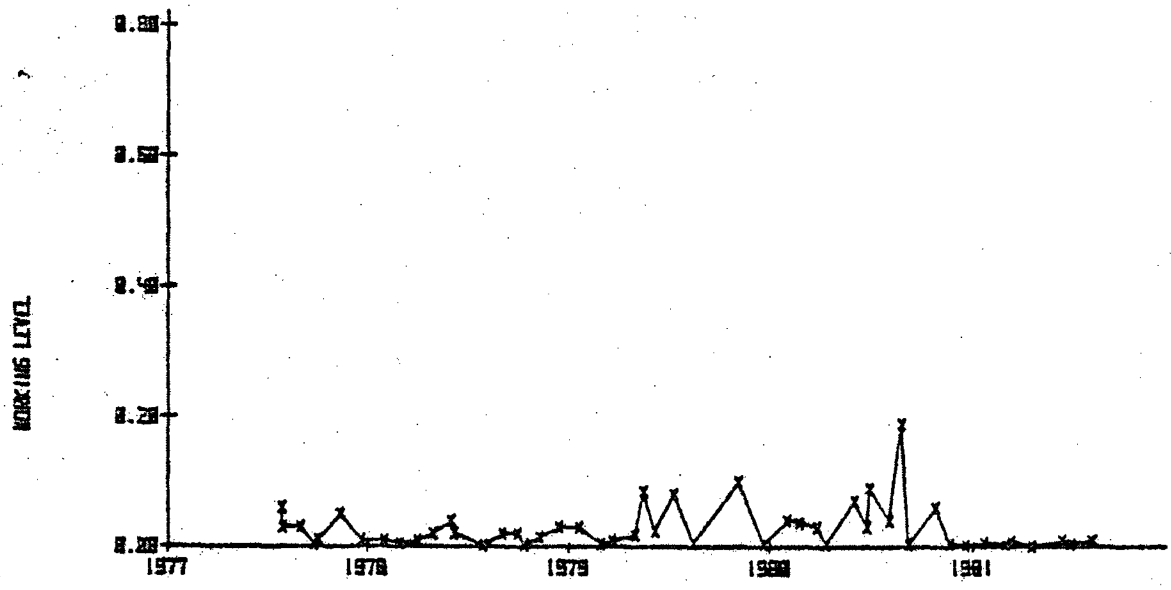


Figure B.25 Working Levels SAG Mill Feed Point

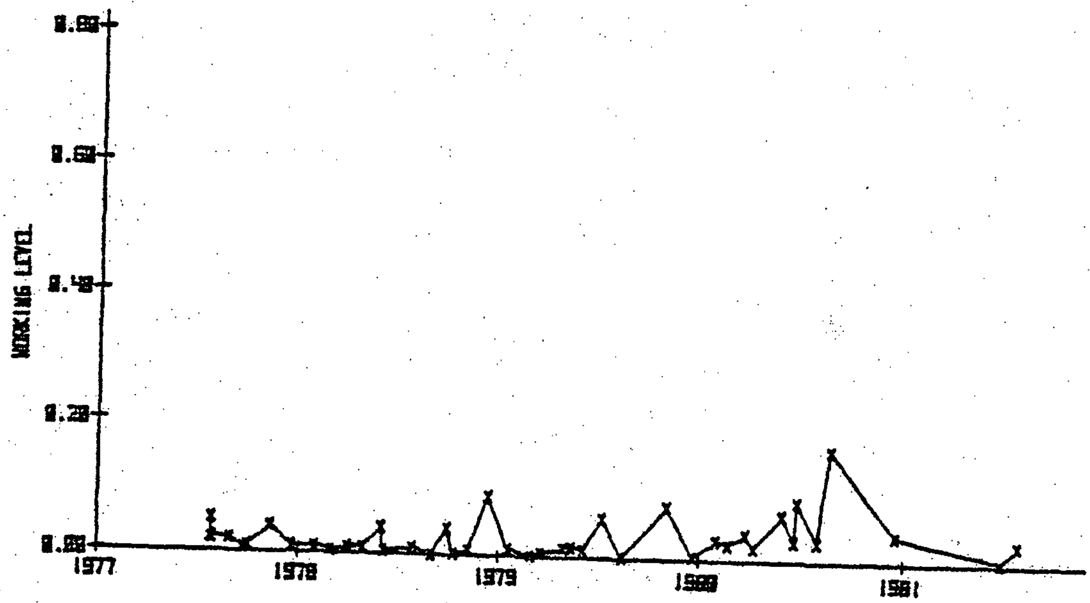


Figure B.26 Working Levels Trommel Screen

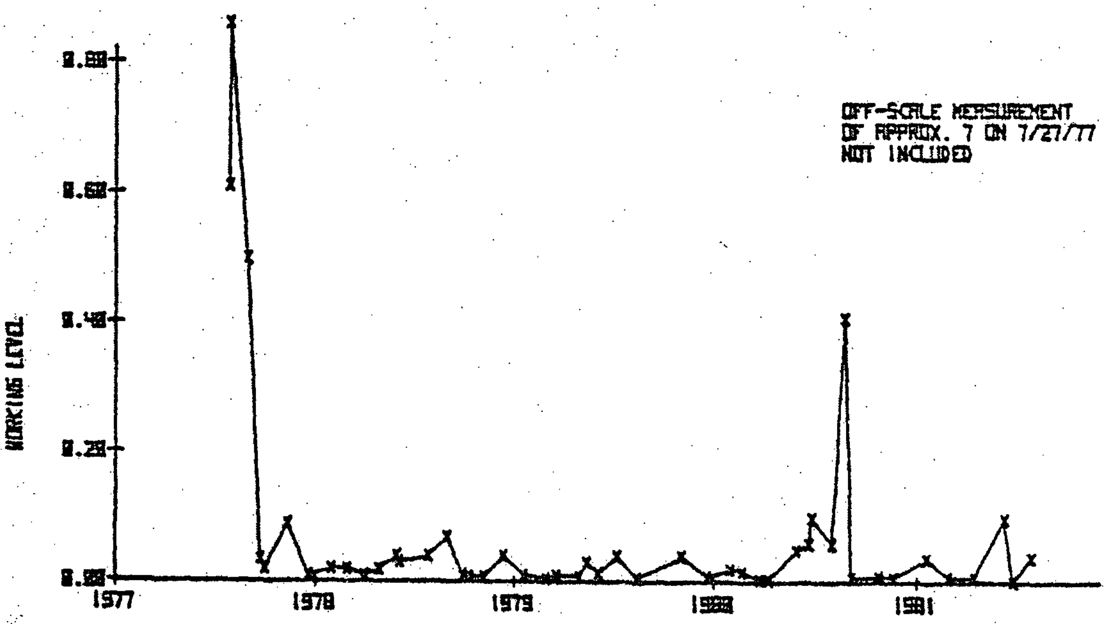


Figure B.27 Working Levels Grizzly Sump

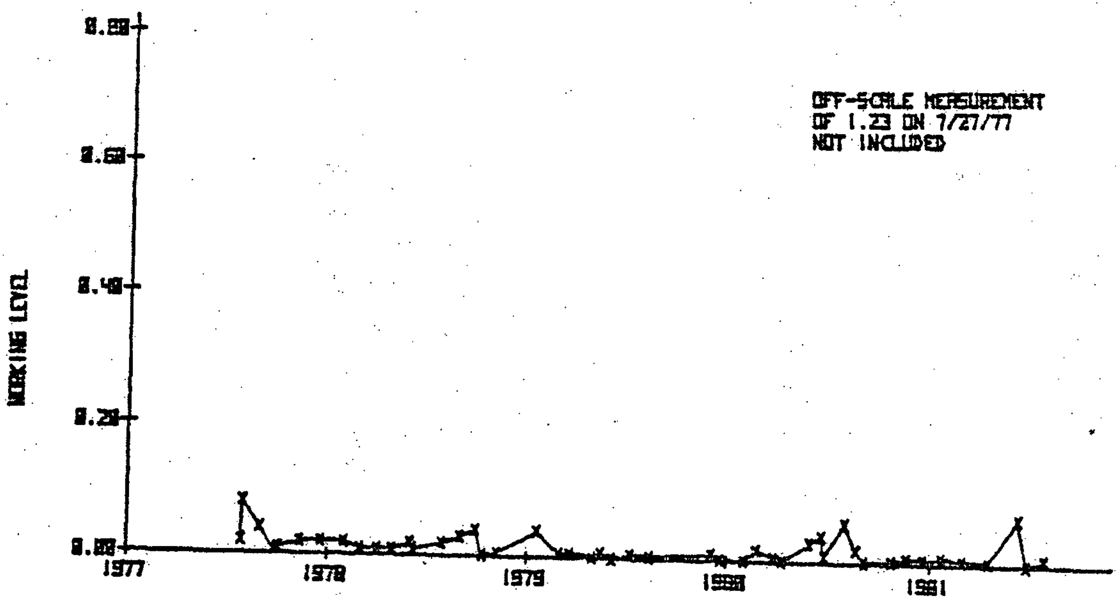


Figure B.28 Working Levels 1/2 Up Conveyor

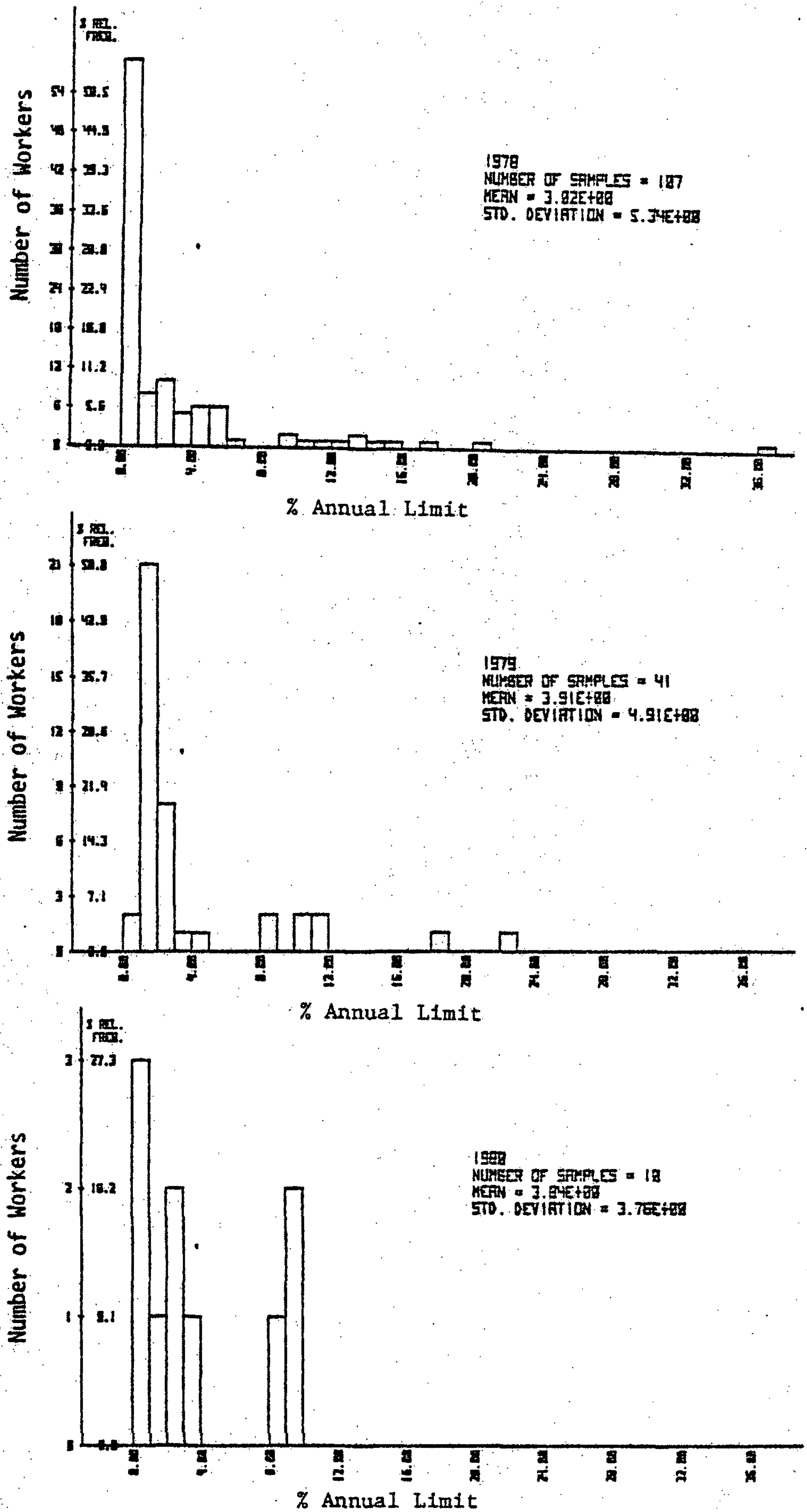
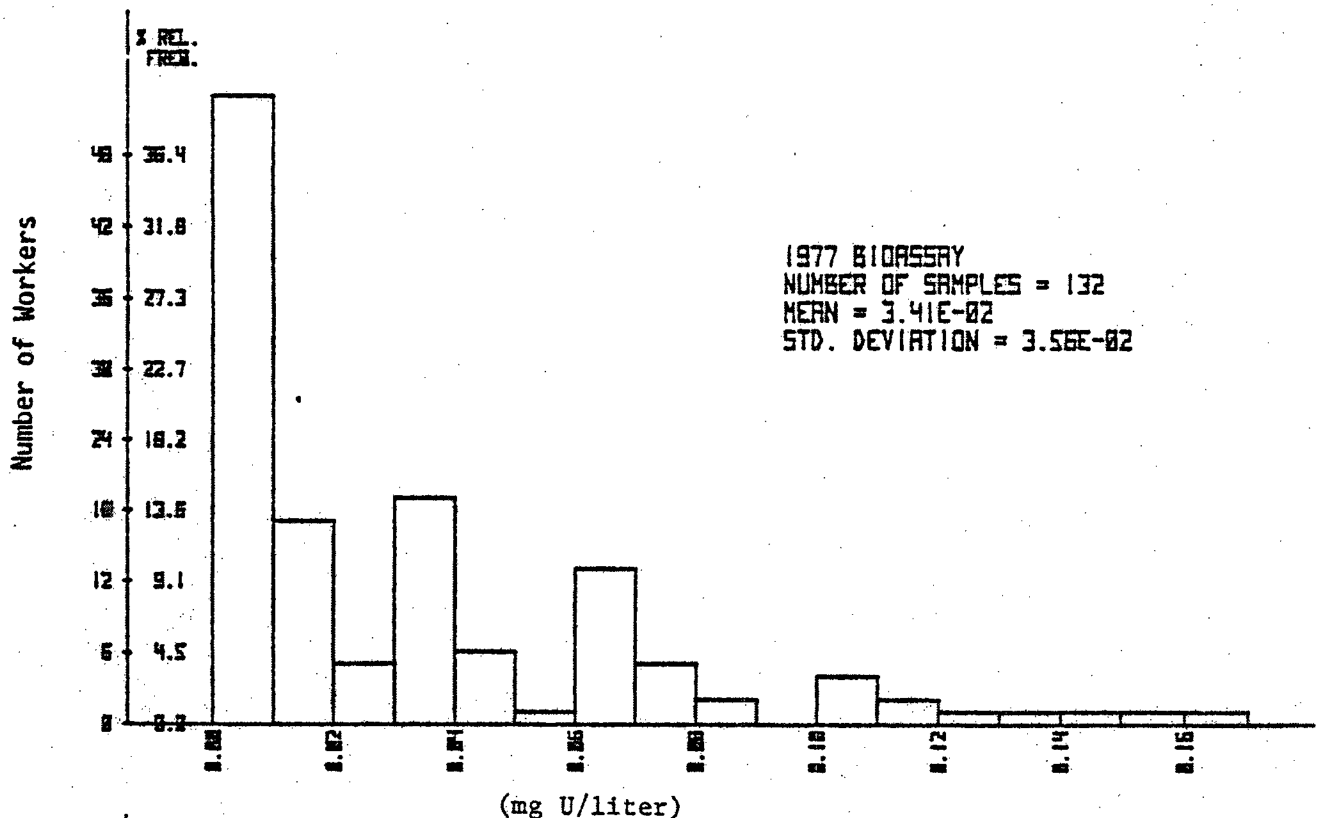


Figure B.29 Inhalation Exposure - % Annual Limit



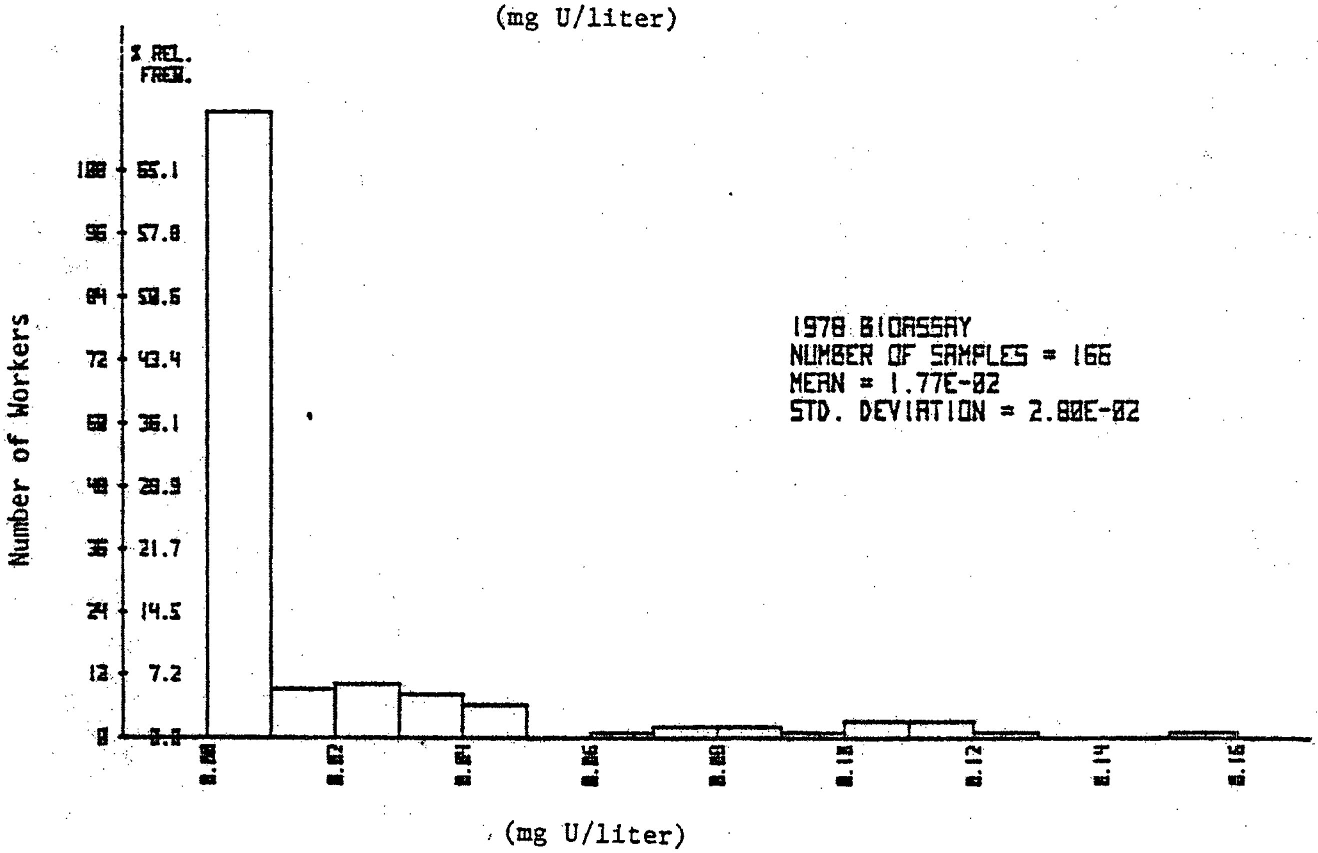
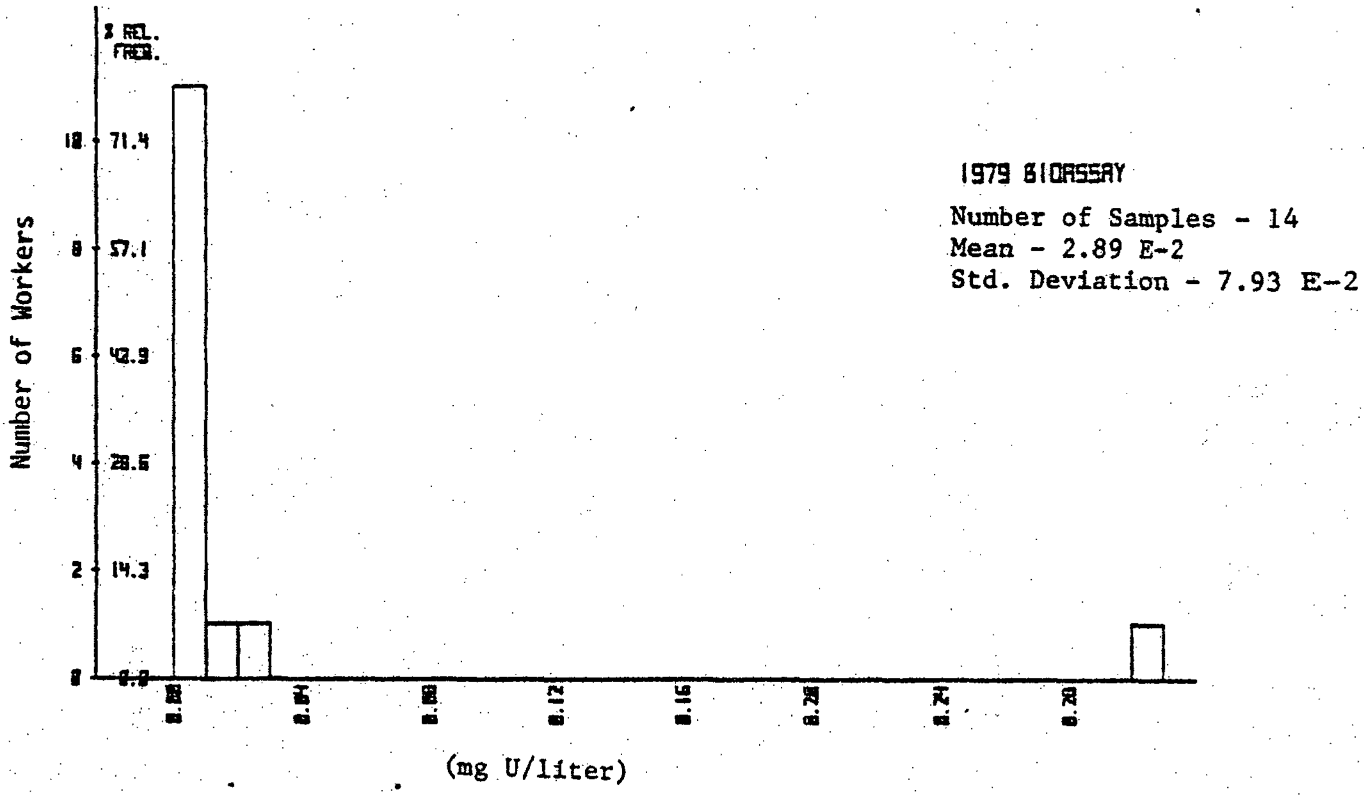


Figure B.30 Uranium Concentration in Urine (mg/liter)



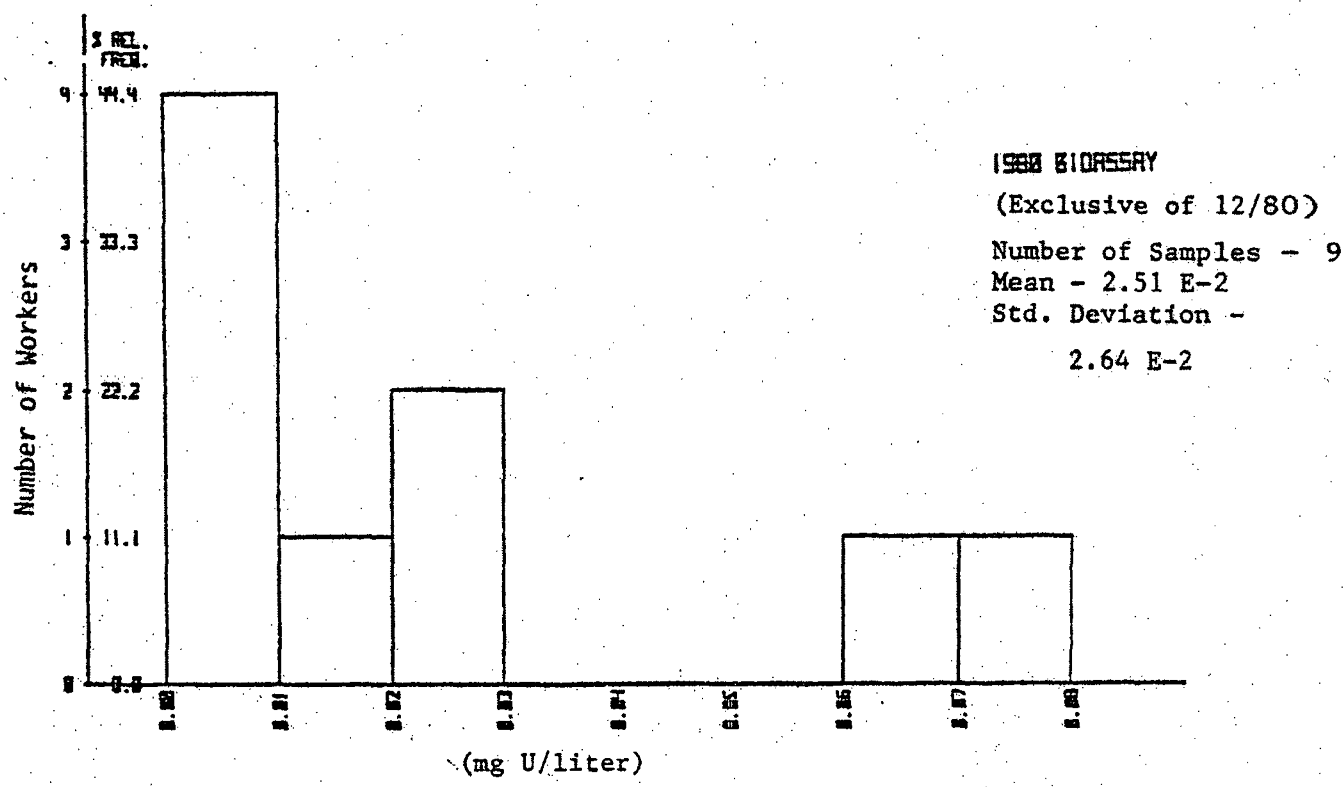
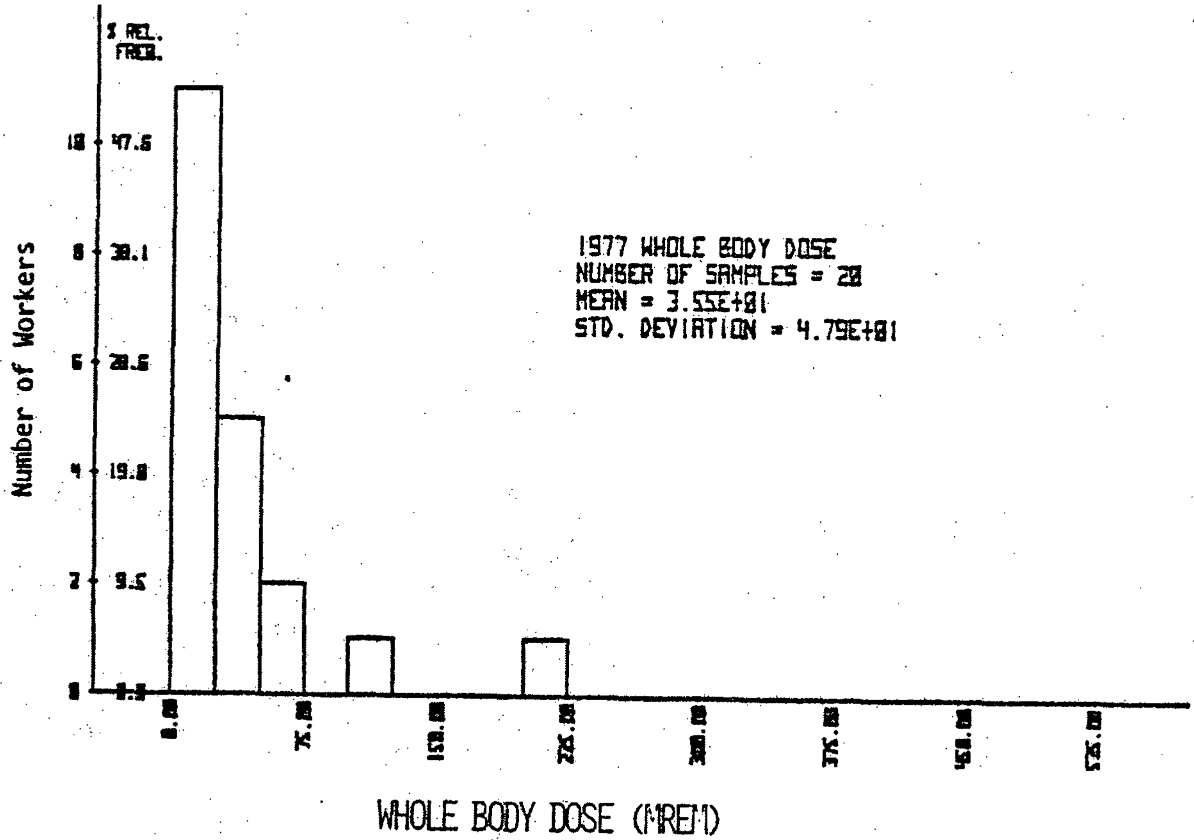


Figure B.30, Cont.
Uranium Concentration in Urine
(mg/liter)



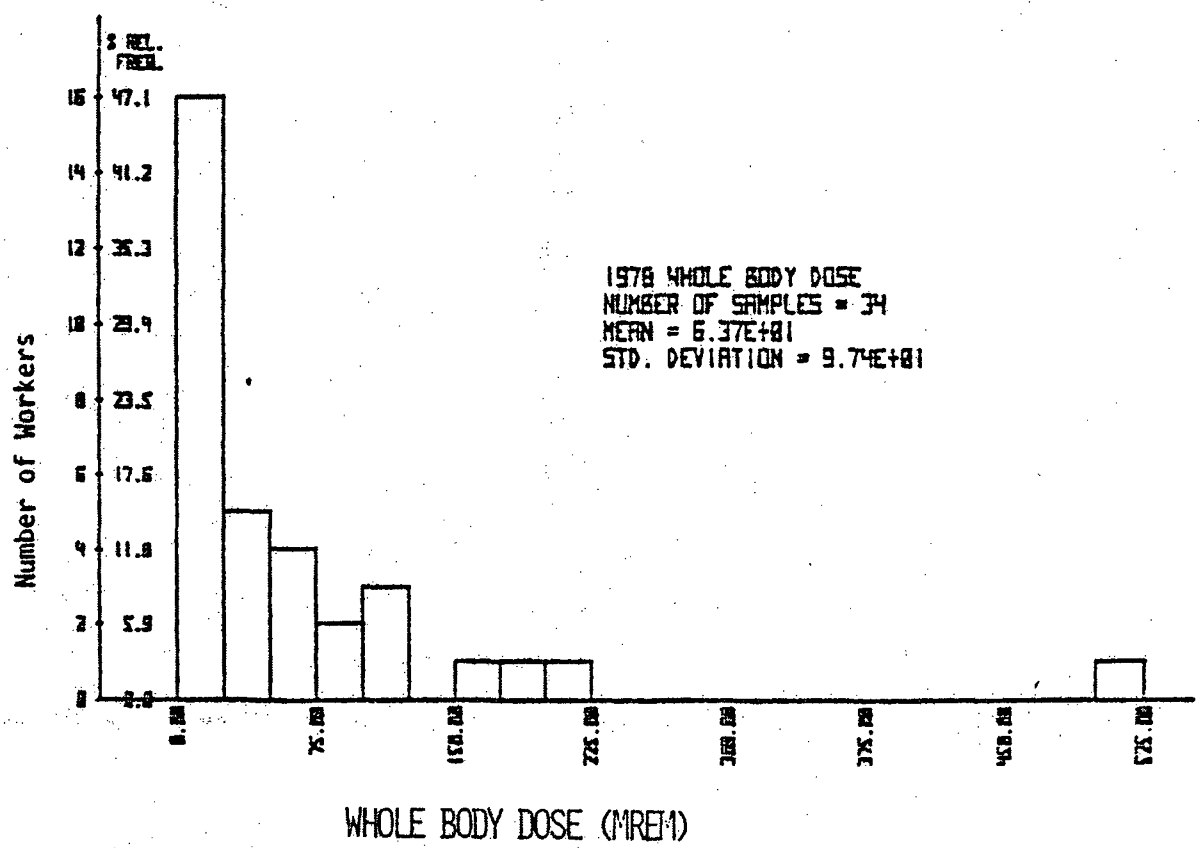
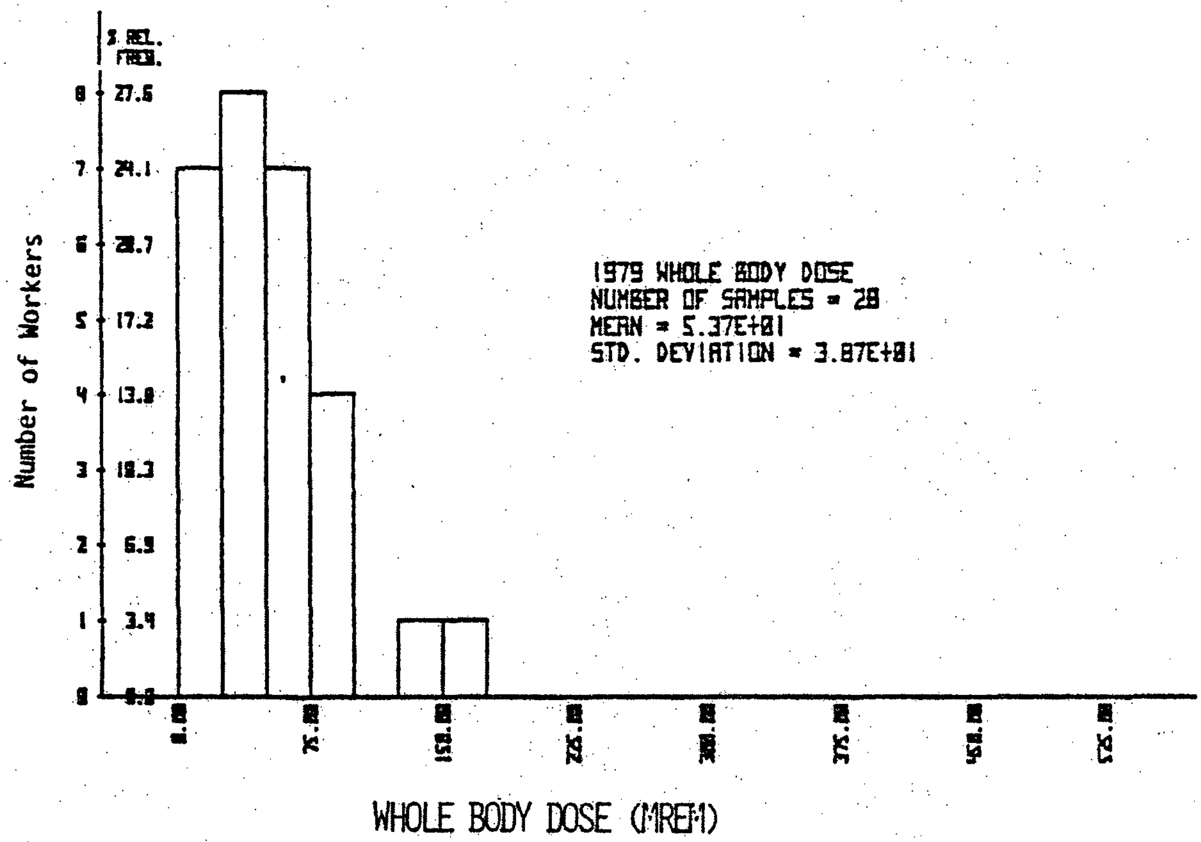


Figure B.31 Whole Body Dose (mrem)



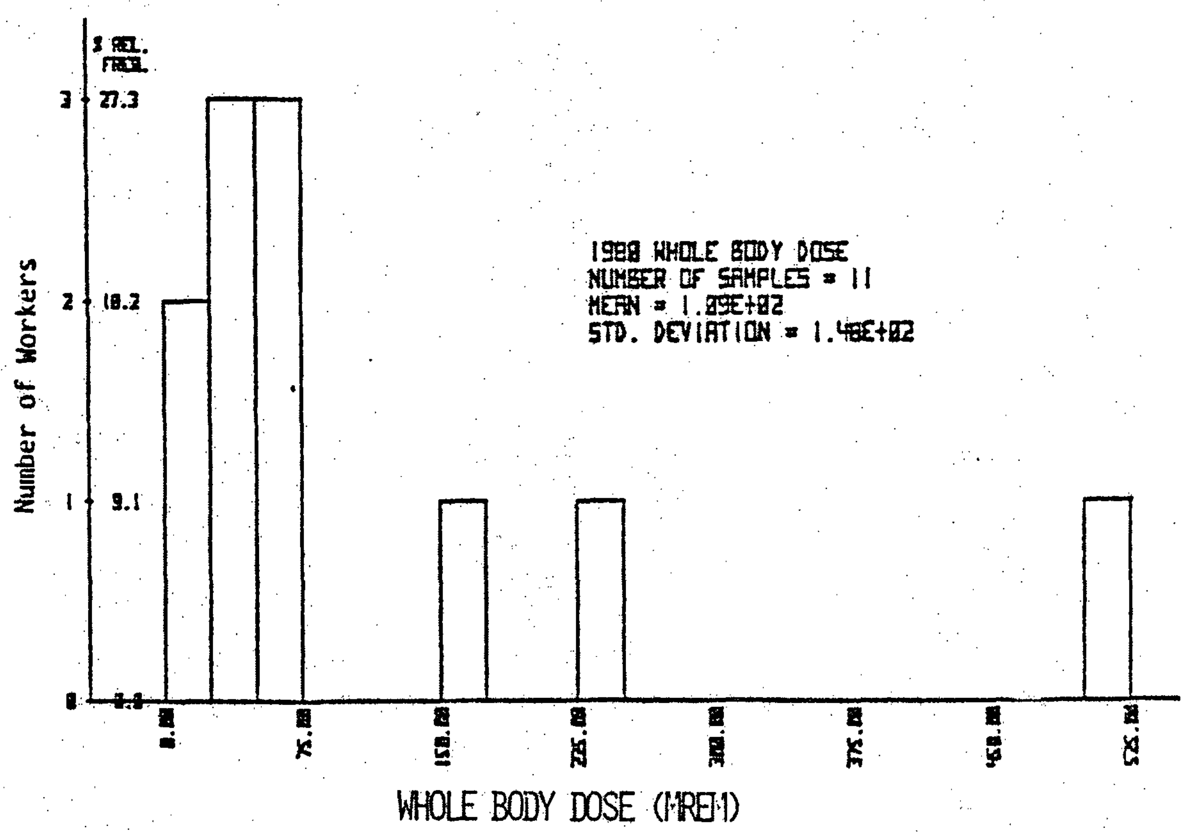


Figure B.31 (Continued) Whole Body Dose (mrem)

DRAWN BY EF 11/6/81 | CHECKED BY | APPROVED BY | DRAWING NUMBER NM81-435-A30

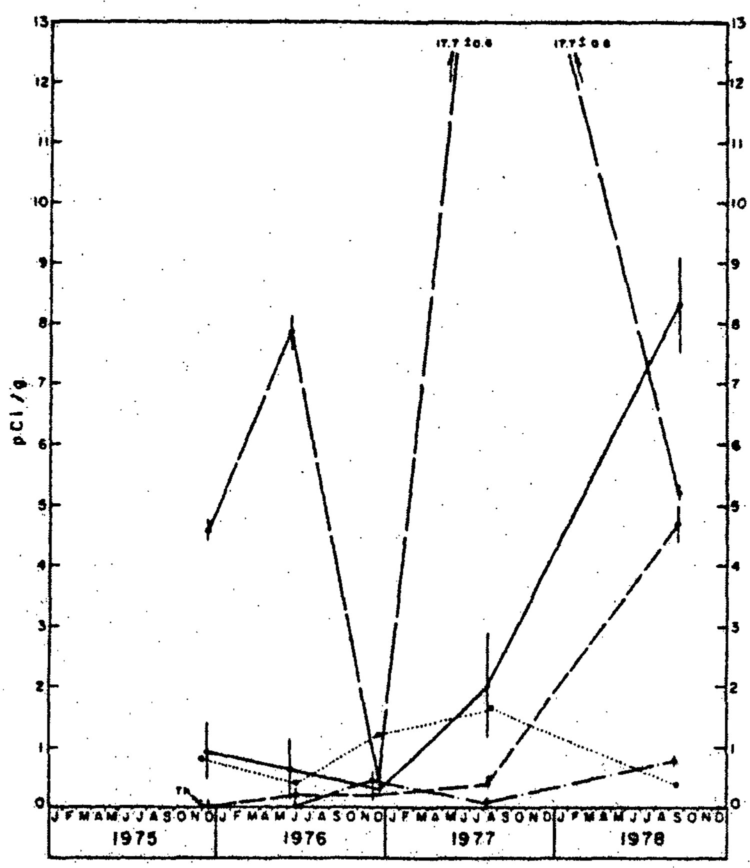


FIGURE B.32A

LEGEND

- α
- β
- Ra-226
- Th-230
- Total Uranium

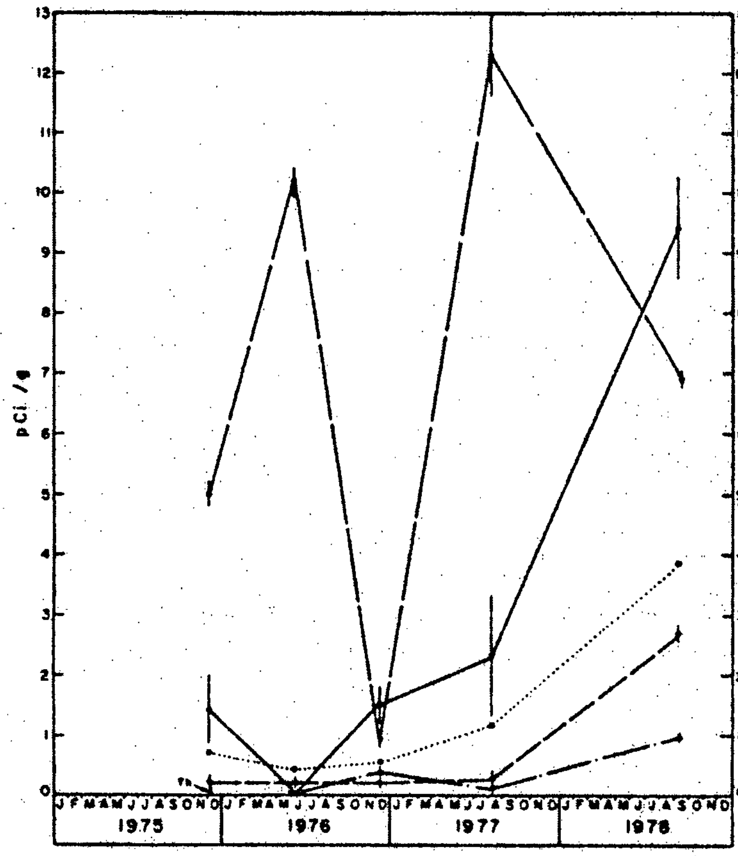
Counting Error — Mean

VEGETATION MONITORING
STATION I
100 YARDS NE OF VENT SHAFT NO.3
1975 - 1978

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA



LEGEND

α
β
Ra-226
Th-230
Total Uranium
Counting Error — Mean

FIGURE B.32B

VEGETATION MONITORING
STATION 2
EAST OF TAILINGS IMPOUNDMENT
1975 - 1978

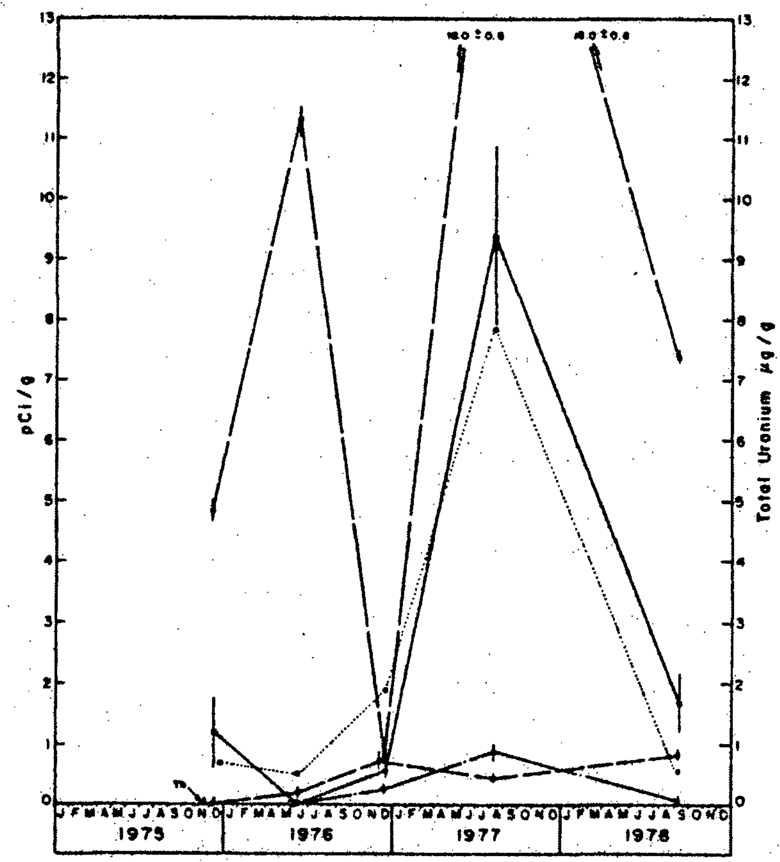
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY EP 11/6/81 | CHECKED BY | APPROVED BY | DRAWING NUMBER NM81-433-A31

DRAWN BY EP 11/6/81 CHECKED BY APPROVED BY DRAWING NUMBER NM81-435-A32



LEGEND

- α
- β
- Ra-226
- Th-230
- Total Uranium

Counting Error — Mean

FIGURE B.32C

VEGETATION MONITORING
STATION 3
SOUTHWEST OF MILL ON ARROYO
AT WEST BOUNDARY, 1975 - 1978

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

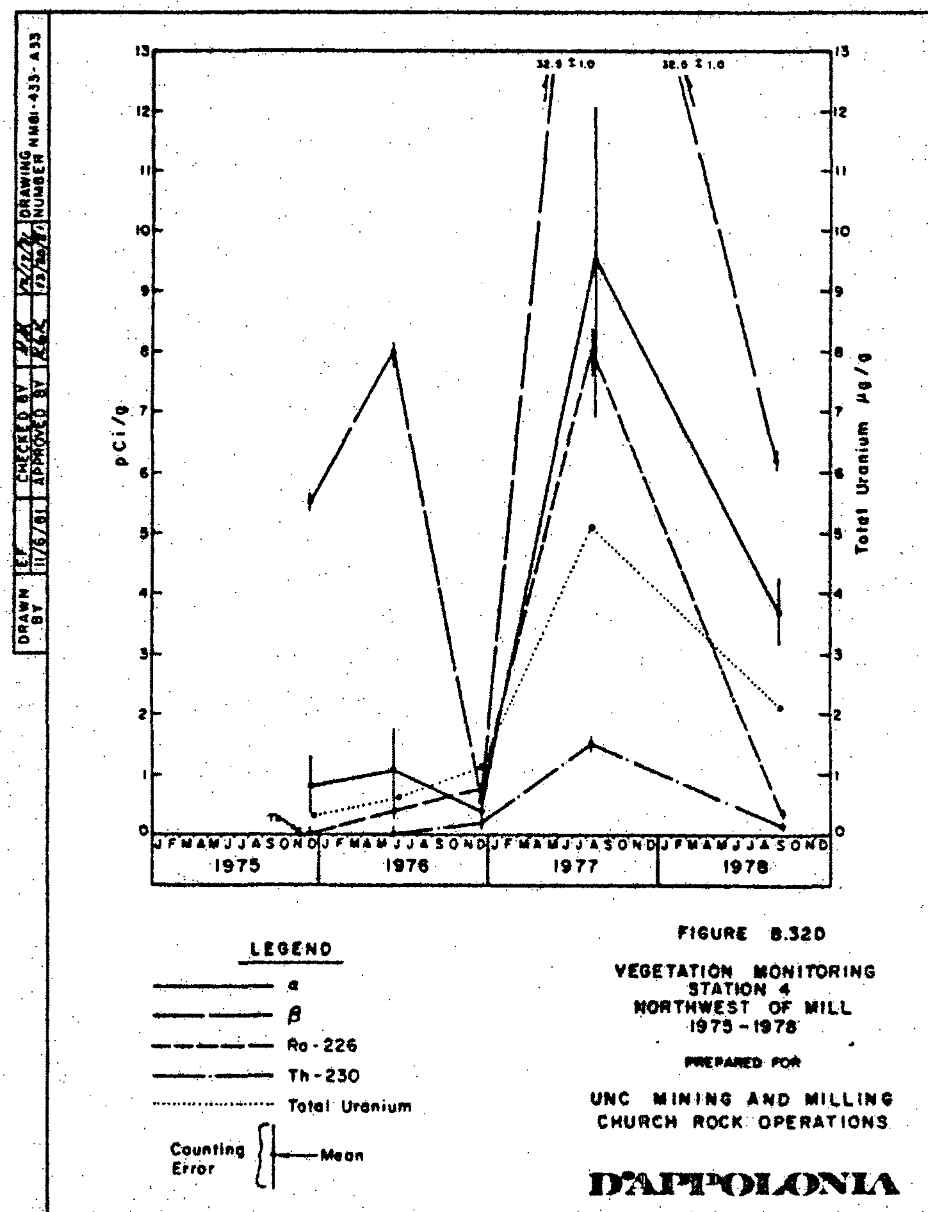


FIGURE B.320

VEGETATION MONITORING
STATION 4
NORTHWEST OF MILL
1975-1978

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

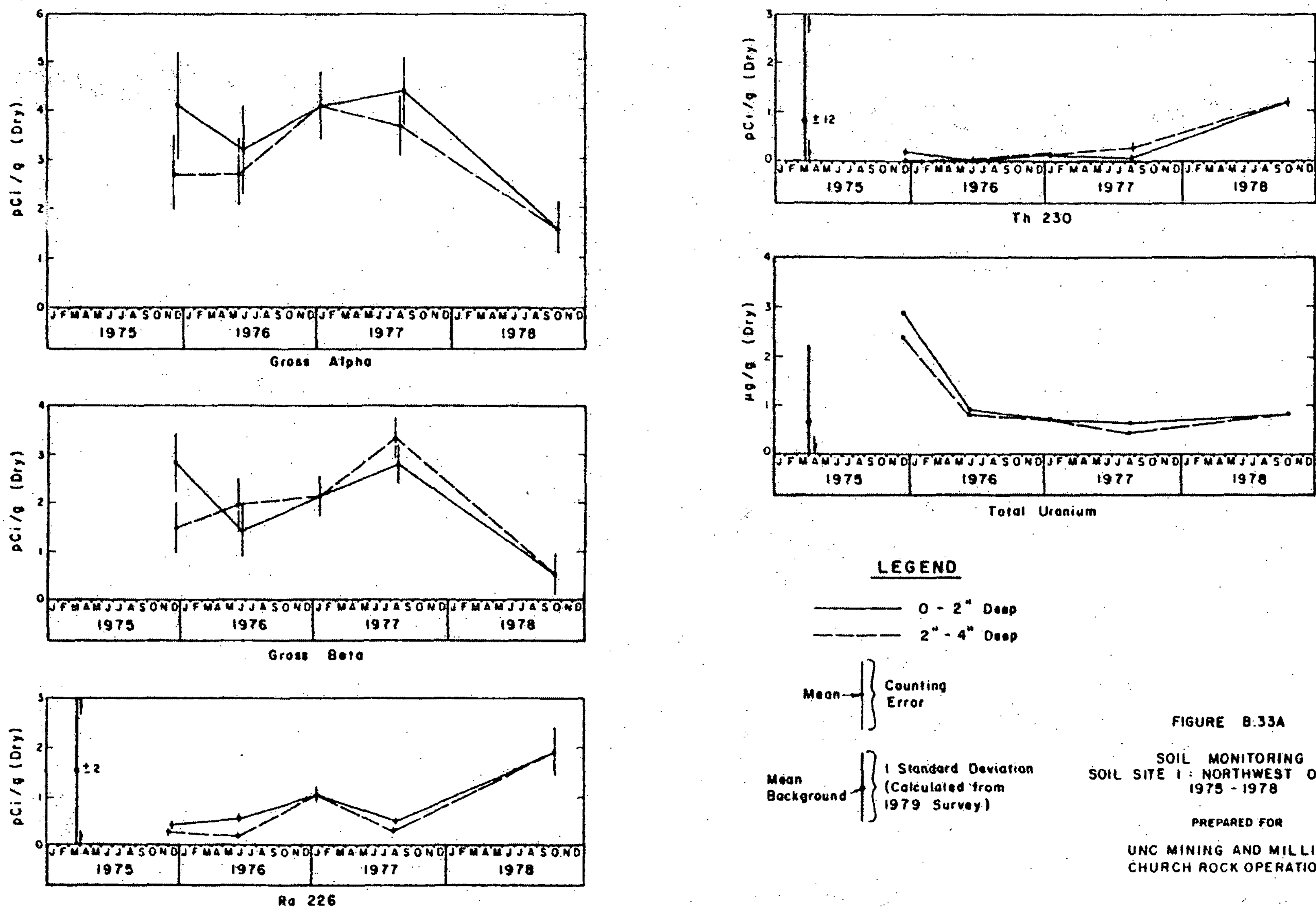


FIGURE B.33A

SOIL MONITORING
SOIL SITE 1 : NORTHWEST OF MILL
1975 - 1978

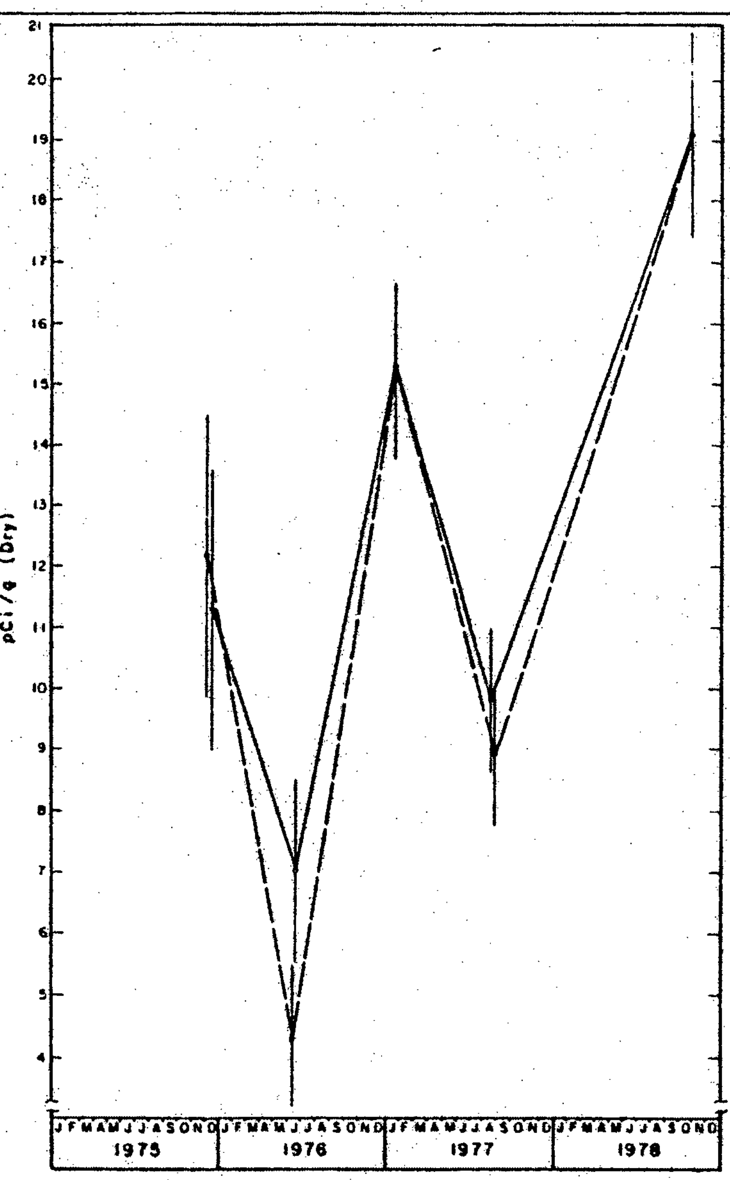
PREPARED FOR

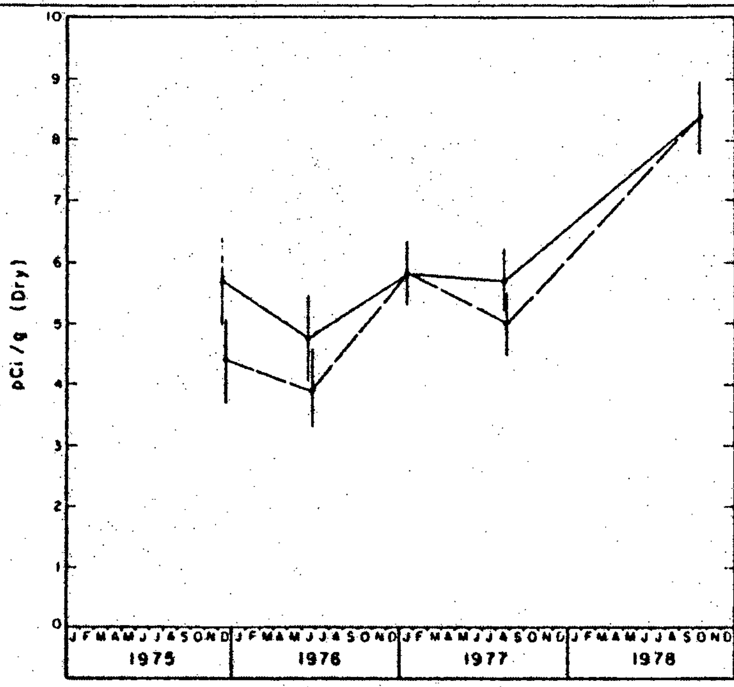
UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER NM81-433-B17

DRAWN BY E.F. 11/12/81 | CHECKED BY | APPROVED BY | DRAWING NUMBER NMB1-433-B18





LEGEND

——— 0 - 2" Deep

— — — 2" - 4" Deep

Mean — Counting Error

Mean Background — 1 Standard Deviation (Calculated from 1979 Survey)

FIGURE 8.338

SOIL MONITORING
SOIL SITE 2 : EAST OF MILL
1975 - 1978

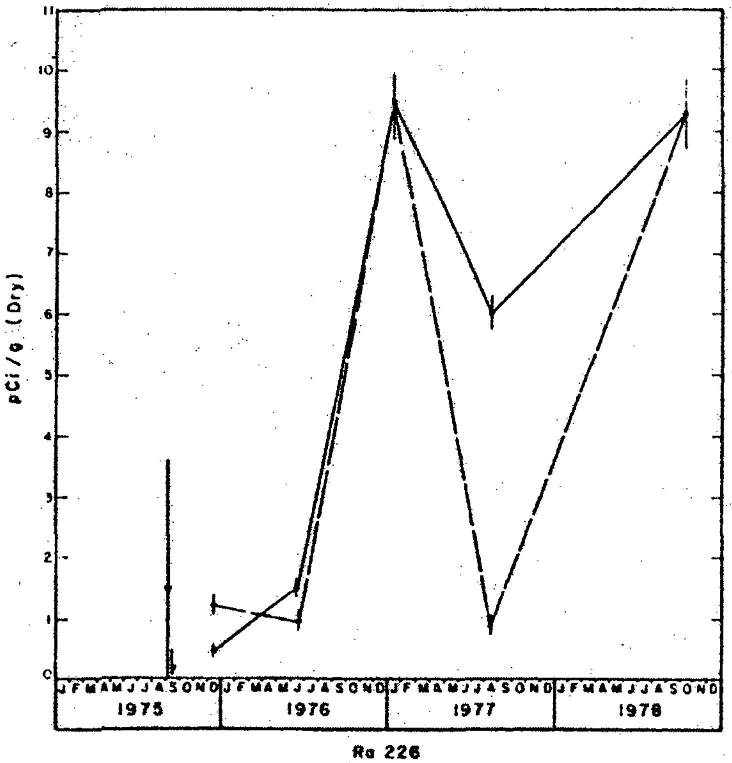
PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

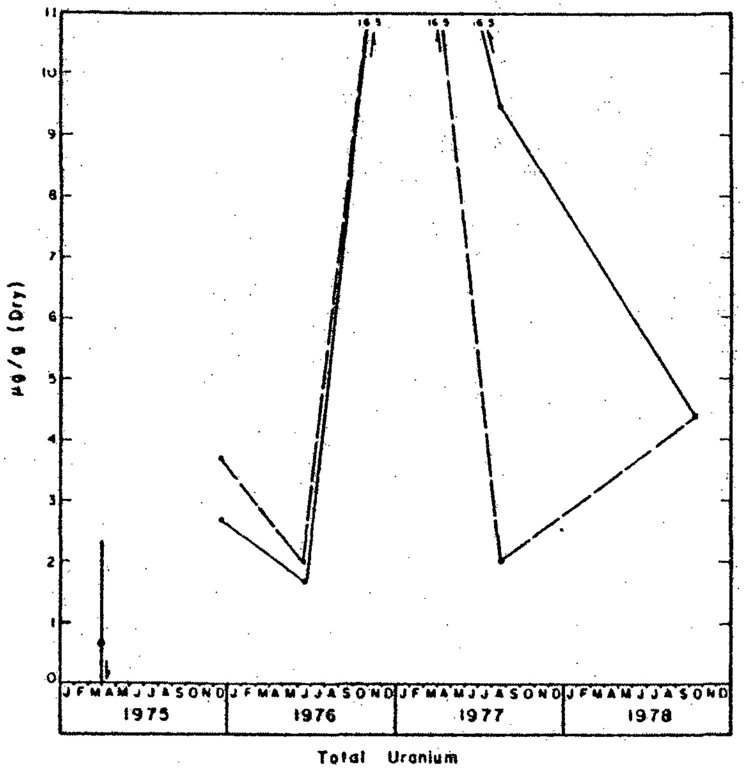
D'APPOLONIA

B-39

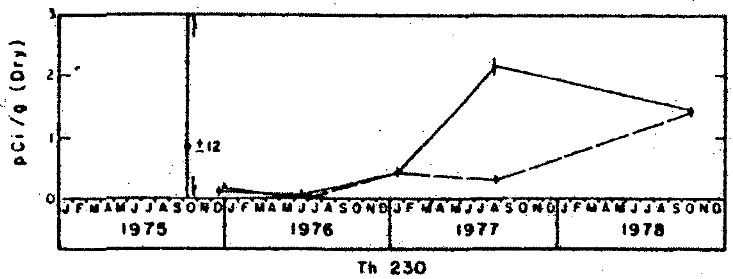
DRAWN BY EF 11/12/81 | CHECKED BY | APPROVED BY | DRAWING NUMBER NM81-433-B19



Ra 226



Total Uranium



Th 230

LEGEND

——— 0 - 2" Deep

— — — 2" - 4" Deep

Mean — Counting Error

Mean Background — 1 Standard (Calculated from 1979 Survey)

FIGURE B.33C

SOIL MONITORING
SOIL SITE 2 : EAST OF MILL
1975 - 1978

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

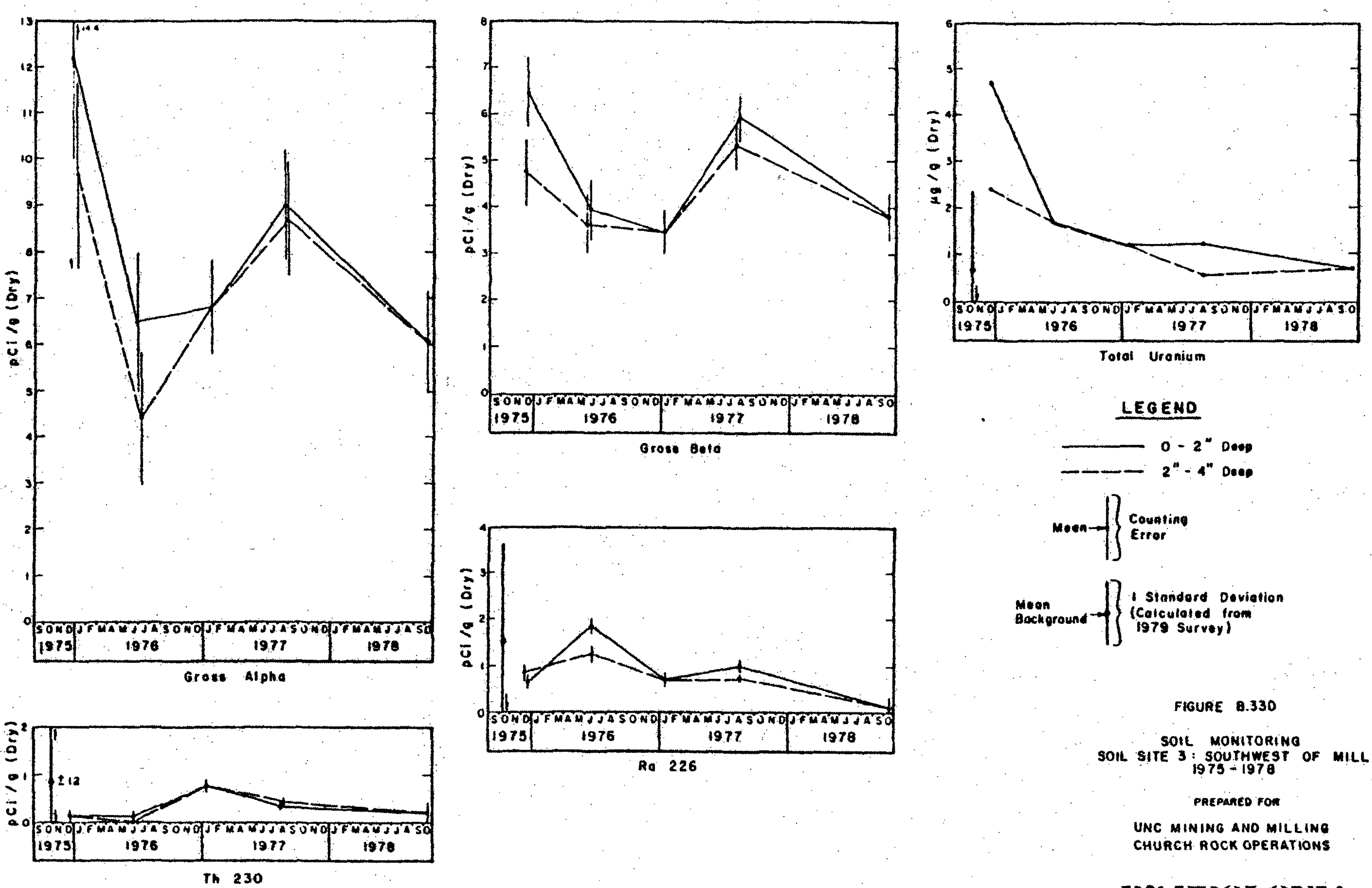


FIGURE B.330

SOIL MONITORING
SOIL SITE 3: SOUTHWEST OF MILL
1975 - 1978

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

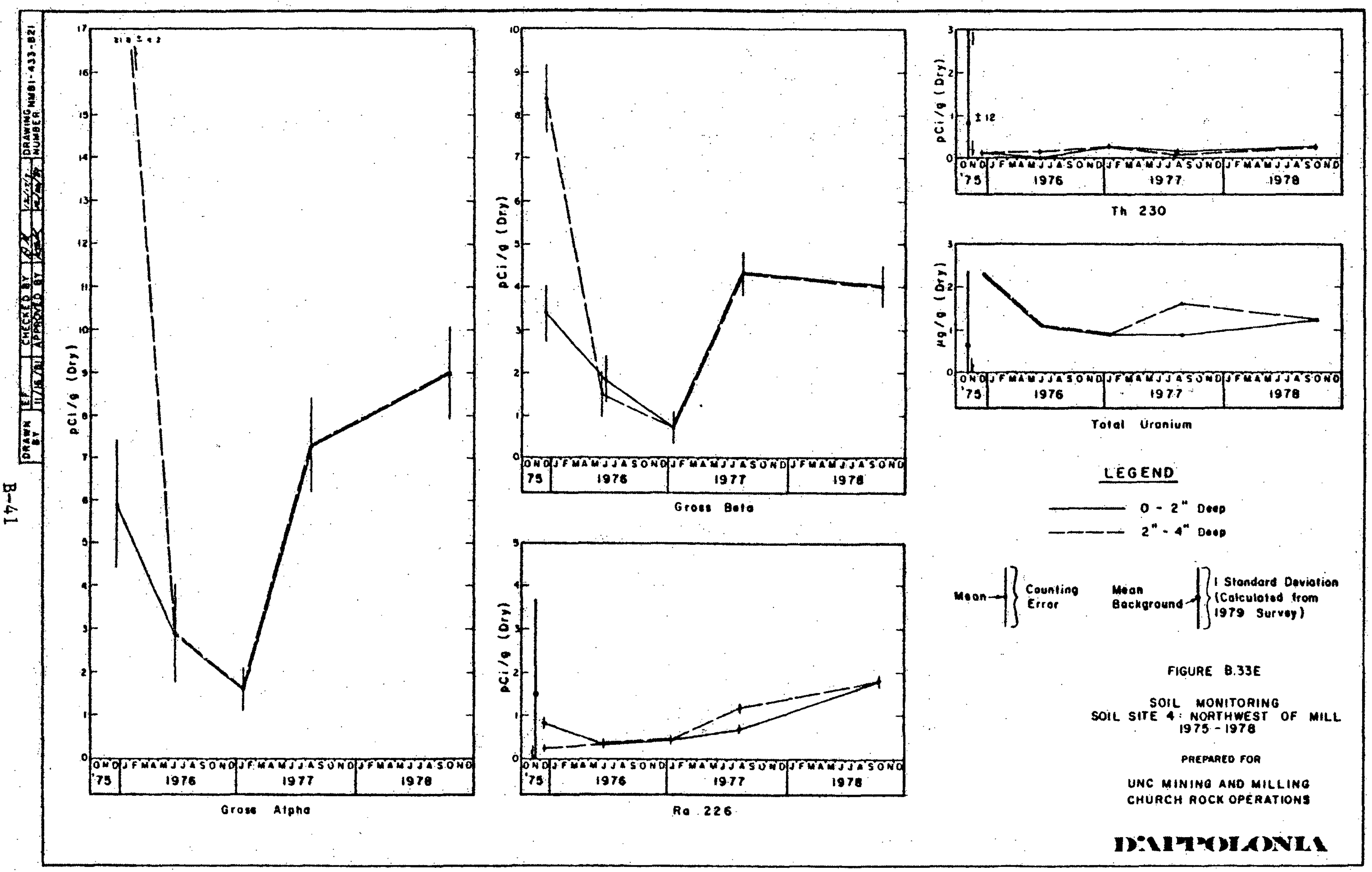


FIGURE B.33E

SOIL MONITORING
SOIL SITE 4: NORTHWEST OF MILL
1975 - 1978

PREPARED FOR
UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

DRAWN BY LEF 11/12/81 | CHECKED BY | APPROVED BY | DRAWING NUMBER NM61-433-B22

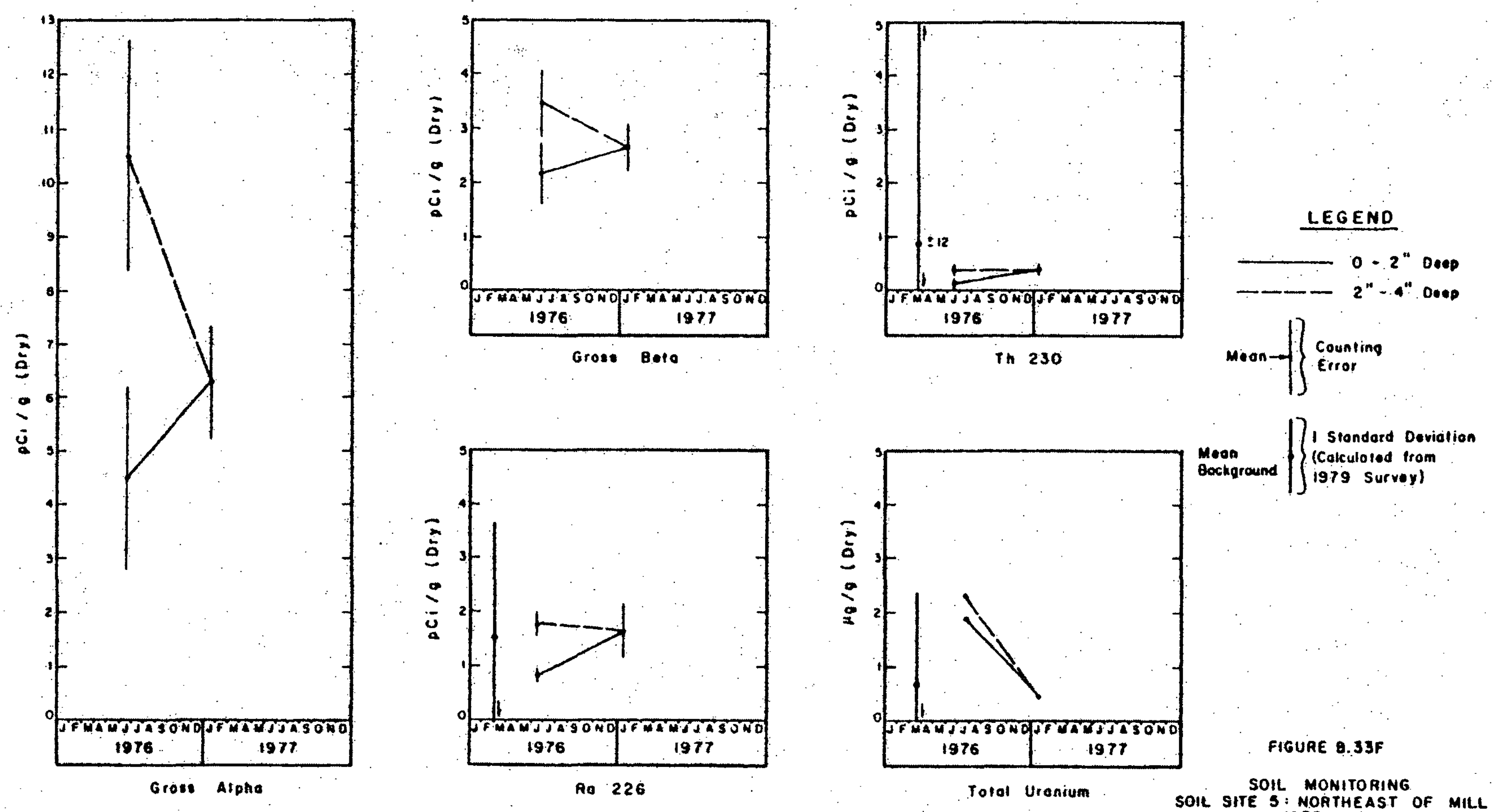


FIGURE B.33F

SOIL MONITORING
SOIL SITE 5: NORTHEAST OF MILL
1975 - 1978

PREPARED FOR

UNC MINING AND MILLING
CHURCH ROCK OPERATIONS

D'APPOLONIA

APPENDIX C

APPENDIX C.1

CONTINGENCY PLAN FOR FAILURE
OF CHURCH ROCK TAILINGS STRUCTURE

APPENDIX C.1

CONTINGENCY PLAN FOR FAILURE
OF CHURCH ROCK TAILINGS STRUCTURE

C1.0 SCOPE

The responsibilities, preventative actions, notifications, and corrective actions for a hypothetical failure in the Church Rock tailings structure are addressed in the contingency plan presented below:

C2.0 RESPONSIBILITIES

C2.1 - Document development is the responsibility of the Director of Environmental Operations.

C2.2 - Preventative actions, notifications, and corrective actions are the responsibility of the General Manager of Milling and Ion Exchange and Director of Tailings Management, with assistance provided on monitoring from the Director of Environmental Operations.

C2.3 - Document location. Copies of this contingency plan will be available from the Director of Environmental Operations and the General Manager of Milling and Ion Exchange.

C2.4 - Managerial review and updating of the contingency plan are the responsibilities of the Director of Environmental Operations.

C3.0 PREVENTATIVE ACTIONS

Provide the alarm system, victaulic couplings, tailings delivery line launder, and surveillance of the tailings area as described in the March 11, 1977 letter from H. J. Abbiss to R. A. Rhoades.

C3.1 – Tailings line surveillance presently requires two inspections per shift.

C3.2 - If anyone attempts to build a residence in the arroyo within three miles of the tailings structure, warn them that such activities may be hazardous and is definitely not advisable.

C3.3 - Maintain and update on a yearly basis a list of people living near the arroyo for three miles downstream from the tailings structure that may be potentially effected by a failure.

C3.4 - Maintain the current availability of an ambulance on the UNC Church Rock property.

C3.5 - Maintain and update on a yearly basis a list of available physicians in the event of an emergency associated with the tailings structure.

C4.0 NOTIFICATION

C4.1 - In the event of any abnormal observations of the tailings structure that may relate to a potential failure, immediately notify the Director of Tailings Management, the General Manager of Milling and Ion Exchange, and notify the Director of Environmental Operations.

C4.2 - In the event of a tailings failure, notify the President, the Vice President of Environmental and Safety Services, the Director of Tailings Management, the Director of Environmental Operations, and the General Manager of Milling and Ion Exchange.

C4.3 - In the event of a tailings failure, the Director of Environmental Operations will immediately notify the Tailings Management Radiation Protection Section of the New Mexico Environmental Improvement Division by telephone and subsequently in writing.

C4.4 - In the event of a tailings failure, the President or the Director of Tailings Management or their designate will issue press releases as deemed appropriate.

C5.0 ACTIONS

C5.1 - In the event of a tailings failure, actions will include:

5.1.1 Shutdown of the mill.

5.1.2 Monitoring to assess the impact of the failure and required corrective actions.

5.1.3 Physical repair of the tailings structure.

5.1.4 Physical clean-up of spilled tailings where appropriate.

C5.2 - In the event of any abnormal observations of the tailings structure that may relate to a potential failure, corrective actions determined by the nature of those observations will be instituted under the direction of the Director of Tailings Management.

APPENDIX C.2

YELLOWCAKE CONTINGENCY PLAN

APPENDIX C.2

YELLOWCAKE CONTINGENCY PLAN

Contingency plans to deal with accidents involving the transportation of yellowcake from the Church Rock Mill were outlined in 1977 [H. J. Abbiss (UNC) to P. F. Donahue (NMEIA), December 19, 1977]. At that time, all area mills tolling UNC Church Rock ore were covered by the plan.

This plan calls for at least two trained personnel to respond to any transportation emergency. These personnel are trained in yellowcake cleanup and decontamination techniques, equipment, and protective measures. Periodic review and updating of procedures and personnel training augment the plan.

Equipment to be available at cleanup sites include:

- Coveralls, boots, gloves, goggles, and respirators
- Alpha survey meter
- Gamma scintillometer
- Personal air samplers
- Water sample containers

Upon notification of an accident, the location and severity of the incident will be verified. If necessary, the clean-up team is dispatched to the site. Trucks and containers for clean-up are identified for availability.

UNC personnel take responsibility for construction of windbreaks, water diversions, covering of spills, decontamination, and sanitation at the site of a spill. If necessary, any additional equipment needs will be met by UNC. Local authorities will be brought in to secure the site and to develop a communications network.

In 1981, UNC proposed a cooperation accident response program to Kerr-McGee and Homestake for in-state yellowcake spills (UNC internal memo,

December 2, 1981). A similar program currently exists for mine rescue in the Ambrosia Lake district, and the currently proposed plan would follow much the same organization. Essentially, the proposed action would institute a single group of trained and prepared personnel in the industry and a pool of equipment and resources to deal efficiently with any transportation accidents in the state of New Mexico involving yellowcake.

Critical to this proposal is a response trailer which is centrally and accessibly located. This trailer contains:

- o Hand tools,
- o Personnel protective equipment,
- o Portable operations and washup facilities, and
- o Site control equipment.

This trailer is to be jointly stocked and regularly checked for utility. Radiation monitoring equipment would be drawn from operational supplies of the cooperating industry members, to assure acceptable calibration and operation.

The assurance of a large pool of trained personnel is a major feature of this program. Under circumstances where a shipper is unable to gather an adequate number of personnel at the time of an accident, a locatable force of trained personnel could fill out a team. Response efficiency would be improved, particularly in the early cleanup stages.

Meeting and training of personnel could also be done in a cooperative program. This joint training program would deal with standard operating procedures for the activities at an accident site and could alleviate many small problems at that time by resolving the mechanics and organization ahead of time. The methods and equipment would be reviewed periodically for potential changes and improvements as new information becomes available.

The overall affect on the uranium industry in New Mexico will be that a group of professional and technical personnel will be prepared to respond quickly to transportation accidents and reduce the potential spread of contamination beyond the immediate area. This effort is directly concerned with reducing the potential risk that the citizens would face as the result of a yellowcake transporation accident as well as increasing the industry's capability for rapid response.

APPENDIX D

TABLE OF CONTENTS

Appendix D

Environmental Radiological Monitoring Data

Table D-1

Stack Monitoring - High Volume-Yellowcake Dryer Stack[1]
(Large Stack)

Date	Stack Gas Flow Rate (dry standard cubic meter/ hour)	Emission Rate (gram/dry standard cubic meter)	Gross Alpha x 10^{-10} (μCi/ml)	Gross Beta x 10^{-10} (μCi/ml)	Utot x 10^{-10} (μCi/ml)	Unat x 10^{-10} (μCi/ml)	Ra-226 x 10^{-10} (μCi/ml)	Th-230 x 10^{-10} (μCi/ml)	Pb-210 x 10^{-10} (μCi/ml)	Po-210 x 10^{-10} (μCi/ml)
7/26/77			0.0269	0.0434						
8/25/77			0.052	0.065						
9/30/77			0.064	0.43						
10/30/77			0.045	0.105						
11/19/77			0.26	0.07						
12/31/77			0.46	0.12						
1/29/78			0.48							
2/18/78			0.199							
3/25/78			0.174							
4/8/78			0.61							
5/6/78			0.77							
6/30/78			0.98	0.9	1.8					
7/31/78			0.33	4.74	8.23					
8/24/78			10.3	58.4	123.6					
9/7/78						3.7	0.02	0.029		
10/2-4/78			12.09	38.8	53.90					
10/2-4/78			14.62	41.2	66.10					
11/7/78			5.04	14.4	25.6					
11/7/78			4.59	14.4	21.0					
12/27/78						3.05				
1/31/79					51.68					
2/9/79					43.09					
2/15/79					27.73					
2/20/79					21.03					
3/30/79			2.215	2.597	1.14					
3/30/79			2.782	4.960	1.55					
3/30/79			0.535	1.127	0.36					
4/20/79			7.887	15.062	31.06					
4/20/79			7.240	13.806	35.26					
5/14/79			5.592	9.283	15.15					
5/14/79			5.422	9.111	21.61					
6/18/79			7.781	9.974	34.13					
6/18/79			8.151	13.320	26.62					
11/29/79						0.629	0.0029	0.0089		
12/10/79						1.127	0.0110	0.0099		
1/31/80						13.208	0.0037	0.361		
2/25/80						10.805	0.0072	0.0071		
4/9/80						19.227	0.0204	0.0988		
5/29/80						6.150	0.0038	0.139		

Table D-1 (Cont'd.)

Stack Monitoring - High Volume-Yellowcake Dryer Stack[1]

Date	Stack Gas Flow Rate (dry standard cubic meter/ hour)	Emission Rate (gram/dry standard cubic meter)	Gross Alpha x 10^{-10} (μCi/ml)	Gross Beta x 10^{-10} (μCi/ml)	Utot x 10^{-10} (μCi/ml)	Unat x 10^{-10} (μCi/ml)	Ra-226 x 10^{-10} (μCi/ml)	Th-230 x 10^{-10} (μCi/ml)	Pb-210 x 10^{-10} (μCi/ml)	Po-210 x 10^{-10} (μCi/ml)
8/29/80						5.302	0.005	0.235		
9/30/80						6.107	0.003	0.193		
10/31/80						14.828	0.003	0.213		
11/30/80						2.731	0.003	0.023		
12/31/80						4.709	0.001	0.084		
1/20-22/81	4391				267.09		0.0117$\pm$0.0024	<0.0005$\pm$0.0001	<0.0005$\pm$0.0001	<0.0005$\pm$0.0001
1/20-22/81	5122				6.26		0.0013$\pm$0.0003	<0.0004$\pm$0.0001	<0.0004$\pm$0.0001	<0.0004$\pm$0.0001
1/20-22/81	4899				2.62		0.0017$\pm$0.0003	<0.0005$\pm$0.0001	<0.0005$\pm$0.0001	<0.0005$\pm$0.0001
5/6-7/81	8582	0.0526			237.17		0.320$\pm$0.08	0.0158$\pm$0.0037	0.0105$\pm$0.0053	0.00263$\pm$0.00053
5/6-7/81	9134	0.0343			8.12		0.111$\pm$0.028	0.0079$\pm$0.0021	0.00412$\pm$0.00274	0.00137$\pm$0.00034
5/6-7/81	9069	0.0300			23.46		0.0345$\pm$0.0087	0.0015$\pm$0.003	0.0012$\pm$0.0018	0.0003$\pm$0.0003
8/4-5/81	8939	0.0339			174.72		0.0048	<0.0014	<0.0024	<0.0014
8/4-5/81	8927	0.0277			148.99		0.0795	0.0033	0.0011	<0.0005
8/4-5/81	9090	0.0243			69.24		0.0400	0.0022	0.0005	<0.0005

[1]Sampling began 7/77
Sampling frequency: monthly (1977-1980); quarterly (1981-present)
Sampling location: since 1/81, thirty two point traverses in the stack are sampled.
Sampling method: Staplex high volume air sampler, 5 to 30 minute samples (1977-1980); since 1981 sampling train is Misco Model 7200 Source Sampler 32-point traverse, 2-minute sample per point, EPA Method 5.

Table D-1 (Cont'd.)

Stack Monitoring - High Volume-Yellowcake Packaging and Precipitation Stack[1] (Cont'd.)
(Small Stack)

Date	Stack Gas Flow Rate (dry standard cubic meter/ hour)	Emission Rate (gram/dry standard cubic meter)	Gross Alpha $\times 10^{-10}$ (μCi/ml)	Gross Beta $\times 10^{-10}$ (μCi/ml)	Utot $\times 10^{-10}$ (μCi/ml)	Unat $\times 10^{-10}$ (μCi/ml)	Ra-226 $\times 10^{-10}$ (μCi/ml)	Th-230 $\times 10^{-10}$ (μCi/ml)	Pb-210 $\times 10^{-10}$ (μCi/ml)	Po-210 $\times 10^{-10}$ (μCi/ml)
8/25/77			0.053	0.047						
9/30/77			0.011	0.101						
10/30/77			0.070	0.107						
11/19/77			0.18	0.05						
12/31/77			0.27	0.19						
1/29/78			0.13							
2/18/78			0.222							
3/25/78			0.21							
4/8/79			0.35							
5/6/78			0.58							
6/30/78			0.3	0.6	0.6					
7/31/78			0.56	4.49	7.8					
8/24/78			0.123	9.45	1.58					
9/7/78						2.4	0.008	0.003		
10/4/78			0.44	0.84	3.26					
10/4/78			0.54	1.83	4.94					
10/4/78			8.25	34.6	82.13					
10/4/78			24.9	107.96	166.22					
10/6/78						8.25				
10/6/78						17.97				
10/6/78						280.58				
10/6/78						125.63				
10/13/78						25.4				
10/13/78						3.72				
10/13/78						3.30				
10/13/78						5.2				
10/13/78						11.5				
10/13/78						10.2				
11/7/78			0.08	0.189	0.59					
11/7/78			0.06	0.176	0.67					
12/27/78						0.32				
1/31/79					0.14					
2/15/79					5.21					
2/20/79					0.13					
3/30/79			0.223	0.446	0.18					
4/20/79			0.072	0.167	0.32					
5/14/79			0.498	1.183	2.90					
6/18/79			0.092	0.148	0.17					
6/18/79			0.021	0.047	0.15					
11/29/79						1.507	0.0031	0.0204		
12/10/79						10.342	0.0043	0.765		
1/16/80						1.905	0.0137	0.0214		
2/25/80						9.004	0.0022	0.0036		
3/26/80						1.200	0.002	0.013		
4/9/80						4.937	0.0021	0.183		

Table D-1 (Cont'd.)

Stack Monitoring - High Volume-Yellowcake Packaging and Precipitation Stack (Cont'd.)
(Small Stack)

Date	Stack Gas Flow Rate (dry standard cubic meter/hour)	Emission Rate (gram/dry standard cubic meter)	Gross Alpha $\times 10^{-10}$ (μCi/ml)	Gross Beta $\times 10^{-10}$ (μCi/ml)	Utot $\times 10^{-10}$ (μCi/ml)	Unat $\times 10^{-10}$ (μCi/ml)	Ra-226 $\times 10^{-10}$ (μCi/ml)	Th-230 $\times 10^{-10}$ (μCi/ml)	Pb-210 $\times 10^{-10}$ (μCi/ml)	Po-210 $\times 10^{-10}$ (μCi/ml)
5/29/80						4.002	0.0004	0.042		
7/31/80						0.833	0.0006	0.009		
8/29/80						0.288	<0.0001	0.007		
9/30/80						1.957	0.001	0.026		
10/31/80						2.315	0.001	0.019		
11/30/80						2.824	0.002	0.027		
12/31/80						9.295	0.005	0.260		
1/20-22/81	1567				1.25		0.0039±0.0008	0.0006±0.0001	0.0008±0.0002	<0.0004±0.0001
1/20-22/81	1598				0.18		<0.0004±0.0001	<0.0004±0.0001	<0.0004±0.0001	<0.0004±0.0001
1-20-22/81	1577				0.14		<0.0003±0.0001	<0.0004±0.0001	<0.0004±0.0001	<0.0004±0.0001
5/6-7/81	1762	0.0046			0.19		0.0174±0.0044	0.0013±0.0003	0.0011±0.0005	0.0005±0.0002
5/6-7/81	1686	0.0053			1.82		0.1340±0.0335	0.0066±0.0016	0.0053±0.0021	0.0024±0.0006
5/6-7/81	1683	0.0056			2.70		0.0609±0.0152	0.0129±0.0006	0.0014±0.0006	0.0006±0.0001
8/4-5/81	1722	0.0210			61.32		0.0842	0.0029	0.0006	<0.0005
8/4-5/81	748	0.0238			111.94		0.0500	0.0026	0.0005	<0.0005
8/4-5/81	1658	0.0105			39.84		0.0371	0.0017	0.0003	<0.0003

[1] Sampling began 7/77
Sampling frequency: monthly (1977-1980); quarterly (1981-present)
Sampling location: since 1/81, 4 point traverses in the stack are sampled.
Sampling method: Staplex high volume air sampler, 5 to 30 minute samples (1977-1980); since 1981 sampling train is Misco Model 7200 Source Sampler. 4 point traverse, 15 minute sample per point, EPA Method 5.

Table D-2

Perimeter Airborne Particulates Monitoring - High Volume and Continuous Low Volume[1]

Site A

Sampling Date	U-Natural µCi/ml	Ra-226 µCi/ml	Th-230 µCi/ml	Pb-210 µCi/ml	Po-210 µCi/ml	TSP µg/m^3
6/28/77	$<2.49\times10^{-14}$	2.13×10^{-14}	ND*			
7/20/77	$<2.85\times10^{-14}$	8.75×10^{-15}	ND			
9/13/77	1.81×10^{-12}	5.64×10^{-15}	ND			
10/13/77	4.78×10^{-13}	3.34×10^{-14}	6.26×10^{-15}			
11/22/77	1.47×10^{-13}	1.06×10^{-14}	2.51×10^{-14}			
12/27/77	8.50×10^{-14}	2.51×10^{-15}	6.91×10^{-15}			
1/25/78	7.79×10^{-13}	1.77×10^{-15}	4.30×10^{-14}			
2/24/78	8.77×10^{-13}	7.06×10^{-15}	7.47×10^{-15}			
3/28/78	2.19×10^{-12}	1.47×10^{-13}	7.61×10^{-14}			
4/17/78	2.37×10^{-14}	1.64×10^{-14}	8.16×10^{-15}			
5/23/78	7.13×10^{-14}	6.70×10^{-14}	4.60×10^{-14}			
6/27/78	1.1×10^{-13}	1.6×10^{-14}	1.0×10^{-14}			
7/27/78	3.16×10^{-13}	3.66×10^{-14}	7.26×10^{-15}			
8/30/78	2.46×10^{-13}	0.19×10^{-13}	6.0×10^{-15}			
9/25/78	3.60×10^{-14}	6.60×10^{-14}	3.0×10^{-15}			
10/9/78	3.23×10^{-13}	7.0×10^{-14}	3.1×10^{-14}			
10/9/78	2.1×10^{-13}	0.3×10^{-13}	0.4×10^{-13}			
11/16/78	1.84×10^{-13}	7.0×10^{-15}	3.0×10^{-15}			
12/5/78	8.85×10^{-13}	3.0×10^{-15}	8.0×10^{-15}			
1/30/79	1.7×10^{-13}	3.0×10^{-14}	$<1.0\times10^{-14}$			
2/26/79	9.0×10^{-14}	1.0×10^{-14}	$<1.0\times10^{-14}$			
3/27/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/25/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	3.0×10^{-14}			
5/17/79	$<2.0\times10^{-13}$	2.0×10^{-14}	3.0×10^{-14}			
6/22/79	2.3×10^{-13}	ND	5.0×10^{-14}			
10/9/79	$<2.0\times10^{-13}$	2.0×10^{-14}	2.0×10^{-14}			
10/9/79	2.1×10^{-13}	0.3×10^{-13}	0.4×10^{-13}			
11/13/79	4.27×10^{-13}	$<1.0\times10^{-13}$	5.0×10^{-15}			
2/5/80	$<2.0\times10^{-13}$	1.0×10^{-14}	2.0×10^{-14}			
3/10/80	$<2.0\times10^{-13}$	3.0×10^{-14}	$<1.0\times10^{-14}$			
4/3/80	6.42×10^{-13}	3.0×10^{-14}	4.0×10^{-14}			
5/19/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	1.0×10^{-13}			
6/7/80	9.2×10^{-13}	2.0×10^{-14}	2.0×10^{-14}			
8/15/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	2.0×10^{-15}			
9/29/80	5.98×10^{-13}	5.0×10^{-14}	2.0×10^{-14}			
10/20/80	$<2.0\times10^{-13}$	1.0×10^{-14}	5.0×10^{-15}			
11/24/80	2.3×10^{-12}	1.3×10^{-14} ($\pm0.4\times10^{-14}$)	5.0×10^{-15} ($\pm17.0\times10^{-15}$)			
12/9/80	1.15×10^{-12}	8.0×10^{-15} ($\pm4.0\times10^{-15}$)	8.0×10^{-15} ($\pm8.0\times10^{-15}$)			
1/9/81	2.58×10^{-12}	8.9×10^{-14} ($\pm1.5\times10^{-14}$)	9.1×10^{-14} (3.5×10^{-14})			
1st Quarter, 1981**	4.29×10^{-14}	2.67×10^{-15} ($\pm0.25\times10^{-15}$)	2.71×10^{-15} ($\pm0.15\times10^{-15}$)	2.17×10^{-14} ($\pm0.13\times10^{-14}$)	9.47×10^{-15} ($\pm1.29\times10^{-15}$)	18.76
2nd Quarter, 1981***	2.99×10^{-14}	3.85×10^{-15} ($\pm0.23\times10^{-15}$)	3.95×10^{-15} ($\pm0.32\times10^{-15}$)	2.41×10^{-14} ($\pm0.11\times10^{-14}$)	9.00×10^{-15} ($\pm0.94\times10^{-15}$)	30.04

* ND No data

** LLD's (µCi/ml) are: U-natural(8×10^{-17}), Ra-226(2×10^{-16}), Th-230(1×10^{-16}), Pb-210(1×10^{-15}), Po-210(5×10^{-16})

***LLD's (µCi/ml) are: U-natural(5×10^{-17}), Ra-226(1×10^{-16}), Th-230(8×10^{-17}), Pb-210(8×10^{-16}), Po-210(3×10^{-16})

Table D-2 (Cont'd.)

Perimeter Airborne Particulate Monitoring - High Volume and Continuous Low Volume (cont'd.)

Site B and B1

Sampling Date	U-Natural µCi/ml	Ra-226 µCi/ml	Th-230 µCi/ml	Pb-210 µCi/ml	Po-210 µCi/ml	TSP µg/m^3
6/28/77	6.73×10^{-14}	4.60×10^{-14}	ND			
7/20/77	$<2.85\times10^{-14}$	0	ND			
9/20/77	2.45×10^{-12}	9.42×10^{-15}	ND			
10/28/77	5.18×10^{-13}	1.24×10^{-14}	1.56×10^{-15}			
11/28/77	2.27×10^{-13}	6.71×10^{-15}	4.08×10^{-14}			
12/30/77	3.19×10^{-14}	4.94×10^{-15}	9.59×10^{-15}			
1/31/78	7.4×10^{-14}	8.24×10^{-15}	4.19×10^{-14}			
3/1/78	9.96×10^{-14}	8.24×10^{-16}	1.90×10^{-14}			
3/31/78	5.98×10^{-13}	2.87×10^{-14}	1.13×10^{-14}			
4/17/78	1.96×10^{-14}	4.84×10^{-15}	5.06×10^{-15}			
5/24/78	6.15×10^{-14}	1.19×10^{-13}	1.47×10^{-14}			
6/27/78	1.8×10^{-13}	2.0×10^{-15}	2.1×10^{-14}			
7/27/78	3.62×10^{-13}	2.17×10^{-14}	7.49×10^{-15}			
8/30/78	2.19×10^{-13}	1.4×10^{-14}	9.0×10^{-15}			
9/27/78	2.2×10^{-13}	6.2×10^{-14}	3.0×10^{-15}			
10/9/78	1.32×10^{-13}	2.3×10^{-14}	6.0×10^{-15}			
11/16/78	1.48×10^{-13}	1.9×10^{-14}	4.0×10^{-15}			
12/26/78	4.43×10^{-13}	1.4×10^{-14}	3.0×10^{-15}			
1/30/79	1.1×10^{-13}	3.0×10^{-14}	$<1.3\times10^{-13}$			
2/26/79	3.3×10^{-13}	2.0×10^{-14}	6.0×10^{-14}			
3/27/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/26/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	2.0×10^{-14}			
5/18/79	$<2.0\times10^{-13}$	4.0×10^{-14}	7.0×10^{-14}			
6/25/79	2.0×10^{-13}	ND	3.0×10^{-14}			
10/9/79	$<2.0\times10^{-13}$	4.0×10^{-14}	$<1.0\times10^{-14}$			
11/13/79	2.08×10^{-13}	$<1.0\times10^{-13}$	5.0×10^{-15}			
12/12/79	1.02×10^{-12}	2.0×10^{-14}	$<1.0\times10^{-14}$			
2/5/80	3.3×10^{-13}	1.0×10^{-14}	1.0×10^{-14}			
3/20/80	$<2.0\times10^{-13}$	2.0×10^{-14}	$<1.0\times10^{-14}$			
4/3/80	$<2.0\times10^{-13}$	1.0×10^{-14}	2.0×10^{-14}			
5/19/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	3.0×10^{-14}			
6/11/80	1.42×10^{-13}	3.0×10^{-14}	1.0×10^{-14}			
8/19/80	$<2.0\times10^{-13}$	$<1.4\times10^{-14}$	1.0×10^{-15}			
9/30/80	2.0×10^{-13}	0	1.0×10^{-14}			
10/20/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	0			
11/26/80	1.10×10^{-12}	1.2×10^{-14} ($\pm0.4\times10^{-14}$)	5.0×10^{-15} ($\pm14.0\times10^{-15}$)			
12/9/80	1.48×10^{-12}	1.2×10^{-14} ($\pm0.4\times10^{-14}$)	7.0×10^{-15} ($\pm9.0\times10^{-15}$)			
1/9/81	6.26×10^{-13}	1.2×10^{-14} ($\pm0.4\times10^{-14}$)	6.0×10^{-15} ($\pm9.0\times10^{-15}$)			
1st Quarter, 1981*	6.86×10^{-15}	4.46×10^{-15} ($\pm0.31\times10^{-15}$)	2.88×10^{-15} ($\pm0.15\times10^{-15}$)	2.28×10^{-14} ($\pm0.13\times10^{-14}$)	1.19×10^{-14} ($\pm0.14\times10^{-14}$)	28.49
2nd Quarter, 1981**	4.62×10^{-15}	5.10×10^{-15} ($\pm0.26\times10^{-15}$)	1.85×10^{-15} ($\pm0.21\times10^{-15}$)	2.00×10^{-14} ($\pm0.10\times10^{-14}$)	6.84×10^{-15} ($\pm0.79\times10^{-15}$)	49.20

* LLD's (µCi/ml) are: U-natural(8×10^{-17}), Ra-226(2×10^{-16}), Th-230(1×10^{-16}), Pb-210(1×10^{-15}), Po-210(5×10^{-16})

**LLD's (µCi/ml) are: U-natural(5×10^{-17}), Ra-226(1×10^{-16}), Th 320(7×10^{-17}), Pb-210(9×10^{-16}), Po-210(3×10^{-16})

Table D-2 (Cont'd.)

Perimeter Airborne Particulate Monitoring - High Volume and Continuous Low Volume (cont'd.)

Site C

Sampling Date	U-Natural μCi/ml	Ra-226 μCi/ml	Th-230 μCi/ml	Pb-210 μCi/ml	Po-210 μCi/ml	TSP μg/m3
6/28/77	3.28×10^{-13}	3.23×10^{-15}	ND			
7/20/77	$<2.85\times10^{-14}$	1.87×10^{-14}	ND			
9/13/77	1.38×10^{-12}	5.02×10^{-15}	ND			
10/12/77	1.12×10^{-13}	9.23×10^{-15}	1.87×10^{-14}			
11/18/77	1.34×10^{-13}	2.00×10^{-14}	4.99×10^{-15}			
12/28/77	3.11×10^{-13}	1.88×10^{-15}	5.18×10^{-15}			
1/25/78	3.19×10^{-13}	2.71×10^{-15}	1.18×10^{-14}			
2/22/78	7.97×10^{-14}	5.29×10^{-15}	1.17×10^{-14}			
3/31/78	4.65×10^{-13}	2.33×10^{-14}	9.3×10^{-15}			
4/18/78	4.29×10^{-14}	4.07×10^{-15}	7.08×10^{-15}			
5/23/78	4.31×10^{-14}	2.54×10^{-14}	1.4×10^{-15}			
6/28/78	6.6×10^{-13}	1.1×10^{-14}	1.4×10^{-14}			
7/28/78	2.99×10^{-13}	1.10×10^{-14}	1.86×10^{-14}			
8/28/78	2.06×10^{-13}	1.2×10^{-14}	1.0×10^{-14}			
9/26/78	7.4×10^{-14}	4.7×10^{-14}	9.0×10^{-15}			
10/11/78	1.04×10^{-13}	1.9×10^{-14}	8.0×10^{-15}			
11/20/78	1.48×10^{-13}	1.0×10^{-14}	3.0×10^{-15}			
12/22/78	4.06×10^{-13}	2.0×10^{-15}	2.3×10^{-14}			
1/23/79	1.7×10^{-13}	4.0×10^{-14}	8.0×10^{-14}			
2/27/79	6.6×10^{-13}	$<1.0\times10^{-14}$	5.0×10^{-14}			
3/26/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/25/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	2.0×10^{-14}			
5/15/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
6/22/79	$<2.0\times10^{-13}$	ND	7.0×10^{-14}			
10/10/79	$<2.0\times10^{-13}$	4.0×10^{-14}	$<1.0\times10^{-14}$			
10/10/79	3.0×10^{-13}	0.7×10^{-13}	$<1.0\times10^{-14}$			
11/14/79	4.62×10^{-13}	$<1.0\times10^{-13}$	9.0×10^{-15}			
12/19/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<2.0\times10^{-14}$			
2/6/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
3/6/80	2.4×10^{-13}	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/7/80	$<2.0\times10^{-13}$	4.0×10^{-14}	2.0×10^{-14}			
5/20/80	3.2×10^{-13}	2.0×10^{-14}	7.0×10^{-14}			
6/11/80	$<2.0\times10^{-13}$	4.0×10^{-14}	3.0×10^{-14}			
8/21/80	$<2.0\times10^{-13}$	5.5×10^{-14}	1.5×10^{-14}			
9/30/80	2.43×10^{-13}	0	$<1.0\times10^{-14}$			
10/20/80	$<2.0\times10^{-13}$	0	0			
11/24/80	1.64×10^{-12}	1.6×10^{-14} ($\pm0.5\times10^{-14}$)	1.1×10^{-14} ($\pm2.0\times10^{-14}$)			
12/9/80	1.73×10^{-12}	1.1×10^{-14} ($\pm0.4\times10^{-14}$)	1.3×10^{-14} ($\pm1.0\times10^{-14}$)			
1/30/81	1.49×10^{-11}	2.08×10^{-13} ($\pm0.19\times10^{-13}$)	3.23×10^{-13} ($\pm0.55\times10^{-13}$)			
1st Quarter, 1981*	4.28×10^{-15}	1.40×10^{-15} ($\pm0.25\times10^{-15}$)	1.14×10^{-15} (0.24×10^{-15})	1.86×10^{-14} ($\pm0.12\times10^{-14}$)	8.84×10^{-15} ($\pm1.27\times10^{-15}$)	19.97
2nd Quarter, 1981**	3.41×10^{-15}	5.38×10^{-15} ($\pm0.23\times10^{-15}$)	2.89×10^{-15} (0.16×10^{-15})	2.22×10^{-14} ($\pm0.10\times10^{-14}$)	1.05×10^{-14} ($\pm0.11\times10^{-14}$)	61.56

* LLD's (μCi/ml) are: U-natural(8×10^{-17}), Ra-226(3×10^{-16}), Th-230(1×10^{-16}), Pb-210(1×10^{-15}), Po-210(5×10^{-16})

**LLD's (μCi/ml) are: U-natural(5×10^{-17}), Ra-226(7×10^{-17}), Th-230(6×10^{-17}), Pb-210(8×10^{-16}), Po-210(3×10^{-16})

Table D-2 (Cont'd.)

Perimeter Airborne Particulate Monitoring - High Volume and Continuous Low Volume (cont'd.)

Site D

Sampling Date	U-Natural $\mu Ci/ml$	Ra-226 $\mu Ci/ml$	Th-230 $\mu Ci/ml$	Pb-210 $\mu Ci/ml$	Po-210 $\mu Ci/ml$	TSP $\mu g/m^3$
6/28/77	1.35×10^{-13}	8.65×10^{-15}	ND			
7/20/77	3.70×10^{-13}	2.02×10^{-15}	ND			
9/14/77	9.74×10^{-13}	3.14×10^{-15}	ND			
10/14/77	3.51×10^{-13}	6.12×10^{-15}	1.25×10^{-14}			
11/21/77	7.33×10^{-14}	6.59×10^{-16}	1.51×10^{-14}			
12/29/77	1.24×10^{-13}	1.88×10^{-15}	9.59×10^{-15}			
1/26/78	5.98×10^{-13}	1.10×10^{-14}	2.43×10^{-14}			
2/22/78	1.59×10^{-14}	2.0×10^{-15}	1.32×10^{-14}			
3/30/78	4.65×10^{-13}	4.48×10^{-14}	1.4910^{-13}			
4/18/78	1.17×10^{-14}	5.9×10^{-15}	2.54×10^{-15}			
5/24/78	2.89×10^{-14}	8.4×10^{-15}	2.5×10^{-15}			
6/28/78	4.0×10^{-14}	2.0×10^{-15}	4.0×10^{-15}			
7/28/78	3.65×10^{-13}	3.08×10^{-13}	1.62×10^{-14}			
8/31/78	6.53×10^{-13}	1.3×10^{-14}	1.2×10^{-14}			
9/28/78	3.7×10^{-14}	4.1×10^{-14}	3.0×10^{-15}			
10/11/78	9.9×10^{-14}	2.8×10^{-14}	1.3×10^{-14}			
11/20/78	1.11×10^{-13}	2.8×10^{-14}	3.0×10^{-15}			
12/22/78	3.32×10^{-13}	9.0×10^{-15}	$3.0.10^{-15}$			
1/23/79	6.0×10^{-14}	4.0×10^{-14}	7.0×10^{-14}			
2/27/79	3.3×10^{-13}	$<1.0\times10^{-14}$	1.0×10^{-14}			
3/26/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/26/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	2.0×10^{-14}			
5/15/79	2.0×10^{-13}	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
6/22/79	$<2.0\times10^{-13}$	ND	4.0×10^{-14}			
10/10/79	$<2.0\times10^{-13}$	5.0×10^{-14}	2.0×10^{-14}			
10/10/79	$<2.0\times10^{-13}$	1.0×10^{-13}	2.0×10^{-14}			
11/14/79	2.06×10^{-13}	$<1.0\times10^{-13}$	1.0×10^{-15}			
12/19/79	2.2×10^{-13}	$<4.0\times10^{-14}$	$<3.0\times10^{-14}$			
2/8/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
2/8/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
3/13/80	2.3×10^{-13}	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/7/80	$<2.0\times10^{-13}$	6.0×10^{-14}	5.0×10^{-14}			
5/20/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	7.0×10^{-14}			
6/12/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
8/26/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	1.0×10^{-15}			
9/29/80	$<2.0\times10^{-13}$	0	$<1.0\times10^{-15}$			
10/23/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	0			
11/25/80	9.01×10^{-13}	1.5×10^{-14} ($\pm0.4\times10^{-14}$)	8.0×10^{-15} ($\pm14.0\times10^{-15}$)			
12/15/81	1.60×10^{-12}	8.0×10^{-15} ($\pm4.0\times10^{-15}$)	1.1×10^{-14} ($\pm1.0\times10^{-14}$)			
1/30/81	1.44×10^{-12}	2.3×10^{-14} ($\pm0.5\times10^{-14}$)	1.8×10^{-14} ($\pm1.2\times10^{-14}$)			
1st Quarter, 1981*	4.78×10^{-15}	1.20×10^{-15} ($\pm0.19\times10^{-15}$)	1.09×10^{-15} ($\pm0.27\times10^{-15}$)	2.10×10^{-14} ($\pm0.14\times10^{-14}$)	1.12×10^{-14} ($\pm0.15\times10^{-14}$)	15.14
2nd Quarter, 1981**	2.58x10-15	1.76×10^{-15} ($\pm0.13\times10^{-15}$)	0.93×10^{-15} ($\pm0.10\times10^{-15}$)	2.01×10^{-14} ($\pm0.09\times10^{-14}$)	6.81×10^{-15} ($\pm0.75\times10^{-15}$)	26.60

* LLD's ($\mu Ci/ml$) are: U-natural(9×10^{-17}), Ra-226(2×10^{-16}), Th-230(1×10^{-16}), Pb-210(2×10^{-15}), Po-210(6×10^{-16})

**LLD's ($\mu Ci/ml$) are: U-natural(4×10^{-17}), Ra-226(4×10^{-17}), Th-230(6×10^{-17}), Pb-210(8×10^{-16}), Po-210(2×10^{-16})

Table D-2 (Cont'd.)

Perimeter Airborne Particulate Monitoring - High Volume and Continuous Low Volume (cont'd.)

Site E

Sampling Date	U-Natural µCi/ml	Ra-226 µCi/ml	Th-230 µCi/ml	Pb-210 µCi/ml	Po-210 µCi/ml	TSP µg/m^3
6/28/77	3.28×10^{-13}	0	ND			
7/20/77	2.39×10^{-13}	1.01×10^{-15}	ND			
9/14/77	9.96×10^{-13}	7.06×10^{-15}	ND			
10/11/77	4.78×10^{-13}	1.51×10^{-15}	3.12×10^{-14}			
11/23/77	8.61×10^{-14}	1.37×10^{-15}	7.53×10^{-15}			
12/30/77	2.66×10^{-14}	2.26×10^{-15}	7.99×10^{-15}			
1/27/78	3.98×10^{-13}	4.47×10^{-15}	5.00×10^{-14}			
2/24/78	1.59×10^{-14}	8.97×10^{-14}	6.65×10^{-15}			
3/29/78	4.43×10^{-13}	4.01×10^{-14}	1.70×10^{-14}			
4/19/78	3.13×10^{-14}	4.17×10^{-15}	1.16×10^{-14}			
5/25/78	2.91×10^{-14}	4.9×10^{-15}	1.1×10^{-15}			
6/29/78	1.2×10^{-13}	1.1×10^{-14}	4.0×10^{-15}			
7/31/78	1.21×10^{-13}	1.18×10^{-14}	1.43×10^{-14}			
8/31/78	1.18×10^{-12}	1.3×10^{-14}	4.0×10^{-15}			
9/25/78	7.6×10^{-14}	2.3×10^{-14}	3.0×10^{-15}			
10/12/78	1.7×10^{-14}	1.6×10^{-14}	6.0×10^{-15}			
11/21/78	1.11×10^{-13}	1.4×10^{-14}	3.0×10^{-14}			
12/22/78	5.75×10^{-13}	1.91×10^{-12}	1.0×10^{-13}			
1/23/79	1.5×10^{-13}	3.0×10^{-14}	1.1×10^{-13}			
2/28/79	6.6×10^{-13}	$<1.0\times10^{-14}$	1.0×10^{-14}			
3/26/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	2.0×10^{-16}			
4/25/79	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<2.0\times10^{-14}$			
5/15/79	$<2.0\times10^{-13}$	3.0×10^{-14}	8.0×10^{-14}			
6/25/79	2.8×10^{-13}	ND	7.0×10^{-14}			
10/10/79	$<2.0\times10^{-13}$	$<2.0\times10^{-14}$	$<1.0\times10^{-14}$			
11/14/79	2.0×10^{-13}	$<1.0\times10^{-13}$	4.0×10^{-15}			
12/4/79	4.0×10^{-13}	1.0×10^{-14}	2.0×10^{-14}			
2/26/80	1.9×10^{-13}	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
3/7/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
3/12/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	$<1.0\times10^{-14}$			
4/8/80	$<2.0\times10^{-13}$	1.0×10^{-14}	2.0×10^{-14}			
5/27/80	2.3×10^{-13}	$<1.0\times10^{-14}$	3.0×10^{-14}			
6/16/80	$<2.2\times10^{-13}$	$<1.0\times10^{-14}$	1.0×10^{-14}			
8/29/80	$<2.0\times10^{-13}$	$<1.0\times10^{-14}$	2.0×10^{-15}			
9/30/80	$<2.0\times10^{-13}$	1.0×10^{-15}	$<1.0\times10^{-14}$			
10/24/80	2.80×10^{-13}	2.1×10^{-14}	0			
11/28/80	1.70×10^{-12}	2.0×10^{-14} ($\pm0.6\times10^{-14}$)	1.2×10^{-14} ($\pm2.3\times10^{-14}$)			
12/9/80	3.06×10^{-12}	7.0×10^{-15} ($\pm8.0\times10^{-15}$)	1.3×10^{-14} ($\pm1.6\times10^{-14}$)			
1/30/81	8.16×10^{-13}	1.5×10^{-14} ($\pm0.4\times10^{-14}$)	2.4×10^{-14} ($\pm1.3\times10^{-14}$)			
1st Quarter, 1981*	7.95×10^{-15}	1.53×10^{-15} ($\pm0.29\times10^{-15}$)	1.32×10^{-15} ($\pm0.31\times10^{-15}$)	1.87×10^{-14} ($\pm0.15\times10^{-14}$)	6.81×10^{-15} ($\pm1.22\times10^{-15}$)	18.09
2nd Quarter, 1981**	8.77×10^{-15}	0.92×10^{-15} ($\pm0.10\times10^{-15}$)	1.82×10^{-15} ($\pm0.18\times10^{-15}$)	1.42×10^{-14} ($\pm0.08\times10^{-14}$)	6.32×10^{-15} ($\pm0.74\times10^{-15}$)	29.73

* LLD's (µCi/ml) are: U-natural(1×10^{-16}), Ra-226(3×10^{-16}), Th-230(1×10^{-16}), Pb-210(2×10^{-15}), Po-210(6×10^{-16})

**LLD's (µCi/ml) are: U-natural(4×10^{-17}), Ra-226(7×10^{-17}), Th-230(5×10^{-17}), Pb-210(8×10^{-16}), Po-210(2×10^{-16})

Table D-2 (Cont'd.)

Perimeter Airborne Particulate Monitoring - High Volume and Continuous Low Volume (cont'd.)

Site F

Sampling Date	U-Natural µCi/ml	Ra-226 µCi/ml	Th-230 µCi/ml	Pb-210 µCi/ml	Po-210 µCi/ml	TSP µg/m^3
8/20/80	$2.4x10^{-13}$	$3.22x10^{-13}$	$2.8x10^{-14}$			
8/29/80	$<2.0x10^{-13}$	$1.0x10^{-14}$	$1.0x10^{-14}$			
10/20/80	$<2.0x10^{-13}$	$1.0x10^{-14}$	0			
11/24/80	$1.58x10^{-12}$	$1.1x10^{-14}$ ($\pm 0.3x10^{-14}$)	$6.0x10^{-15}$ ($\pm 14.0x10^{-15}$)			
12/9/80	$2.19x10^{-12}$	$5.0x10^{-15}$ ($\pm 8.0x10^{-15}$)	$7.0x10^{-15}$ ($\pm 14.0x10^{-15}$)			
1/13/81	$1.13x10^{-12}$	$1.14x10^{-13}$ ($\pm 0.11x10^{-13}$)	$9.7x10^{-14}$ ($\pm 2.4x10^{-14}$)			
1st Quarter, 1981*	$6.46x10^{-15}$	$5.31x10^{-14}$ ($\pm 0.11x10^{-14}$)	$1.41x10^{-14}$ ($\pm 0.09x10^{-14}$)	$8.40x10^{-14}$ ($\pm 0.36x10^{-14}$)	$5.03x10^{-14}$ ($\pm 0.31x10^{-14}$)	231.06
2nd Quarter, 1981**	$9.15x10^{-15}$	$9.94x10^{-15}$ ($\pm 0.33x10^{-15}$)	$1.19x10^{-14}$ ($\pm 0.05x10^{-14}$)	$3.29x10^{-14}$ ($\pm 0.15x10^{-14}$)	$3.04x10^{-14}$ ($\pm 0.17x10^{-14}$)	170.43

Site OCR/IX

Sampling Date	U-Natural µCi/ml	Ra-226 µCi/ml	Th-230 µCi/ml	Pb-210 µCi/ml	Po-210 µCi/ml	TSP µg/m^3
8/28/80	$<2.0x10^{-13}$	$1.0x10^{-14}$	$1.0x10^{-14}$			
9/30/80	$<2.0x10^{-13}$	$1.0x10^{-14}$	$5.0x10^{-15}$			
10/29/80	$<2.0x10^{-13}$	$1.0x10^{-14}$	0			
11/25/80	$1.58x10^{-12}$	$1.3x10^{-14}$ ($\pm 0.4x10^{-14}$)	$1.0x10^{-14}$ ($\pm 0.8x10^{-14}$)			
12/11/80	$1.33x10^{-12}$	0 ($\pm 0.4x10^{-14}$)	$3.0x10^{-15}$ ($\pm 8.0x10^{-15}$)			
1/12/81	$2.49x10^{-13}$	$1.3x10^{-14}$ ($\pm 0.4x10^{-14}$)	$1.2x10^{-14}$ ($\pm 1.1x10^{-14}$)			
2nd Quarter, 1981***	$0.94x10^{-15}$	$0.29x10^{-15}$ ($\pm 0.05x10^{-15}$)	$0.62x10^{-15}$ ($\pm 0.11x10^{-15}$)	$1.43x10^{-13}$ ($\pm 0.09x10^{-13}$)	$4.53x10^{-15}$ ($\pm 0.68x10^{-15}$)	33.73

* LLD's (µCi/ml) are: U-natural($1x10^{-16}$), Ra-226($2x10^{-16}$), Th-230($1x10^{-16}$), Pb-210($2x10^{-15}$), Po-210($6x10^{-16}$)

** LLD's (µCi/ml) are: U-natural($4x10^{-17}$), Ra-226($1x10^{-16}$), Th-230($6x10^{-17}$), Pb-210($9x10^{-16}$), Po-210($3x10^{-16}$)

***LLD's (µCi/ml) are: U-natural($5x10^{-17}$), Ra-226($7x10^{-17}$), Th-230($6x10^{-17}$), Pb-210($8x10^{-15}$), Po-210($3x10^{-16}$)

Table D-2 (Cont'd.)

Perimeter Airborne Particulate Monitoring - High Volume and Continuous Low Volume (cont'd.)

Site Springstead

Sampling Date	U-Natural μCi/ml	Ra-226 μCi/ml	Th-230 μCi/ml	Pb-210 μCi/ml	Po-210 μCi/ml	TSP μg/m^3
8/28/80	$<2.0\times10^{-13}$	0	$<1.0\times10^{-14}$			
9/30/80	2.3×10^{-13}	0	2.0×10^{-15}			
10/30/80	$<2.0\times10^{-13}$	1.0×10^{-14}	1.0×10^{-15}			
11/25/80	1.21×10^{-12}	9.0×10^{-15} ($\pm5.0\times10^{-15}$)	9.0×10^{-15} ($\pm9.0\times10^{-15}$)			
12/11/80	5.69×10^{-12}	3.0×10^{-15} ($\pm5.0\times10^{-15}$)	6.0×10^{-15} ($\pm9.0\times10^{-15}$)			
1/12/81	1.43×10^{-12}	1.2×10^{-14} ($\pm0.4\times10^{-14}$)	3.9×10^{-14} ($\pm1.6\times10^{-15}$)			
1st Quarter, 1981*	2.14×10^{-15}	2.50×10^{-15} ($\pm0.27\times10^{-15}$)	1.46×10^{-15} ($\pm0.17\times10^{-15}$)	1.68×10^{-14} ($\pm0.14\times10^{-14}$)	6.63×10^{-15} ($\pm1.19\times10^{-15}$)	25.89
2nd Quarter, 1981**	0.82×10^{-15}	0.15×10^{-15} ($\pm0.06\times10^{-15}$)	0.36×10^{-15} ($\pm0.06\times10^{-15}$)	0.91×10^{-14} ($\pm0.07\times10^{-14}$)	2.21×10^{-15} ($\pm0.45\times10^{-15}$)	37.86

* LLD's (μCi/ml) are: U-natural(1×10^{-16}), Ra-226(2×10^{-16}), Th-230(1×10^{-16}), Pb-210(2×10^{-15}), Po-210(7×10^{-16})

**LLD's (μCi/ml) are: U-natural(4×10^{-17}), Ra-226(9×10^{-17}), Th-230(5×10^{-17}), Pb-210(8×10^{-16}), Po-210(3×10^{-16})

[1]Sampling began 6/77 at sites A, B, C, D, and E; sites B1, F, OCR/IX, and Springstead (since 8/80).
Sampling frequency: monthly, except during mill shut down (7/79-10/79); quarterly (1981-present).
Sampling location: eight locations currently monitored, eight of which coincide with the ambient radon and gamma-TLD monitoring programs:

Site A: north of mill site at NECR trailer park

Site B: 1.5 mi. n.e. of mill in Pipeline Canyon

Site B1: northeast corner of Kerr-McGee Administration Building

Site C: about 150' east of the midpoint of the east boundary of the tailings impoundment

Site D: southeast margin of tailings impoundment on access road

Site E: near south end of tailings impoundment, about 300' north of Pipeline Arroyo

Site F: north of tailings impoundment at access road, 1800' east of intersection with NM566

Site OCR/IX: southwest corner of treatment plant

Springstead: at sewage treatment plant

Sampling method: 1977-1980, Staplex high volume air sampler, 3-4 hours at 840 lpm pump rate; since 1/9/81, continuous samples are pumped at 60 lpm using Eberline RAS-2 pump, collected on 0.2- m filters; filters are changed weekly, composited quarterly.

Table D-3

Perimeter Ambient Radon Monitoring[1]
Ambient Radon Activity (pCi/l)

Lucas Chamber

Sample Date	Sample Site 1	Sample Site 2	Sample Site 3
4/25/77-4/27/77	0.80±0.53* (7)	3.14±2.41 (4)	1.16±0.61 (4)
7/28/77	0.24±0.01 (2)	0.12±0.16 (2)	0.35±0.17 (2)
12/2/77	0.12±0.16 (2)	0.23±0.00 (2)	0.12±0.16 (2)
3/19/78	ND**	2.49 (1)	ND
5/24/78	8.76±24.75 (8)	0.17±0.24 (6)	0.19±0.23 (6)
8/18/78	0.06±0.08 (2)	0.03±0.04 (2)	0.10±0.13 (2)
12/26/78	0.99±0.68 (4)	0.33±0.29 (3)	0.38±0.65 (3)
2/23/79	1.09±1.27 (2)	0.2 (1)	ND
6/6/79	0.59 (1)	0 (1)	0.72 (1)
10/23/79	4.20±1.04 (2)	1.52±0.37 (2)	3.39±1.68 (2)

* format of entries: Mean of multiple readings $\geq$0 pCi/l ± 1 standard deviation.
(number of readings $\geq$0 pCi/l)

** ND No Data.

Table D-3 (Cont'd)

Perimeter Ambient Radon Monitoring (cont'd)
Ambient Radon Activity (pCi/l)

Tracketch
(percent error in parentheses)

Sample Site

Sample Period	A	B1	C	D	E	F	OCR/IX	Springstead
10/3/80-	5.84	2.37	1.61	ND	2.37	5.69	2.37	2.67
11/3/80	(16.6)	(27.1)	(33.8)	ND	(27.1)	(16.8)	(27.1)	(25.3)
11/3/80-	2.45	2.79	3.96	1.29	1.45	1.45	1.62	1.29
12/1/80	(28.1)	(26.1)	(21.5)	(41.2)	(38.2)	(38.2)	(35.8)	(41.2)
12/1/80-	2.67	1.19	2.30	1.19	2.55	2.18	1.32	1.44
1/8/81	(22.6)	(35.8)	(24.5)	(35.8)	(23.2)	(25.3)	(33.8)	(32.0)
1/8/81-	2.89	3.26	2.55	2.55	2.84	1.80	ND*	1.19
2/10/81	(13.5)	(12.7)	(14.5)	(14.5)	(13.7)	(17.7)	ND	(22.7)
2/10/81-	5.11	1.69	3.82	2.43	4.15	4.57	3.82	5.11
3/11/81	(10.6)	(16.0	(12.5)	(13.2)	(10.0)	(11.3)	(12.5)	(10.6)
3/11/81-	1.27	1.59	1.35	1.32	1.51	2.33	1.25	1.38
4/23/81	(14.7)	(13.1)	(14.3)	(14.4)	(13.5)	(10.8)	(14.9)	(14.1)
4/23/81-	13.54	6.74	7.80	9.85	10.91	11.34	10.77	12.19
5/15/81	(7.4)	(10.6)	(9.8)	(8.7)	(8.2)	(8.1)	(8.3)	(7.8)
5/15/81-	2.53	2.03	2.45	4.80	2.67	3.31	5.44	3.16
6/16/81	(12.0)	(13.5)	(12.2)	(8.7)	(11.7)	(10.5)	(8.1)	(10.7)
6/16/81-	1.96	1.22	1.22	2.32	3.45	2.04	2.24	2.43
7/16/81	(14.4)	(18.5)	(18.5)	(13.2)	(10.8)	(14.1)	(13.5)	(12.7)

* chip damage.

[1] Sampling began 4/77.
Sampling frequency: monthly (1/81-present); quarterly (4/77-10/79).
Sampling locations: three sites (1977-1979).

1: on fence line off highway on south boundary, west side across from shaft construction, just north of site E.
2: across highway from scale house on tailings fence line.
3: middle of new road on north side of tailings, near site F.

Since 11/80 eight sites are sampled, and 2 additional sites were added in 3/81. All sites coincide with perimeter continuous low volume air monitoring sites:

Site A: north of mill site at NECR Trailer Park.
Site B1: northeast corner of Kerr-McGee Administration Building.
Site C: about 150' east of the midpoint of the east boundary of the tailings impoundment.
Site D: southeast margin of tailings impoundment, on access road.
Site E: near south end of tailings impoundment, about 300' north of Pipeline Arroyo.
Site F: north of tailings impoundment at access road, 1800' east of intersection with NM566.
Site OCR/IX: southwest corner of treatment plant.
Springstead: at sewage treatment plant.

Sampling method: Lucas Chamber (1977-1979); Since 11/80, Tracketch alpha particle detectors, as directed by T. E. Baca (NMEID) to T. F. Bailey (UNC), 7/3/80.

Table D-4

Perimeter Continuous Gamma Monitoring - TLD[1]
Gamma dosage (mrem/counting interval)

Sites / Sampling Interval*	1	2	3	4	5
10/17/74 - 4/17/75	93	100	88	96	ND
6/4/75 - 12/12/75	87	ND	97	91	90
12/12/75 - 6/11/76	90	72	86	84	77
6/11/76 - 12/21/76	146	145	131	119	111
12/76 - 8/77	102	108	107	95	93

Sites / Sampling Interval*	A	B1	C	D	E	F	Spring-stead	OCR/IX
10/2/80 - 1/28/81	54.0(7.3)**	48.0(3.7)	45.6(5.6)	52.6(5.4)	59.0(18.5)	80.2(3.0)	42.0(16.0)	59.8(6.1)
12/16/80 - 5/6/81	56.2(11.3)	51.4(19.6)	46.9(7.8)	63.8(18.8)	53.8(10.6)	83.8(13.1)	46.2(9.5)	53.8(9.7)

ND = no data
* date annealed to date read
** average of 5 readings (2 standard deviations)

[1] Sampling began 10/74. No data between 8/77 and 10/80.
Sampling frequency: continuous sampling; TLD's read semiannually (10/74 to 8/77); quarterly after 10/80.
Sampling locations: Five original sites (10/74 to at least 10/78).

1. Bend in Rt. 566 opposite arrow on tree, inside barbed wire fence in line with three pole power line
2. Far east side of south property line fence at sign on fence
3. On south property line fence, east of Rt. 566 at arroyo
4. On tree on slight ridge southeast of stack of metal pipe at mill site, (west of Rt. 566); or Popovich Rd. west of mill site
5. At General Store, Springstead Trailer Park, or at Springstead water tower cable

Eight new sites (since 10/80) correspond with continuous low volume air and ambient radon monitoring stations.

Site A: north of mill site at NECR Trailer Park.
Site B1: northeast corner of Kerr-McGee Administration Building
Site C: about 150' east of the midpoint of the east boundary of the tailings impoundment
Site D: southeast margin of tailings impoundment on access road
Site E: near south end of tailings impoundment, about 300' north of Pipeline Arroyo
Site F: north of tailings impoundment at access road, 1800' east of intersection with NM566
Springstead: at sewage treatment plant
Site OCR/IX: southwest corner of treatment plant

Sampling method: Eberline LiF TLD is mounted in plastic several feet above the ground.

Table D-5

Drinking Water Monitoring[1]

Date	Sample Site Location	Gross alpha (pCi/l)	Gross beta (pCi/l)	Total Uranium (mgU/l)	Radium 226 (pCi/l)	Strontium 90 (pCi/l)	Total Lead (mg/l)
1/77	CR Mill	47.6±10.4	11.8±3.4	0.207	4.3±0.4	0.0±1.0	
10/77	CR Mill	41±6*	6±2	0.050			
12/77	CR Mill	4.85		0.070	1.33		
12/77	CR Mine***	0		0.085	1.75		
6/79	CR Mine	<2**		3.44	<0.6		0.0036
5/80	CR Mill Area	<2		0.06	1.8		0.0044

* 38 pCi/l alpha activity due to Uranium
** excluding uranium
*** CR mine and mill receive drinking water from the same source

[1] Sampling began 1/77
Sampling frequency: annually, after start up
Sampling location: mill area water taps (same source as mine drinking water).
Sampling methods: see Appendix D

Table D-6

Vegetation Monitoring[1]

I. Vegetation Sampling 1975 through 1978

Sample Site	Sample Date	Alpha pCi/g	Beta pCi/g	Total Uranium μg/g	Radium-226 pCi/g	Thorium-230 pCi/g
#1	12/12/75	0.9±0.5	4.58±0.16	0.8	0.0±0.1	0.0±0.1
	6/11/76	0.6±0.5	7.84± 0.21	0.4	0.2±0.1	0.0±0.1
	12/21/76	0.3±0.1	0.5±0.1	1.2	0.2±0.1	0.45±0.10
	8/5/77*	2.0±0.9	17.7±0.8	1.62	0.39±0.06	0.07±0.06
	9/28/78	8.3±0.9	5.2±0.1	0.35	4.7±0.3	0.75±0.04
#2	12/12/75	1.4±0.6	4.95±0.17	0.7	0.2±0.1	0.0±0.1
	6/11/76	0.0±0.1	10.2±0.2	0.4	0.2±0.1	0.0±0.1
	12/12/76	1.5±0.3	0.9±0.1	0.5	0.2±0.1	0.37±0.08
	8/5/77*	2.3±1.0	12.3±0.7	1.14	0.22±0.03	0.10±0.05
	9/28/78	9.4±0.9	6.9±0.1	3.88	2.7±0.1	0.95±0.05
#3	12/12/75	1.2±0.6	4.83±0.17	0.7	0.0±0.1	0.0±0.1
	6/11/76	0.0±0.1	11.3±0.2	0.5	0.2±0.1	0.0±0.1
	12/21/76	0.6±0.1	0.8±0.1	1.9	0.74±0.13	0.29±0.07
	8/5/77*	9.4±1.5	18.0±0.8	7.86	0.43±0.06	0.88±0.14
	9/28/78	1.7±0.5	7.4±0.1	0.57	0.84±0.04	0.07±0.02
#4	12/12/75	0.8±0.5	5.50±0.18	0.3	0.0±0.1	0.0±0.1
	6/11/76	1.1±0.6	8.01±0.21	0.6	0.4±0.1	0.0±0.1
	12/21/76	0.4±0.1	0.6±0.1	1.1	0.71±0.17	0.19±0.10
	8/5/77*	9.5±2.6	32.5±1.0	5.09	8.00±0.35	1.49±0.10
	9/28/78	3.7±0.6	6.2±0.1	2.1	0.34±0.02	0.12±0.02
#5	6/11/76	2.7±0.8	8.10±0.21	3.8	0.7±0.1	0.3±0.1

II. Vegetation Sampling 1979

Sample Site	Sample Date	Total Uranium μg/g	Radium-226 pCi/g	Thorium-230 pCi/g	Lead-210 pCi/g
Veg 1	11/16/79	2.1	1.6±0.1	9.3±0.2	3.7±0.1
Veg 2	11/28/79	0.63	0.67±0.05	0.50±0.04	0.46±0.05
Veg 3	11/21/79	0.32	0.46±0.04	1.9±0.1	0.34±0.08
Veg 4	11/21/79	0.20	0.11±0.03	0.38±0.03	0.25±0.07
Veg 5	11/21/79	2.1	3.8±0.2	13.0±1	1.9±0.1
Veg 6	11/26/79	1.3	1.3±0.1	10.0±1	0.93±0.10
Veg 7	11/26/79	0.38	0.69±0.06	1.2±0.1	0.57±0.09
Veg 8	11/26/79	0.24	0.13±0.04	0.06±0.03	0.37±0.07
Veg 9	11/27/79	0.88	0.46±0.04	1.5±0.9	0.62±0.07
Veg 10	11/27/79	0.20	0.12±0.03	0.22±0.04	1.10±0.08

* Date samples received for analysis

Table D-6 (Cont'd.)

Vegetation Monitoring (cont'd.)

III. Vegetation Sampling 1980

Sample Site	Sample Date	Nat U pCi/g	Ra-226 pCi/g	Th-230 pCi/g	Pb-210 pCi/g	Po-210 pCi/g
A-1	10/31/80	2.5	1.2±0.2	1.5±0.4	1.1±0.5	0.8±0.5
A-2	10/31/80	1.2	8.1±0.5	4.5±1.5	2.8±4.0	3.2±0.9
B-1	10/31/80	0.7	0.3±0.1	1.1±1.9	0.8±0.4	0.1±0.4
B-2	10/31/80	0.6	0.1±0.1	2.3±1.2	1.1±4.1	0.1±0.4
C-1	10/31/80	1.6	2.2±0.2	2.4±1.2	1.7±0.6	0.3±0.4

[1]Sampling began 12/75.
Sampling frequency: annually, except semiannually during start up (1975-1976).
Sampling locations: five original sites (1975-1978) are
1. Approximately 100 yards NE of vent shaft #3.
2. Approximately 50 yards west from mesa side along dam protection dike.
3. North of arroyo on west boundary fence.
4. 100 yards NE of ventilation shaft west of mill.
5. Curve in road leading to NECR on 566.

Sampling locations 1979: All samples were taken inside the banks of the arroyo beginning at the point of the spill to the Rio Puerco at the state line at five (5) mile intervals. NMEID agreed to accept these samples as annual vegetation monitoring.

The current (1980-present) sampling sites are:

A-1: Approximately 100' east of continuous low volume air monitoring location C.
A-2: Approximately 1/4 mile east of continuous low volume air monitoring location C.
B-1: Approximately 100' north of continuous low volume air monitoring location F.
B-2: Approximately 1/4 mile north of continuous low volume air monitoring location F.
C-1: Approximately 1 mile north of continuous low volume air monitoring location F at windmill 15T-503.

Sampling methods: see Appendix G. All samples are air dried until no weight change occurs before analysis; samples are taken from 20' x 20' areas near continuous low volume particulate and ambient radon monitoring stations.

Table D-7

Soil Monitoring[1]

Sampling Site #1 Northeast of Ventshaft #3

Depth Interval (inches)	Gross Alpha pCi/g (dry) 0-2	Gross Alpha pCi/g (dry) 2-4	Gross Beta pCi/g (dry) 0-2	Gross Beta pCi/g (dry) 2-4	Total Uranium µg/g (dry) 0-2	Total Uranium µg/g (dry) 2-4	Radium-226 pCi/g (dry) 0-2	Radium-226 pCi/g (dry) 2-4	Thorium-230 pCi/g (dry) 0-2	Thorium-230 pCi/g (dry) 2-4
Sample Date										
12/75	4.1±1.1*	2.7±0.9	2.81±0.59	1.47±0.53	2.9	2.4	0.39±0.08	0.28±0.06	0.18±0.06	0.00±0.01
6/11/76	3.2±0.9	2.7±0.8	1.44±0.52	1.93±0.54	0.9	0.8	0.51±0.09	0.19±0.03	0.03±0.02	0.00±0.01
1/77**	4.1±0.7		2.14±0.39		0.7		1.03±0.19		0.13±0.06	
8/77	3.7±0.6	4.4±0.7	2.8±0.4	3.3±0.4	0.61	0.45	0.49±0.09	0.30±0.06	0.07±0.03	0.27±0.09
10/78***	1.6±0.5		0.5±0.4		0.82		1.9±0.5		1.2±0.1	

* Counting error
** Samples combined because previous data showed two layers to be very similar.
*** Depth interval not available

Table D-7 (Cont'd.)

Soil Monitoring (cont'd.)

Sampling Site #2 West of Ram Mesa

Depth Interval (inches) / Sample Date	Gross Alpha pCi/g (dry) 0-2	Gross Alpha pCi/g (dry) 2-4	Gross Beta pCi/g (dry) 0-2	Gross Beta pCi/g (dry) 2-4	Total Uranium µg/g (dry) 0-2	Total Uranium µg/g (dry) 2-4	Radium-226 pCi/g (dry) 0-2	Radium-226 pCi/g (dry) 2-4	Thorium-230 pCi/g (dry) 0-2	Thorium-230 pCi/g (dry) 2-4
12/75	11.3±2.3*	12.2±2.3	5.71±0.71	4.41±0.66	2.7	3.7	0.48±0.09	1.22±0.17	0.11±0.04	0.16±0.05
6/11/76	7.0±1.4	4.3±1.1	4.74±0.66	3.94±0.63	1.7	2.0	1.50±0.18	0.97±0.15	0.05±0.02	0.00±0.01
1/77**	15.3±1.4		5.84±0.50		16.5		9.44±0.58		0.46±0.11	
8/77	9.8±1.2	8.9±1.1	5.7±0.5	5.0±0.5	9.48	2.00	6.03±0.32	0.82±0.10	2.15±0.17	0.32±0.07
10/78***	19.1±1.7		8.4±0.6		4.4		9.3±0.6		1.4±0.1	

Sampling Site #3 West Boundary Fence

Depth Interval (inches) / Sample Date	Gross Alpha pCi/g (dry) 0-2	Gross Alpha pCi/g (dry) 2-4	Gross Beta pCi/g (dry) 0-2	Gross Beta pCi/g (dry) 2-4	Total Uranium µg/g (dry) 0-2	Total Uranium µg/g (dry) 2-4	Radium-226 pCi/g (dry) 0-2	Radium-226 pCi/g (dry) 2-4	Thorium-230 pCi/g (dry) 0-2	Thorium-230 pCi/g (dry) 2-4
12/75	12.2±2.2*	9.7±2.0	6.47±0.74	4.75±0.67	4.7	2.4	0.62±0.11	0.85±0.14	0.14±0.05	0.14±0.05
6/11/76	6.5±1.5	4.4±1.4	3.92±0.63	3.62±0.62	1.7	1.7	0.87±0.14	1.27±0.17	0.11±0.03	0.00±0.01
1/77**	6.8±1.0		3.47±0.44		1.2		0.70±0.12		0.75±0.13	
8/77	9.0±1.2	8.7±1.2	5.9±0.5	5.3±0.5	1.21	0.55	0.98±0.09	0.73±0.07	0.31±0.04	0.42±0.05
10/78***	5.9±1.1		3.8±0.5		0.68		0.1±0.3		0.18±0.2	

Table D-7 (Cont'd.)

Sampling Site #4 West of Mill

	Gross Alpha pCi/g (dry)		Gross Beta pCi/g (dry)		Total Uranium µg/g (dry)		Radium-226 pCi/g (dry)		Thorium-230 pCi/g (dry)	
Depth Interval (inches)	0-2	2-4	0-2	2-4	0-2	2-4	0-2	2-4	0-2	2-4
Sample Date										
12/75	5.9±1.5*	21.8±4.2	3.40±0.62	8.38±0.80	2.3	2.2	0.81±0.13	0.23±0.06	0.12±0.04	0.12±0.04
6/11/76	2.9±1.1	2.9±1.2	1.86±0.54	1.51±0.52	1.1	1.1	0.37±0.08	0.38±0.08	0.00±0.01	0.13±0.04
1/77**	1.6±0.5		0.74±0.34		0.9		0.44±0.12		0.29±0.08	
8/77	7.3±1.1	7.3±1.1	4.3±0.5	4.2±0.5	0.87	1.57	0.77±0.06	1.18±0.10	0.14±0.02	0.11±0.05
10/78***	9.0±1.1		4.0±0.5		1.2		1.8±0.2		0.28±0.03	

Sampling Site #5 Northeast of Mill

	Gross Alpha pCi/g (dry)		Gross Beta pCi/g (dry)		Total Uranium µg/g (dry)		Radium-226 pCi/g (dry)		Thorium-230 pCi/g (dry)	
Depth Interval (inches)	0-2	2-4	0-2	2-4	0-2	2-4	0-2	2-4	0-2	2-4
Sample Date										
6/11/76	4.5±1.7*	10.5±2.1	2.19±0.55	3.48±0.61	1.9	2.3	0.83±0.13	1.73±0.20	0.14±0.05	0.36±0.08
1/77**	6.3±1.1		2.63±0.41		0.43		1.61±0.5		0.39±0.10	

Table D-7 (Cont'd.)

Soil Monitoring (cont'd.)

Background soil samples collected in a cooperative program between UNC and NMEID. Samples collected at 48 locations along the Pipeline Canyon, North Fork Rio Puerco and Rio Puerco Arroyo, in order to determine background soil concentrations. Values in pCi/g (dry), with mean and 1 standard deviation, were calculated by Battelle Northwest Laboratories.

Uranium	Radium-226	Thorium-230	Lead-210
0.67±1.7	1.5±2.1	0.83±12.0	1.9±1.3

New Sampling Sites
(10/29-31/80)

Sample Site	Nat. Uranium pCi/g (dry)	Radium-226 pCi/g (dry)	Thorium-230 pCi/g (dry)	Lead-210 pCi/g (dry)	Polonium-210 pCi/g (dry)
A	1.6	1.1±0.2	1.3±0.5	0.1±3.0	0.7±0.5
B-1	0.6	0.5±0.2	1.1±0.5	2.3±4.0	0.1±0.4
C	1.2	1.6±2.4	1.9±0.6	3.1±1.2	0.8±0.5
D	0.9	0.9±0.2	2.6±0.8	0.1±0.7	0.1±0.4
E	0.8	0.6±0.2	1.0±0.5	1.1±0.8	1.2±0.6
F	3.6	7.7±0.5	7.9±1.2	0.1±5.0	7.2±1.0
Springstead	1.0	0.3±0.2	1.9±0.6	1.7±1.1	0.9±0.5
OCR/IX	4.8	4.8±4.0	4.1±0.9	0.1±0.1	0.9±0.8

Table D-7 (Cont'd.)

Soil Monitoring (cont'd.)

1 Sampling began 12/75 at five sites; in 1980, sampling began at eight sites corresponding to high volume air monitoring sites.

Sampling frequency: semiannually except during 1979 and 1980 until 10/80; annually since 10/80.

Sampling locations:

From 12/75 to 10/78, five sites were sampled in two inch depth intervals (0"-2" and 2"-4").

The five sites are:

1. Approximately 100 yds. northeast of ventshaft #3.
2. Approximately 50 yds. west of Ram Mesa along dam protection (Dilco) dike.
3. North side of arroyo on west boundary fence.
4. 100 yds. northeast of ventilation shaft west of mill.
5. Northeast of curve in NM566 leading to mine.

Since 1979, eight sites sites are sampled. Sites are:

Location A - Near the continuous low volume station A at the NECR Mine Trailer Court.
Location B1 - Near the Kerr-McGee Training School sewage treatment plant north of Section 2.
Location C - On the dam at the east side of Borrow Pit #2.
Location D - Near the continuous low volume location D.
Location E - Near the continuous low volume location E.
Location F - Near the continuous low volume location F on the flood protection dike.
Springstead - Near the sewage treatment plant at the Springstead Trailer Park.
OCR/IX - Taken on the east side of the IX Plant at the Old Church Rock Mine.

Additional samples were taken during 1979 along the Pipeline Canyon, North Fork of the Rio Puerco, and Rio Puerco Arroyo, in a cooperative UNC - NMEID program to assess background levels in local soils.

Sampling method: see Appendix G; samples are air dried until no weight change occurs before analysis.

Table D-8

Effluent Monitoring(1)

Calculated concentrations of radionuclides released to unrestricted areas in liquid & gaseous effluents.

Monitoring Period	Radionuclides	Liquid Effluent Concentration	Gaseous and Particulate Effluent Concentration $\mu Ci/ml \times 10^{-13}$
5-3-77	U nat	0	1.5
	Ra-226	0	0.14
to	Th-230	0	0.14
6-30-77	Rn-222	*ND	0.016
7-1-77	U nat	**2.73 µCi total	4.02
	Ra-226	1.19 µCi total	<background
to	Th-230	74.95 µCi total	0.096
12-31-77	Rn-222	ND	<background
1-1-78	U nat	0	2.54
	Ra-226	0	0.12
to	Th-230	0	0.15
6-30-78	Rn-222	ND	<background
7-1-78	U nat	***1.59 mg/l	2.38
	Ra-226	181.70 pCi/l	0.109
to	Th-230	79.50 pCi/l	0.013
12-31-78	Rn-222	ND	<background
1-1-79	U nat	0	1.88
	Ra-226	0	0.059
to	Th-230	0	0.323
6-30-79	Rn-222	ND	70.2
7-1-79	U nat	****2.95 Ci total	2.24
	Ra-226	3.59 Ci total	0.129
to	Th-230	7.64 Ci total	0.053
12-31-79	Rn-222	ND	900.0
1-1-80	U nat	0	1.92
	Ra-226	0	0.120
to	Th-230	0	0.133
6-30-80	Rn-222	ND	<background
7-1-80	U nat	0	<background
	Ra-226	0	0.145
to	Th-230	0	0.03
12-31-80	Rn-222	ND	5900.00
1-1-81	U nat	0	9.7
	Ra-226	0	6.6
to	Th-230	0	3.1
6-30-81	Rn-222	ND	0.0

(1) Monitor results are biannually reported to NMEID. Background is determined at background perimeter airborne particulate (high volume) monitoring stations, Springstead and OCR/IX.

* ND = no data

** event: tailings spill during cleanout of tailings line 9/25/77; slimes (1 ton) and flush water (900 gallons) released to arroyo

*** event: tailings line spill 9/30/78; small amount of slurry entered stream

**** event: tailings dam breach 7/16/79

APPENDIX E

TABLE OF CONTENTS

Appendix E

Mill Area Radiological Monitoring Data

TABLE E-1

Airborne Particulate Monitoring -- Low Volume[1]

A. Yellowcake Dryer
(Dryer Closed Except Where Noted)

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
7/77	0	0	ND*	ND
8/77	0.183	2.78	ND	ND
9/77	0.0584	0	ND	ND
10/77	0.36	0.347	ND	ND
11/77	3.36	2.34	ND	336
12/77	0.18	0.13	ND	18
1/78	0.65	0.048	0.05	65
2/78**	0.36	0.85	0.12	36
2/78***	0.08	ND	0.30	ND
2/78***	0.17	0	1.05	17
2/78***	0.29	ND	0.80	ND
2/78***	0.78	0.69	1.63	78
3/78	0.007	0.03	0.12	0.7
4/78	0.04	0.05	1.32	4
5/78	1.56	0.54	1.17	156
6/78	0.0176	0.047	0.15	1.76
6/78	0.04	0.09	0.07	4
6/78	0.12	0	ND	12
6/78	0.2	0.52	0.8	20
7/78	0.259	2.34	2.04	25.9
7/78	0.32	0.38	0.84	32
7/78***	3.86	5.12	3.48	386
8/78	0.26	0.2	0.51	26
8/78	4.11	2.5	5.0	411
8/78	3.48	2.3	5.07	348
8/78	3.29	1.9	4.47	329
8/78	0.138	0.126	0.187	13.8
9/78	0.29	0.26	0.30	29
9/78	0.49	0.32	0.76	49
10/78	0.123	0.17	0.14	12.3
10/78	0.27	0.33	0.39	27
11/78	0.089	0.068	0.23	8.9
11/78	0.07	0.05	0.04	7
11/78***	0.35	0.23	0.53	35
12/78	0.1	0.13	0.21	10

* ND No Data
** Dryer Down
*** Dryer Open

Table E-1 (Cont'd)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

A. Yellowcake Dryer (cont'd.)

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	ΣMPC alpha
1/79	0.065	0.052	0.45	6.5
1/79	0.087	0.077	0.17	8.7
2/79	3.630	1.953	5.93	363
3/79***	0.087	0.088	0.10	8.7
3/79	0.056	0.054	<0.04	5.6
3/79***	0.186	0.212	0.173	18.6
3/79	0.031	0.015	0.03	3.1
4/79	0.223	0.180	0.22	22.3
5/79	0.239	0.198	0.26	23.9
5/79***	0.411	0.313	0.48	41.1
6/79	0.111	0.154	<0.04	11.1
6/79***	0.796	0.612	0.42	79.6
7/79	0.390	0.241	0.40	39
11/79	0.207	0.203	0.23	20.7
12/79	0.154	0.11	0.18	15.4
1/80	0.201	0.19	0.209	20.1
2/80	0.228	0.225	0.29	22.8
3/80	0.008	0.011	0.018	0.8
4/80	0.137	0.086	0.147	13.7
5/80	0.092	0.079	0.117	9.2
6/80	0.056	0.026	0.08	5.6
7/80	0.042	0.034	<0.04	4.2
9/80	0.055	0.058	0.06	5.5
10/80	0.141	0.137	0.087	14.1
12/80	2.540	1.579	3.19	254.0
12/80***	1.110	1.388	0.07	111.0
12/80***	1.262	1.286	1.40	126.2
12/80***	5.170	5.470	6.77	517.0
1/81***	0.274	0.315	0.24	27.4
1/81***	0.027	0.041	<0.04	2.7
1/81***	0.309	0.366	0.04	30.9
1/81***	0.079	0.096	<0.04	7.9
1/81	0.211	0.214	0.30	21.1
2/81	ND	ND	0.80	ND
3/81	ND	ND	0.24	ND
4/81	ND	ND	0.12	ND
5/81	ND	ND	0.43	ND
6/81	ND	ND	0.27	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

B. Grizzly Sump

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
11/77	0.17	0	ND	17
12/77	0.10	0.21	ND	10
1/78	0.045	0.018	0.04	4.5
2/78	0.022	0	0.33	2.2
3/78	0.06	0.17	0.11	6
4/78	0.005	0.012	0.03	0.5
5/78	0.08	0	0.06	8
6/78	0.23	0.25	ND	23
7/78	0.02	0.004	0.1	2
8/78	0.14	0.19	0.10	14
9/78	0.04	0.07	0.04	4.0
10/78	0.026	0.06	0.10	2.6
11/78	0.007	0	0.02	0.7
12/78	0.009	0.02	0.06	0.9
1/79	0.041	0.036	<0.04	4.1
2/79	0.028	0.094	0.04	2.8
3/79	0.009	0.004	<0.04	0.9
4/79	0.103	0.170	<0.04	10.3
5/79	0.980	1.220	0.40	98.0
6/79	0.028	0.038	<0.04	2.8
7/79	0.058	0.095	0.03	5.8
11/79	0.022	0.091	<0.04	2.2
12/79	0.028	0	<0.04	2.8
1/80	0.002	0.048	0.015	0.2
2/80	0.037	0.138	<0.04	3.7
3/80	0	0.031	0.008	0
4/80	0.026	0.059	0.030	2.6
5/80	0.063	0.056	0.038	6.3
6/80	0.072	0.085	0.04	7.2
7/80	0.023	0.049	<0.04	2.3
9/80	0.016	0.032	<0.04	1.6
10/80	0.009	0.022	<0.04	0.9
12/80	0.043	0.062	0.09	4.3
1/81	0.020	0.049	0.05	2.0
2/81	ND	ND	0.17	ND
3/81	ND	ND	ND	ND
4/81	ND	ND	0.27	ND
5/81	ND	ND	0.13	ND
6/81	ND	ND	0.14	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume (cont'd.)

C. Leach Platform

Sampling Date	Gross alpha x 10^{-10} μCi/ml	Gross beta x10^{-10} μCi/ml	U Total x10^{-10} μCi/ml	%MPC alpha
6/77	0.0024	2.5	ND	ND
7/77	0.059	0	ND	ND
8/77	0.0118	0.532	ND	ND
9/77	0.0278	3.30	ND	ND
10/77	0.038	0.603	ND	ND
11/77	0.06	0	ND	6
12/77	0.02	0	ND	2
1/78	0.0053	0	ND	0.53
2/78	0.007	0	0.23	0.7
3/78	0.001	0	0.014	0.1
4/78	0.020	0.020	0.28	2.0
5/78	0.10	0	0.09	10
6/78	0.11	0.29	0.08	11
7/78	0.00054	0.634	0.833	0.054
7/78	<0.01	0.20	0.9	<1
8/78	0.03	0.03	0.05	3
9/78	0.013	0.032	0.24	1.3
10/78	0.009	0.043	0.036	0.9
11/78	0	0	0.01	0
12/78	0.006	0.08	0.008	0.6
2/79	0.024	0.059	0.01	2.4
3/79	0.007	0.033	<0.04	0.7
4/79	0.009	0.004	<0.04	0.9
5/79	0.015	0.079	0.03	1.5
6/79	0.027	0.062	<0.04	2.7
7/79	0.014	0.055	0.006	1.4
11/79	0.005	<0.025	<0.04	0.5
12/79	0.005	0	<0.04	0.5
1/80	0.007	0.015	0.028	0.7
2/80	0.006	<0.025	<0.04	0.6
3/80	0	0.004	0.006	0
4/80	0.008	0	0.007	0.8
6/80	ND	ND	<0.04	ND
7/80	0.011	0.028	<0.04	1.1
9/80	0.005	0.033	<0.04	0.5
10/80	0.025	0.037	<0.04	2.5
12/80	0.061	0.256	0.38	6.1
1/81	0.028	0.039	0.04	2.8
2/81	ND	ND	0.26	ND
3/81	ND	ND	0.04	ND
4/81	ND	ND	0.04	ND
5/81	ND	ND	0.02	ND
6/81	ND	ND	0.01	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

D. Yellowcake Change Room

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
7/77	0.12	0	ND	ND
9/77	0.0219	0	ND	ND
10/77	0.101	0.445	ND	ND
11/77	0.37	0.07	ND	37
12/77	0.17	0.10	ND	17
1/78	0.029	0.41	0.04	2.9
2/78	0.24	0.71	0.08	24
3/78	0.04	0.02	0.08	4
4/78	<0.001	0	3.59	<0.1
5/78	0.035	0	0.086	3.5
6/78	0.035	0.05	ND	3.5
7/78	1.32	0.82	1.74	132
9/78	0.77	0.65	1.07	77
10/78	1.23	0.58	ND	123
10/78	0.38	0.52	0.008	38
11/78	0.017	0.005	0.03	1.7
12/78	4.05	2.6	6.74	405
12/78	2.1	1.43	1.58	210
1/79	0.010	0.024	0.24	1.0
2/79	23.398	12.694	41.40	2339.8
3/79	0.047	0.082	0.04	4.7
4/79	0.106	0.146	0.12	10.6
5/79	0.097	0.121	0.09	9.7
6/79	0.160	0.144	0.14	16.0
7/79	0.303	0.205	0.35	30.3
11/79	1.030	0.84	1.47	103.0
12/79	0.030	0.05	<0.04	3.0
1/80	0.477	0.621	0.507	47.7
1/80	0.556	0.402	0.44	55.6
2/80	0.022	<0.025	0.34	2.2
2/80	0.248	0.189	0.36	24.8
3/80	0	0	0.023	0
4/80	0.160	0.126	0.175	16.0
5/80	0.494	0.500	0.515	49.4
6/80	0.029	ND	0.05	2.9
7/80	0.019	<0.025	<0.04	1.9
8/80	1.05	0.49	0.91	105
9/80	0.033	0.034	0.04	3.3
10/80	0.016	0.031	<0.04	1.6
12/80	0.018	0.022	0.03	1.8
1/81	0.027	0.049	0.07	2.7
2/81	ND	ND	0.11	ND
3/81	ND	ND	0.21	ND
4/81	ND	ND	0.25	ND
5/81	ND	ND	0.10	ND
6/81	ND	ND	0.07	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

E. Yellowcake Bin Platform

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
7/77	0	0	ND	ND
11/77	0.06	0.48	ND	6
1/78	0.20	0.73	ND	20
2/78	0.94	1.3	0.69	94
3/78	0.02	0.05	0.16	2.0
4/78	0.007	0.074	0.57	0.7
5/78	0.52	0.33	0.29	52
6/78	0.173	0.066	0.15	17.3
6/78	0.05	0.11	0.09	5
6/78	0.09	0	ND	9
6/78	0.24	0.17	0.5	24
7/78	0.322	2.68	1.99	32.2
7/78	0.20	1.07	1.43	20
8/78	0.25	0.44	0.62	25
8/78	0.31	0.074	1.12	31
8/78	0.274	0.172	0.329	27.4
9/78	0.27	0.28	0.15	27
9/78	0.21	0.14	0.27	21
10/78	0.173	0.21	0.31	17.3
10/78	0.08	0.12	0.03	8
11/78	0.078	0.033	0.18	7.8
12/78	0.1	0.09	0.18	10
1/79	0.462	0.279	0.70	46.2
2/79	0.225	0.151	0.39	22.5
3/79	0.248	0.194	0.29	24.8
4/79	0.094	0.118	0.12	9.4
5/79	0.198	0.183	0.30	19.8
6/79	0.296	0.216	0.32	29.6
7/79	1.014	0.363	1.51	101.4
11/79	0.181	0.093	0.23	18.1
12/79	0.115	0.08	0.13	11.5
1/80	0.145	0.121	0.164	14.5
2/80	0.132	0.146	0.15	13.2
3/80	0.002	0	0.003	0.2
4/80	0.231	0.12	0.260	23.1
5/80	0.458	0.463	0.365	45.8
6/80	0.025	ND	<0.04	2.5
7/80	0.030	<0.025	<0.04	3.0
9/80	0.062	0.045	0.08	6.2
10/80	0.024	0.038	<0.04	2.4
12/80	0.067	0.071	0.11	6.7
1/81	0.094	0.093	0.13	9.4
2/81	ND	ND	0.43	ND
3/81	ND	ND	0.42	ND
4/81	ND	ND	0.17	ND
5/81	ND	ND	0.07	ND
6/81	ND	ND	0.04	ND

Table E-1 (Cont'd.)
Airborne Particulate Monitoring -- Low Volume
(cont'd.)

F. Yellowcake Packaging Area

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
6/77	0.017	0.50	ND	ND
7/77	0.87	0.72	ND	ND
9/77	0.0613	0	ND	ND
10/77	0.0237	0.0793	ND	ND
11/77	1.22	0.55	ND	122
12/77	0.17	0.09	ND	17
2/78	1.34	0.55	1.48	134
2/78	0.61	0.38	0.86	61
3/78	0.08	0.11	0.21	8
4/78	0.011	0.044	0.39	1.1
5/78	0.84	0.53	0.53	84
6/78	0.0296	0.01	0.06	2.96
6/78	0.27	0.51	ND	27
6/78	2.18	1.2	2.6	218
7/78*	0.002	0.13	0.84	0.2
7/78	4.57	2.28	5.18	457
7/78	5.70	3.09	4.36	570
8/78	0.62	0.52	0.82	62
8/78	4.5	3.7	2.13	450
8/78	0.014	0	0.012	1.4
8/78	0	0	0.25	0
9/78	0.002	0	0.004	0.2
9/78	0.026	0	0.07	2.6
10/78	0.426	0.29	0.35	43
11/78	0.015	0.017	0.02	1.5
12/78	1.2	0.85	0.27	120
12/78	3.4	2.1	4.28	340
1/79	0.016	0.008	0.30	1.6
1/79	0.901	0.365	1.26	90.1
2/79	5.60	3.095	9.19	560.0
2/79	0.068	0.066	0.08	6.8
3/79	0.150	0.122	0.15	15.0
3/79	0.092	0.142	0.15	9.2
3/79**	10.265	8.683	13.23	1026.5
4/79	0.103	0.142	0.11	10.3
5/79	1.913	1.290	5.34	191.3
5/79	1.282	0.737	1.5	128.2
5/79	1.668	1.333	2.8	166.8
5/79	1.679	0.674	2.40	167.9
5/79	1.308	0.762	1.51	130.8
5/79	0.610	0.332	0.99	61.0
5/79	0.161	0.165	0.18	16.1
6/79	0.033	0.065	<0.04	3.3
7/79	0.033	0.055	0.03	3.3
11/79	0.032	<0.025	<0.04	3.2
12/79	0.151	0.09	0.16	15.1
1/80	0.247	0.189	0.20	24.7
1/80	0.011	0.031	0.013	1.1
2/80	0.695	0.498	0.87	69.5

* Post clean up
**Drum transfer

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

F. Yellowcake Packaging Area (cont'd.)

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
3/80	0.003	0	0.008	0.3
4/80	0.228	0.185	0.274	22.8
5/80	0.014	0.056	0.031	1.4
6/80	0.052	ND	0.06	5.2
7/80	0.407	0.275	0.105	40.7
7/80	5.18	4.80	3.90	518
7/80***	0.64	0.78	0.81	64
7/80	0.024	<0.025	<0.04	2.4
8/80	0.005	<0.025	<0.04	0.5
9/80	0.645	0.289	0.69	64.5
10/80	0.003	0.007	<0.04	0.3
12/80	0.016	0.030	0.04	1.6
1/81	0.081	0.154	0.25	8.1
2/81	ND	ND	0.23	ND
3/81	ND	ND	0.35	ND
4/81	ND	ND	1.80	ND
5/81	ND	ND	0.08	ND
6/81	ND	ND	0.07	ND

***Outside Package

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

G. SAG Mill Feed Platform

Sampling Date	Gross alpha x 10^{-10} μCi/ml	Gross beta x10^{-10} μCi/ml	U Total x10^{-10} μCi/ml	%MPC alpha
1/78	0.029	0	0.03	2.9
2/78	0.002	0	0.17	0.2
3/78	0.004	0	0.015	0.4
4/78	0.008	0.035	0.30	0.8
5/78	0.05	0	0.035	5
6/78	0.06	0.18	0.04	6
8/78	0.04	0.03	0.22	4
9/78	0.043	0.048	0.06	4.3
10/78	0.026	0.033	0.076	2.6
11/78	0.004	0.023	0.03	0.4
12/78	0.02	0.06	0.02	2
1/79	0.030	0.044	0.07	3.0
2/79	0.025	0	0.15	2.5
3/79	0.044	0.113	<0.04	4.4
4/79	0.032	0.098	<0.04	3.2
5/79	0.029	0.116	0.08	2.9
6/79	0.087	0.147	<0.04	8.7
7/79	0.074	0.127	0.03	7.4
11/79	0.099	0.087	0.04	9.9
12/79	0.036	<0.025	<0.04	3.6
1/80	0.037	0.065	0.030	3.7
2/80	0.037	0.075	<0.04	3.7
3/80	0.005	0	0.003	0.5
4/80	0.013	0.017	0.015	1.3
5/80	0.037	0.036	<0.04	3.7
6/80	0.072	0.055	0.06	7.2
7/80	0.070	0.086	<0.04	7.0
9/80	0.167	0.142	0.08	16.7
10/80	0.094	0.119	0.04	9.4
12/80	0.021	0.033	0.03	2.1
1/81	0.082	0.086	0.05	8.2
2/81	ND	ND	0.09	ND
3/81	ND	ND	ND	ND
4/81	ND	ND	0.09	ND
5/81	ND	ND	0.09	ND
6/81	ND	ND	0.06	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring — Low Volume
(cont'd.)

H. Yellowcake Centrifuge Platform

Sampling Date	Gross alpha x 10-10 µCi/ml	Gross beta x10-10 µCi/ml	U Total x10-10 µCi/ml	%MPC alpha
9/77	0.417	0	ND	ND
11/77	0.17	0.31	ND	17
12/77	0.62	0.45	ND	62
1/78	0.25	0.23	ND	25
2/78	0.18	0.56	0.23	18
3/78	0.03	0	0.24	3
4/78	0.009	0.060	0.43	0.9
5/78	1.69	0.88	1.58	169
6/78*	0.02	ND	0.09	ND
6/78	0.42	0.084	0.28	42
6/78	0.10	0.22	0.12	10
6/78	0.25	0	ND	25
6/78	0.2	0.19	1.9	20
7/78	0.456	4.29	1.70	45.6
7/78	1.26	1.02	1.85	126
8/78	0.27	0.2	0.40	27
8/78	3.9	3.8	8.67	390
8/78	0.098	0.09	0.137	9.8
9/78	0.24	0.28	0.10	24
9/78	1.10	0.71	1.2	110
10/78	0.051	0.11	0.12	5.1
10/78	0.02	0.06	0.24	2
11/78	0.085	0.083	0.37	8.5
11/78**	1.41	0.62	1.97	141
12/78	0.2	0.21	0.23	20.0
1/79	0.070	0.035	0.47	7.0
1/79***	0.035	0.009	0.05	3.5
2/79	0.658	0.323	1.23	65.8
3/79	0.115	0.084	0.15	11.5
4/79	0.136	0.171	0.15	13.6
5/79	0.232	0.202	0.25	23.2
6/79	0.087	0.156	0.05	8.7
7/79	0.264	0.228	0.29	26.4
11/79	0.210	0.134	0.25	21.0
12/79	0.116	0.08	0.13	11.6
1/80	0.091	0.103	0.092	9.1
2/80	0.061	0.038	0.08	6.1
3/80	0.009	0	0.014	0.9
4/80	0.088	0.080	0.079	8.8
5/80	0.143	0.118	0.174	14.3
6/80	0.067	0.077	0.10	6.7
7/80	0.039	0.038	0.05	3.9
9/80	0.112	0.073	0.12	11.2
10/80	0.028	0.030	<0.04	2.8
12/80	7.541	4.130	8.64	754.2
1/81	1.636	1.385	1.95	163.6
2/81	ND	ND	3.38	ND
3/81	ND	ND	0.15	ND
4/81	ND	ND	0.26	ND
5/81	ND	ND	1.78	ND
6/81	ND	ND	0.75	ND

*Repair maintenance
**Dryer overflow
***Centrifuge open

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

I. Feed Belt Platform

Sampling Date	Gross alpha x 10-10 μCi/ml	Gross beta x10-10 μCi/ml	U Total x10-10 μCi/ml	%MPC alpha
6/77	0.027	0.90	ND	ND
7/77	0.042	0.001	ND	ND
8/77	0.133	0.663	ND	ND
9/77	0.0642	0	ND	ND
10/77	0.537	6.17	ND	ND
11/77	0.26	0.02	ND	26
12/77	0.08	0.03	ND	8
1/78	0.014	0.0092	ND	1.4
2/78	0.021	0	0.52	2.1
3/78	0.15	0.77	0.37	15
4/78	0.013	0.027	0.24	1.3
5/78	0.57	0.51	0.23	57
6/78	0.18	0.33	0.12	18
7/78	0.04	0.11	0.34	4
7/78	<0.01	0.006	0	<1
8/78	0.25	0.34	0.20	25
9/78	0.076	0.12	0.15	7.6
10/78	0.254	0.32	0.14	25.4
11/78	0.0007	0.010	0.01	0.07
12/78	0.01	0.02	0.02	1
1/79	0.050	0.068	0.12	5.0
2/79	0.038	0.096	0.03	3.8
3/79	0.056	0.081	<0.04	5.6
4/79	0.102	0.138	<0.04	10.2
5/79	0.562	0.798	0.21	56.2
6/79	0.060	0.105	<0.04	6.0
7/79	0.368	0.510	0.11	36.8
11/79	0.030	0	<0.04	3.0
12/79	0.091	<0.025	<0.04	9.1
1/80	0.069	0.088	0.045	6.9
2/80	0.069	<0.025	0.08	6.9
3/80	0.096	0	0.038	9.6
4/80	0.071	0.122	0.038	7.1
5/80	1.373	1.859	0.880	137.3
6/80	1.530	2.084	0.95	153.0
7/80	0.95	1.1	0.43	95.0
9/80	0.773	0.787	0.29	77.3
10/80	0.041	0.051	<0.04	4.1
12/80	0.025	0.038	0.05	2.5
1/81	0.169	0.201	0.08	16.9
2/81	ND	ND	0.33	ND
3/81	ND	ND	ND	ND
4/81	ND	ND	0.04	ND
5/81	ND	ND	0.21	ND
6/81	ND	ND	0.15	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring -- Low Volume
(cont'd.)

J. Below Primary Thickener

Sampling Date	Gross alpha x 10-10 µCi/ml	Gross beta x10-10 µCi/ml	U Total x10-10 µCi/ml	%MPC alpha
7/77	0.0084	0	ND	ND
9/77	0.0438	0	ND	ND
10/77	0.674	0.663	ND	ND
11/77	0.20	0	ND	20
12/77	0.07	0.01	ND	7
1/78	0.0031	0	ND	0.31
2/78	1.4	1.5	1.35	140
3/78	0.04	0.06	0.13	4.0
4/78	0.010	0.094	0.50	1.0
5/78	0.01	0	0.20	1.0
6/78	0.04	0.72	0.08	4
7/78	0.093	8.74	1.01	9.3
7/78	0.95	1.0	0.85	95
9/78	0.13	0.17	0.31	13
10/78	0.182	0.18	0.26	18.2
11/78	0.054	0.042	0.20	5.4
12/78	0.08	0.075	0.13	8.0
1/79	0.163	0.099	0.20	16.3
2/79	0.214	0.165	0.30	21.4
3/79	0.079	0.075	0.07	7.9
4/79	0.132	0.152	0.16	13.2
5/79	0.155	0.161	0.21	15.5
6/79	0.017	0.040	<0.04	1.7
7/79	0.202	0.146	0.24	20.2
11/79	0.094	0.04	0.09	9.4
12/79	0.029	0	<0.04	2.9
1/80	0.103	0.105	0.121	10.3
2/80	0.003	<0.025	<0.04	0.3
3/80	0	0	0.004	0
4/80	0.015	0.029	0.018	1.5
5/80	0.021	0.042	0.036	2.1
6/80	0.006	ND	0.12	0.6
7/80	0.042	0.039	<0.04	4.2
9/80	0.108	0.058	0.12	10.8
10/80	0.008	0.027	<0.04	0.8
12/80	0.057	0.072	0.09	5.7
1/81	0.166	0.139	0.20	16.6
2/81	ND	ND	0.18	ND
3/81	ND	ND	0.43	ND
4/81	ND	ND	0.13	ND
5/81	ND	ND	0.07	ND
6/81	ND	ND	0.08	ND

Table E-1 (Cont'd.)

Airborne Particulate Monitoring — Low Volume
(cont'd.)

[1]Sampling began 6/77 or 7/77 at all sites except B(11/77), C(1/78), H(9/77).
Sampling frequency: biweekly or monthly, with occasional multiple samples (7/77-present).
Sampling locations: ten mill locations are regularly sampled.
Only these are tabulated:

A. Yellowcake dryer
B. Grizzly sump
C. Leach platform
D. Yellowcake change room
E. Yellowcake Bin Platform
F. Yellowcake packaging area
G. SAG mill feed platform
H. Yellowcake centrifuge platform
I. Feed belt platform
J. Below primary thickener

Other mill locations were occasionally sampled, particularly during 1977.

Sampling method: air pump, RAS-1, run 1 hr. minimum at 30 lpm; sample collected on filters (0.2-10 μm pore size); see also Appendix G.

Table E-2

Working Levels - Radon Daughters

Mill Location Sample Date	Grizzly Sump	1/2 Up Conveyor	SAG Mill Feed Pt.	Trommel Screen	SAG Mill Sump*
7/26/77	0.61	0.02	ND**	0.02	0.02
7/27/77	6.79***	1.23	0.06	0.05	0.05
7/28/77	0.86	0.08	0.03	0.02	0.01
8/29/77	0.50	0.04	0.03	0.02	0.01
9/23/77	0.034	0.006	0.003	0.006	0
10/77	0.02	0.01	0.01	0.01	0
11/11/77	0.09	0.02	0.05	0.04	0.02
12/19/77	0.01	0.02	0.01	0.01	0.02
1/30/78	0.02	0.02	0.01	0.01	0.01
2/28/78	0.02	0.01	0.005	0.005	0.01
3/31/78	0.01	0.01	0.01	0.01	0.01
4/28/78	0.02	0.01	0.02	0.01	0.01
5/31/78	0.04	0.02	0.04	0.04	0.03
6/5/78	0.03	0.01	0.02	0.005	0.005
7/28/78	0.04	0.02	0.002	0.01	0.01
8/31/78	0.07	0.03	0.02	0	0
9/28/78	0.01	0.04	0.02	0.04	0.02
10/10/78	0.008	0.002	0.003	0.002	0.001
11/6/78	0.009	0.007	0.015	0.008	0.005
12/12/78	0.04	ND	0.03	0.09	0.06
1/18/79	0.01	0.04	0.03	0.01	0.01
2/28/79	0.006	0.006	0.004	0.002	0.004
3/20/79	0.01	0.006	0.01	0.006	0.006
4/30/79	0.008	0.002	0.018	0.014	0.016
5/16/79	0.030	0.008	0.085	0.015	0.004
6/5/79	0.014	0	0.024	0.012	0.006
7/9/79	0.04	0.006	0.08	0.06	0.04
8/13/79	0.006	0.004	0.006	0.002	0.002
11/2/79	0.04	0.01	0.10	0.08	0
12/19/79	0.008	0.002	0.004	0.004	0.002
1/30/80	0.02	0.002	0.04	0.03	0.008

* Grinding floor sampled, 7/77 only
** ND No data
*** Mean of multiple measurements

Table E-2 (Cont'd.)

Working Levels - Radon Daughters (Cont'd.)

Mill Location Sample Date	Grizzly Sump	1/2 Up Conveyor	SAG Mill Feed Pt.	Trommel Screen	SAG Mill Sump
2/21/80	0.016	0.018	0.036	0.024	0.008
3/24/80	0.004	0.006	0.03	0.04	0.02
4/9/80	0.004	0.002	0.004	0.02	0.006
5/29/80	0.05	0.03	0.07	0.07	0.05
6/20/80	0.06	0.04	0.03	0.03	0.03
6/25/80	0.10	0.01	0.09	0.09	0
7/31/80	0.06	0.06	0.04	0.03	0.03
8/21/80	0.41	0.02	0.19	0.17	0.14
9/4/80	0.008	0.002	0.004	ND	0.002
10/23/80	0.01	0.004	0.06	ND	0.002
11/19/80	0.008	0.008	0.004	ND	0.002
12/18/80	ND	0.007	0.002	0.04	0.02
1/19-20/81	0.038	0.01	0.006	ND	0.002
2/27/81	0.008	0.006	0.004	ND	0.02
3/9/81	ND	ND	0.008	ND	0
4/16/81	0.009	0.005	0.001	ND	0.004
6/9/81	0.10	0.07	0.01	ND	ND
6/26/81	0.002	0	0.004	0.004	0

Mill areas occasionally monitored

Location	Sample Date	Working Level
Scale house - operator's area	12/27/77	0
	12/28/77	0.005
	4/16/81	0.001
Scale house - bucking room	12/27/77	0
	12/12/78	0.02
	5/16/79	0.004
	4/16/81	0.008

Table E-2 (cont'd.)

Working Levels - Radon Daughters (Cont'd.)

Mill areas occasionally monitored

Location	Sample Date	Working Level
OCR/IX #1	9/28/78	0.007
	5/29/80	0.03
OCR/IX #2	9/28/78	0
	5/29/80	0.05
OCR/IX #3	9/28/78	0
	5/29/80	0.04
Yellowcake Centrifuge Platform	12/12/78	0.04
Cone-#2 Thickener	5/16/79	0.013
Walking Sample Mill	5/16/79	0.004
Battelle Lab	10/11/79	0.006
Feed Belt Platform	12/12/78	0.05
	8/21/80	0.06
	8/26/80	0.05***
	9/4/80	0.004
	10/23/80	0.008
	11/19/80	0.006
	12/18/80	0.12
	1/19/81	0.02
	2/27/81	0.06
	6/9/81	0.00
	6/26/81	0.001
Yellowcake Dryer Platform	8/26/80	0.003***

Table E-2 (Cont'd.)

Working Levels - Radon Daughters (Cont'd.)

Mill areas occasionally monitored

Location	Sample Date	Working Level
Under Main Yellowcake Thickener	3/9/81	0.004
	6/9/81	0.01
Yellowcake Packaging	5/16/79	0
	3/9/81	0.007
	6/9/81	0.04
NECR IX-A	10/23/80	0.004
	2/27/81	0.006
NECR IX-B	10/23/80	0
	2/27/81	0.002
NECR IX-C	10/23/80	0.002
	2/27/81	0.008
OCR-IX	4/16/81	0.008
Ball Mill Sump	6/9/81	0.01
Cyclone Shack	4/16/81	0.03
Ball Mill Control Room	6/9/81	0.02
Yellowcake Control Room	6/9/81	0.02
Precipitation	6/9/81	0.04
Precipitation Control Room	6/9/81	0.00
Metallurgical Lab	6/9/81	0.01

Table E-2 (Cont'd.)

Working Levels - Radon Daughters (Cont'd.)

Mill areas occasionally monitored

Location	Sample Date	Working Level
Chemistry Lab	6/9/81	0.00

[1] Monitoring began 7/77.
Monitoring frequency: monthly, except during mill closure (9/79-10/79).

Monitoring locations: five location are regularly monitored:

1. Grizzly sump
2. Halfway up conveyor
3. SAG Mill Feed Pit
4. Trommel screen
5. Grinding mill or SAG sump, except Grinding floor (7/77).

Monitoring method: Kusnetz method (1977-1980); MDA Instant Working Level Meter (IWLM) since 9/80; five liter (2 minute) samples are pumped and counted; see also Appendices G and I.

Below 0.1 WL, IWLM efficiency drops, but remains accurate to ±10% at 0.01 WL (NMEID-Milan, personal communication, 1981).

Annual exposure to workers due to working levels in mill are not calculated because working levels do not approach 0.33 (10CFR20, Appendix B) except sporadically in 7/77.

Table E-3

Instantaneous Alpha Surface Contamination Monitoring[1]
(μCi x10-3)

	6/9/77	6/21/77	6/30/77	7/15/77	7/28/77	8/16/77	9/7/77
1. Incline conveyor supports & housing	0.2	0.6		0.3		0.2	0.08
2. Feed belt housing	0.3	0.6	0.4	0.5 "supports"		0.5	0.08
3. Transfer point to incline conveyor	0.3	0.6	0.3	0.6		0.2	0.08
4. SAG mill feed housing	0.3	0.5	0.3				
5. Primary sampler	0.5	0.6	0.6				
6. Trommel screen housing	0.2	0.6					
7. Sump pump feed lines & valves	0.2	0.6		0.5		0.2	
8. Handrails - grinding	0	0		0.6		0.3	0.08
9. Handrails - stairway to leach	0	0.5	0.8	0.3		0.3	0.08
10. Grinding control room	0	0	0.6	0.5		0.2	0.15
11. Leach control room	0.3	0.7	0.2	0.6		0.3	0.17
12. Leach handrails	0	0.6	0.3	0.6		0.2	0.12
13. CCD handrails	0	0.5		0.6		0.2	0.17
14. CCD control room	0	0.6		0.5		0.2	0.12
15. #1 thickener handrails	0	0.6					0.17
16. #6 U-flow pump lines	0						
17. #1 U-flow pump lines	0						
18. #6 thickener handrails	0	0					
19. SX handrails		0.6	0.6	0.6		0.2	0.12
20. SX-PPT control room		0.5	0.6	0.5		0.2	0.42
21. PPT handrails		0	0.5	0.6	0.1	0.1	0.12
22. YC change room		0					
23. YC packaging		0.3					
24. YC sample preparation		0.6				0.1	0.94
25. YC bin supports			0.6				
26. Scrubber sump by dryer			6.5				
27. Dryer combustion chamber			1.6				
28. Vent - top of dryer			4.0				
29. Fan housing from impingent			3.2				
30. PPT and pkg fan			13.0				

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination (cont'd)
(μCi x10^{-3})

	10/7/77	11/10/77	12/28-29/77	1/30/78	2/11/78	3/27/78	4/6/78
1. Incline conveyor supports & housing	0.28	0.1	0.8				
2. Feed belt housing	0.14	0.1	0.6				
3. Transfer point to incline conveyor	0.03	0.1	1.1				
4. SAG mill feed housing							
5. Primary sampler							
6. Trommel screen housing							
7. Sump pump feed lines & valves							
8. Handrails - grinding	0.03	0	0.5				
9. Handrails - stairway to leach	0.03	0.1	0.1				
10. Grinding control room	0.1	<0.1	0.4	0.1 (table)	0.1 (table)	0.04 (table)	
11. Leach control room	0.35	0.1	0.1				
12. Leach handrails	0.21	0.2	0.1				
13. CCD handrails	0.03	0.1	0.4				
14. CCD control room	0.10	0.2	0.1				
15. #1 thickener handrails	0.35	0.1	0.2				
16. #6 U-flow pump lines							
17. #1 U-flow pump lines							
18. #6 thickener handrails							
19. SX handrails	0.35	0.3	0.1				
20. SX-PPT control room	1.21	0.3					
21. PPT handrails	0.69	0.7	0.2				
22. YC change room				0.2	0.2	0.2	
23. YC packaging							
24. YC sample preparation	0.07	0.1	0.4				
25. YC bin supports							
26. Scrubber sump by dryer							
27. Dryer combustion chamber							
28. Vent - top of dryer							
29. Fan housing from impingent							
30. PPT and pkg fan							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	5/12/78	6/13/78	7/27/78	8/1/78	9/21/78	10/3/78	11/8/78
1. Incline conveyor supports & housing							
2. Feed belt housing							
3. Transfer point to incline conveyor							
4. SAG mill feed housing							
5. Primary sampler							
6. Trommel screen housing							
7. Sump pump feed lines & valves							
8. Handrails - grinding							
9. Handrails - stairway to leach							
10. Grinding control room							
11. Leach control room							
12. Leach handrails							
13. CCD handrails							
14. CCD control room							
15. #1 thickener handrails							
16. #6 U-flow pump lines							
17. #1 U-flow pump lines							
18. #6 thickener handrails							
19. SX handrails							
20. SX-PPT control room							
21. PPT handrails							
22. YC change room							0.3mr/hr (bench)
23. YC packaging							
24. YC sample preparation							
25. YC bin supports							
26. Scrubber sump by dryer							
27. Dryer combustion chamber							
28. Vent - top of dryer							
29. Fan housing from impingent							
30. PPT and pkg fan							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	12/28/78	1/11/79	2/7/79	3/6/79	4/9/79	5/29/79	6/28/79
1. Incline conveyor supports & housing							
2. Feed belt housing							
3. Transfer point to incline conveyor							
4. SAG mill feed housing							
5. Primary sampler							
6. Trommel screen housing							
7. Sump pump feed lines & valves							
8. Handrails - grinding							
9. Handrails - stairway to leach							
10. Grinding control room							8 dpm
11. Leach control room							2 dpm
12. Leach handrails							
13. CCD handrails							
14. CCD control room							
15. #1 thickener handrails							
16. #6 U-flow pump lines							
17. #1 U-flow pump lines							
18. #6 thickener handrails							
19. SX handrails							
20. SX-PPT control room			1.0 mr/hr				10 dpm
21. PPT handrails							
22. YC change room						196 dpm "top of washer"	192 dpm
23. YC packaging							
24. YC sample preparation							
25. YC bin supports							
26. Scrubber sump by dryer							
27. Dryer combustion chamber							
28. Vent - top of dryer							
29. Fan housing from impingent							
30. PPT and pkg fan							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(μCi x10^{-3})

	11/15-19/79	12/29/79	1/30/80	3/17/80	4/2/80	5/27/80	7/22/80
1. Incline conveyor supports & housing							
2. Feed belt housing							
3. Transfer point to incline conveyor							
4. SAG mill feed housing							
5. Primary sampler							
6. Trommel screen housing							
7. Sump pump feed lines & valves							
8. Handrails - grinding							
9. Handrails - stairway to leach							
10. Grinding control room							
11. Leach control room	3 cpm						
12. Leach handrails							
13. CCD handrails							6.2 cpm
14. CCD control room							
15. #1 thickener handrails							
16. #6 U-flow pump lines							
17. #1 U-flow pump lines							
18. #6 thickener handrails							
19. SX handrails							
20. SX-PPT control room	29 cpm (table)	3 cpm					27 cpm
21. PPT handrails							bin pltf 744 cpm dryr pltf 257 cpm centr pltf 2568 cpm
22. YC change room	20 cpm						
23. YC packaging							
24. YC sample preparation							
25. YC bin supports							
26. Scrubber sump by dryer							
27. Dryer combustion chamber							
28. Vent - top of dryer							
29. Fan housing from impijet							
30. PPT and pkg fan							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(μCi x10-3)

	8/18/80	9/29/80	10/22/80	11/5/80	12/16/80	1/30/81	2/5/81
1. Incline conveyor supports & housing							
2. Feed belt housing							
3. Transfer point to incline conveyor							
4. SAG mill feed housing							
5. Primary sampler							
6. Trommel screen housing							
7. Sump pump feed lines & valves							
8. Handrails - grinding							
9. Handrails - stairway to leach							
10. Grinding control room							
11. Leach control room							
12. Leach handrails							
13. CCD handrails							
14. CCD control room							
15. #1 thickener handrails							
16. #6 U-flow pump lines							
17. #1 U-flow pump lines							
18. #6 thickener handrails							
19. SX handrails							
20. SX-PPT control room			300 cpm	50 cpm	2452 cpm		
21. PPT handrails		Centr. plt 2451 cpm	750 cpm	2500 cpm	32 cpm		
22. YC change room							
23. YC packaging							
24. YC sample preparation							
25. YC bin supports							
26. Scrubber sump by dryer							
27. Dryer combustion chamber							
28. Vent - top of dryer							
29. Fan housing from impingent							
30. PPT and pkg fan							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	3/23/81	4/15/81	5/19/81	7/30/81
1. Incline conveyor supports & housing				
2. Feed belt housing				
3. Transfer point to incline conveyor				
4. SAG mill feed housing				
5. Primary sampler				
6. Trommel screen housing				
7. Sump pump feed lines & valves				
8. Handrails - grinding				
9. Handrails - stairway to leach				
10. Grinding control room				
11. Leach control room				
12. Leach handrails				
13. CCD handrails				
14. CCD control room				
15. #1 thickener handrails				
16. #6 U-flow pump lines				
17. #1 U-flow pump lines				
18. #6 thickener handrails				
19. SX handrails				
20. SX-PPT control room				
21. PPT handrails				
22. YC change room				
23. YC packaging				
24. YC sample preparation				
25. YC bin supports				
26. Scrubber sump by dryer				
27. Dryer combustion chamber				
28. Vent - top of dryer				
29. Fan housing from impingent				
30. PPT and pkg fan				

Table E-3 (Cont'd.)

Instananeous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	6/9/77	6/21/77	6/30/77	7/15/77	7/28/77	8/16/77	9/7/77
31. PPT Centrifuge housing			4.9			1.9	0.94
32. Enviroclear motor & mount			4.9				
33. Top of PPT tanks			29.2				
34. Sand filters			0.6				
35. Trommel screen platform handrails			0.6				
36. Sump housing of incline conveyor			0.3				
37. Centrifuge feed to dryer			6.5				
38. CCD sump valves & housing				0.6			
39. Clarifloc handrail				1.0		0.2	0.12
40. YC fan floor handrails				1.0			
41. Primary YC thickener U-flow				0.8			
42. Lunchroom in shop bldg.							0.04
43. Lunchroom in admin.bldg.					0.5	0.0	0.04
44. Men's dry - guard house					0.2	0.1	0.04
45. Women's dry - guard house					0.1	0.1	0.04
46. Scale house - weigh room					0.2		
47. Scale house - sample prep.					0.8		
48. Grinding sump valves							0.33
49. CCD handrails over #2 thickener						0.4	
50. PPT - wood stave tanks						1.5	
51. PPT - dryer & furnace controls						0.2	0.17
52. CCD - handrails over #2 thickener						0.4	
53. PPT - precip. tank covers							1.9
54. YC clean rm						0.3	0.08
55. YC pkg hoods						3.1	12
56. Scale house operator's room							
57. Scale house - bucking room						0.3	0.33
58. Pkg. - walls							
59. Incline conveyor housing at trans. pt.							
60. Grizzly -air							
61. SX sample booth table top							
62. PPT - control rm table top							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	10/7/77	11/10/77	12/28-29/77	1/30/78	2/11/78	3/27/78	4/6/78
31. PPT Centrifuge housing	0.97	0.7	2.1				
32. Enviroclear motor & mount							
33. Top of PPT tanks							
34. Sand filters							
35. Trommel screen platform handrails							
36. Sump housing of incline conveyor							
37. Centrifuge feed to dryer							
38. CCD sump valves & housing							
39. Clarifloc handrails	0.07	0.1	0.2				
40. YC fan floor handrails							
41. Primary YC thickener U-flow							
42. Lunchroom in shop bldg.	0.07	<0.1	0.1	0.1			
43. Lunchroom in admin.bldg.	0.03	0.1	0	<0.1			
44. Men's dry - guard house	0.1	0.2	0.2	<0.1	<0.1		
45. Women's dry - guard house	0.07	0.1	0.1	<0.1	0.1		
46. Scale house - weigh room							
47. Scale house - sample prep.							
48. Grinding sump valves	0.28	0.2	0.3				
49. CCD handrails over #2 thickener							
50. PPT - wood stave tanks							
51. PPT - dryer & furnace controls	0.03	0.3	1.1				
52. CCD - handrails over #2 thickener	0.21	0.1	0.2				
53. PPT - precip. tank covers	1.73	1.5	0.2				
54. YC clean rm	0.03	<0.1	0.3				
55. YC pkg hoods	1.73	2.1	2.3				
56. Scale house operator's room	0.21	0.1	0	0.1	0.1		
57. Scale house - bucking room	0.28	0.3	0.1				
58. Pkg. - walls	0.03	0.3	0.4				
59. Incline conveyor housing at trans. pt.			2.8				
60. Grizzly -air			0.8				
61. SX sample booth table top			0.9	0.5	0.4	0.1	
62. PPT - control rm table top			0.5	wood 0.7 metal 1.2	0.7	wood 0.5 metal 1.2	0.87

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(μCi x 10^{-3})

	5/12/78	6/13/78	7/27/78	8/1/78	9/21/78	10/3/78	11/8/78
31. PPT Centrifuge housing							
32. Enviroclear motor & mount							
33. Top of PPT tanks							
34. Sand filters							
35. Trommel screen platform handrails							
36. Sump housing of incline conveyor							
37. Centrifuge feed to dryer							
38. CCD sump valves & housing							
39. Clarifloc handrails							
40. YC fan floor handrails							
41. Primary YC thickener U-flow							
42. Lunchroom in shop bldg.							
43. Lunchroom in admin.bldg.							
44. Men's dry - guard house							
45. Women's dry - guard house							
46. Scale house - weigh room							
47. Scale house - sample prep.							
48. Grinding sump valves							
49. CCD handrails over #2 thickener							
50. PPT - wood stave tanks							
51. PPT - dryer & furnace controls							
52. CCD - handrails over #2 thickener							
53. PPT - precip. tank covers							
54. YC clean rm							
55. YC pkg hoods							
56. Scale house operator's room							
57. Scale house - bucking room							
58. Pkg. - walls							
59. Incline conveyor housing at trans. pt.							
60. Grizzly -air							
61. SX sample booth table top							
62. PPT - control rm table top			metal 0.5 mr/hr		wood 0.18mr/hr	wood 0.18 mr/hr	

Table E-3 (cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	12/28/78	1/11/79	2/7/79	3/6/79	4/9/79	5/29/79	6/28/79
31. PPT Centrifuge housing							
32. Enviroclear motor & mount							
33. Top of PPT tanks							
34. Sand filters							
35. Trommel screen paltform handrails							
36. Sump housing of incline conveyor							
37. Centrifuge feed to dryer							
38. CCD sump valves & housing							
39. Clarifloc handrails							
40. YC fan floor handrails							
41. Primary YC thickener U-flow							
42. Lunchroom in shop bldg.							
43. Lunchroom in admin.bldg.							
44. Men's dry - guard house							
45. Women's dry - guard house							
46. Scale house - weigh room							
47. Scale house - sample prep.							
48. Grinding sump valves							
49. CCD handrails over #2 thickener							
50. PPT - wood stave tanks							
51. PPT - dryer & furnace controls							
52. CCD - handrails over #2 thickener							
53. PPT - precip. tank covers							
54. YC clean rm							
55. YC pkg hoods							
56. Scale house operator's room							
57. Scale house - bucking room							16 cpm. counter
58. Pkg. - walls							
59. Incline conveyor housing at trans. pt.							
60. Grizzly -air							
61. SX sample booth table top							
62. PPT - control rm table top	0.5mr/hr					8 cpm	

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(μCi x10^{-3})

	11/15-19/79	12/29/79	1/30/80	3/17/80	4/2/80	5/27/80	7/22/80
31. PPT Centrifuge housing							
32. Enviroclear motor & mount							
33. Top of PPT tanks							
34. Sand filters							
35. Trommel screen platform handrails							
36. Sump housing of incline conveyor							
37. Centrifuge feed to dryer							
38. CCD sump valves & housing							
39. Clarifloc handrails							
40. YC fan floor handrails							
41. Primary YC thickener U-flow							
42. Lunchroom in shop bldg.							
43. Lunchroom in admin.bldg.							
44. Men's dry - guard house							
45. Women's dry - guard house							
46. Scale house - weigh room							
47. Scale house - sample prep.							
48. Grinding sump valves							
49. CCD handrails over #2 thickener							
50. PPT - wood stave tanks							
51. PPT - dryer & furnace controls							
52. CCD - handrails over #2 thickener							
53. PPT - precip. tank covers							
54. YC clean rm							
55. YC pkg hoods							
56. Scale house operator's room							
57. Scale house - bucking room	7 cpm (table)						
58. Pkg. - walls							
59. Incline conveyor housing at trans. pt.							
60. Grizzly -air							
61. SK sample booth table top							
62. PPT - control rm table top			1)31 cpm 2)41 cpm			45 cpm	

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	8/18/80	9/29/80	10/22/80	11/5/80	12/16/80	1/30/81	2/5/81
31. PPT Centrifuge housing							
32. Enviroclear motor & mount							
33. Top of PPT tanks							
34. Sand filters							
35. Trommel screen platform handrails							
36. Sump housing of incline conveyor							
37. Centrifuge feed to dryer							
38. CCD sump valves & housing							
39. Clarifloc handrails							
40. YC fan floor handrails							
41. Primary YC thickener U-flow							
42. Lunchroom in shop bldg.							
43. Lunchroom in admin.bldg.							
44. Men's dry - guard house							
45. Women's dry - guard house							
46. Scale house - weigh room							
47. Scale house - sample prep.							
48. Grinding sump valves							
49. CCD handrails over #2 thickener							
50. PPT - wood stave tanks							
51. PPT - dryer & furnace controls							
52. CCD - handrails over #2 thickener							
53. PPT - precip. tank covers							
54. YC clean rm							
55. YC pkg hoods							
56. Scale house operator's room							
57. Scale house - bucking room							
58. Pkg. - walls							
59. Incline conveyor housing at trans. pt.							
60. Grizzly -air							
61. SX sample booth table top							
62. PPT - control rm table top							157 cpm

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(μCi x10^{-3})

	3/23/81	4/15/81	5/19/81	7/30/81
31. PPT Centrifuge housing				
32. Enviroclear motor & mount				
33. Top of PPT tanks				
34. Sand filters				
35. Trommel screen platform handrails				
36. Sump housing of incline conveyor				
37. Centrifuge feed to dryer				
38. CCD sump valves & housing				
39. Clarifloc handrails				
40. YC fan floor handrails				
41. Primary YC thickener U-flow				
42. Lunchroom in shop bldg.				
43. Lunchroom in admin.bldg.				
44. Men's dry - guard house				
45. Women's dry - guard house				
46. Scale house - weigh room				
47. Scale house - sample prep.				
48. Grinding sump valves				
49. CCD handrails over #2 thickener				
50. PPT - wood stave tanks				
51. PPT - dryer & furnace controls				
52. CCD - handrails over #2 thickener				
53. PPT - precip. tank covers				
54. YC clean rm				
55. YC pkg hoods				
56. Scale house operator's room				
57. Scale house - bucking room				
58. Pkg. - walls				
59. Incline conveyor housing at trans. pt.				
60. Grizzly -air				
61. SX sample booth table top				
62. PPT - control rm table top				

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(μCi x10^{-3})

	6/9/77	6/21/77	6/30/77	7/15/77	7/28/77	8/16/77	9/7/77
63. PPT bin walls							
64. PPT railing around bin							
65. Pkg. sample prep. table tops							
66. Leach - control rm record table							
67. Leach - control rm sample table							
68. CCD - control rm table							
69. SX sample booth desk							
70. Dryer area control panel							
71. Pkg.- pkging head							
72. Pkg. - window ledge							
73. Pkg.- sample prep tables							
74. Pkg.- operator's table							
75. Guard house - coffee table							
76. CCD control rm panel							
77. PPT - control rm panel							
78. Grinding - control rm desk							
79. Leaching control rm desk							
80. Leaching control panel							
81. CCD control rm desk							
82. Pkg. - table shelf							
83. PPT - control chair							
84. Shifter office coffee table							
85. YC chem lab sample table							
86. SAG mill control room table							
87. Scale house - coffee rm table							
88. X-ray leak test							
89. Chem lab south hood							
90. PPT pH table							
91. Chem lab YC lab hood							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	10/7/77	11/10/77	12/28-29/77	1/30/78	2/11/78	3/27/78	4/6/78
63. PPT bin walls	0.62	1.0	0.9				
64. PPT railing around bin			2.3				
65. Pkg. sample prep. table tops			YC 3.8				1.23
66. Leach - control rm record table				0.1	0.1		
67. Leach - control rm sample table				0.1			
68. CCD - control rm table				0.1	0.1		
69. SX sample booth desk							0.25
70. Dryer area control panel				0.1	0.1		
71. Pkg.- pkging head				3.5	3.8		
72. Pkg. - window ledge				3.7			
73. Pkg.- sample prep tables				3.1	2.5	0.5	
74. Pkg.- operator's table				0.8		0.3	
75. Guard house - coffee table				0			
76. CCD control rm panel					0.1		
77. PPT - control rm panel					0.4		
78. Grinding - control rm desk							0.12
79. Leaching control rm desk							0.17
80. Leaching control panel							0.08
81. CCD control rm desk							0.17
82. Pkg. - table shelf							0.99
83. PPT - control chair							
84. Shifter office coffee table							
85. YC chem lab sample table							
86. SAG mill control room table							
87. Scale house - coffee rm table							
88. X-ray leak test							
89. Chem lab south hood							
90. PPT pH table							
91. Chem lab YC lab hood							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	5/12/78	6/13/78	7/27/78	8/1/78	9/21/78	10/3/78	11/8/78
63. PPT bin walls							
64. PPT railing around bin							
65. Pkg. sample prep. table tops							
66. Leach - control rm record table							
67. Leach - control rm sample table							
68. CCD - control rm table							
69. SX sample booth desk							
70. Dryer area control panel							
71. Pkg.- pkging head							
72. Pkg. - window ledge							
73. Pkg.- sample prep tables							
74. Pkg.- operator's table							
75. Guard house - coffee table							
76. CCD control rm panel							
77. PPT - control rm panel							
78. Grinding - control rm desk							
79. Leaching control rm desk	0.07						
80. Leaching control panel							
81. CCD control rm desk	0.15						
82. Pkg. - table shelf							
83. PPT - control chair	0.31						
84. Shifter office coffee table							
85. YC chem lab sample table							
86. SAG mill control room table							
87. Scale house - coffee rm table							
88. X-ray leak test							
89. Chem lab south hood							
90. PPT pH table							
91. Chem lab YC lab hood							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
(µCi x10^{-3})

	12/18/78	1/11/79	2/7/798	3/6/79	4/9/798	5/29/79	6/28/79
63. PPT bin walls							
64. PPT railing around bin							
65. Pkg. sample prep. table tops							
66. Leach - control rm record table							
67. Leach - control rm sample table							
68. CCD - control rm table					10 dpm		
69. SX sample booth desk							
70. Dryer area control panel							
71. Pkg.- pkging head							
72. Pkg. - window ledge							
73. Pkg.- sample prep tables							
74. Pkg.- operator's table							
75. Guard house - coffee table							
76. CCD control rm panel							
77. PPT - control rm panel							
78. Grinding - control rm desk							
79. Leaching control rm desk							
80. Leaching control panel							
81. CCD control rm desk							
82. Pkg. - table shelf							
83. PPT - control chair	0.2 mr/hr						
84. Shifter office coffee table	0.2 mr/hr						
85. YC chem lab sample table	0.3 mr/hr						8 dpm
86. SAG mill control room table						6 cpm	
87. Scale house - coffee rm table							10 dpm
88. X-ray leak test							
89. Chem lab south hood							
90. PPT pH table							
91. Chem lab YC lab hood							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	11/15-19/79	12/29/79	1/30/80	3/17/80	4/2/80	5/27/80	7/22/80
63. PPT bin walls							
64. PPT railing around bin							
65. Pkg. sample prep. table tops							
66. Leach - control rm record table							
67. Leach - control rm sample table							
68. CCD - control rm table		1 cpm					
69. SX sample booth desk							
70. Dryer area control panel							
71. Pkg.- pkging head							
72. Pkg. - window ledge							
73. Pkg.- sample prep tables							
74. Pkg.- operator's table							
75. Guard house - coffee table							
76. CCD control rm panel							
77. PPT - control rm panel							
78. Grinding - control rm desk							
79. Leaching control rm desk							
80. Leaching control panel							
81. CCD control rm desk							
82. Pkg. - table shelf							
83. PPT - control chair							
84. Shifter office coffee table							
85. YC chem lab sample table							
86. SAG mill control room table	2 cpm						
87. Scale house - coffee rm table	2 cpm						
88. X-ray leak test	4 cpm						
89. Chem lab south hood	178 cpm						
90. PPT pH table				173 cpm			
91. Chem lab YC lab hood					567cpm		146 cpm

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	8/18/80	9/29/80	10/22/80	11/5/80	12/16/80	1/30/81	2/5/81
63. PPT bin walls							
64. PPT railing around bin							
65. Pkg. sample prep. table tops							
66. Leach - control rm record table							
67. Leach - control rm sample table							
68. CCD - control rm table							
69. SX sample booth desk							
70. Dryer area control panel							
71. Pkg.- pkging head							
72. Pkg. - window ledge							
73. Pkg.- sample prep tables							
74. Pkg.- operator's table							
75. Guard house - coffee table							
76. CCD control rm panel							
77. PPT - control rm panel							
78. Grinding - control rm desk							
79. Leaching control rm desk							
80. Leaching control panel							
81. CCD control rm desk							
82. Pkg. - table shelf							
83. PPT - control chair							
84. Shifter office coffee table							28 cpm
85. YC chem lab sample table							
86. SAG mill control room table							
87. Scale house - coffee rm table							
88. X-ray leak test							
89. Chem lab south hood							
90. PPT pH table							
91. Chem lab YC lab hood							301 cpm

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci\ x10^{-3}$)

	3/23/81	4/15/81	5/19/81	7/30/81
63. PPT bin walls				
64. PPT railing around bin				
65. Pkg. sample prep. table tops				
66. Leach - control rm record table				
67. Leach - control rm sample table				
68. CCD - control rm table				33.3
69. SX sample booth desk				
70. Dryer area control panel				
71. Pkg.- pkging head				
72. Pkg. - window ledge				
73. Pkg.- sample prep tables				
74. Pkg.- operator's table				
75. Guard house - coffee table				
76. CCD control rm panel				
77. PPT - control rm panel				
78. Grinding - control rm desk				
79. Leaching control rm desk				
80. Leaching control panel				
81. CCD control rm desk				
82. Pkg. - table shelf				
83. PPT - control chair				
84. Shifter office coffee table				
85. YC chem lab sample table				
86. SAG mill control room table				
87. Scale house - coffee rm table				
88. X-ray leak test				
89. Chem lab south hood				
90. PPT pH table			34.3 cpm	
91. Chem lab YC lab hood	86 cpm			2.9 cpm

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	6/9/77	6/21/77	6/30/77	7/15/77	7/28/77	8/16/77	9/7/77
92. PPT water fountain							
93. PPT log book							
94. Surface labor shack table							
95. Chem lab coffee table							
96. Met lab - hot plate for YC mix							
97. CCD coffee table							
98. Met lab mobile cart							
99. Elect. box in chem lab hood							
100. PPT control rm coffee table							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	10/7/77	11/10/77	12/28-29/77	1/30/78	2/11/78	3/27/78	4/6/78
92. PPT water fountain							
93. PPT log book							
94. Surface labor shack table							
95. Chem lab coffee table							
96. Met lab - hot plate for YC mix							
97. CCD coffee table							
98. Met lab mobile cart							
99. Elect. box in chem lab hood							
100. PPT control rm coffee table							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd)
($\mu Ci \times 10^{-3}$)

	5/12/78	6/13/78	7/27/78	8/1/78	9/21/78	10/3/78	11/8/78
92. PPT water fountain							
93. PPT log book							
94. Surface labor shack table							
95. Chem lab coffee table							
96. Met lab - hot plate for YC mix							
97. CCD coffee table							
98. Met lab mobile cart							
99. Elect. box in chem lab hood							
100. PPT control rm coffee table							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	12/28/78	1/11/79	2/7/79	3/6/79	4/9/79	5/29/79	6/28/79
92. PPT water fountain							
93. PPT log book							
94. Surface labor shack table							
95. Chem lab coffee table							
96. Met lab - hot plate for YC mix							
97. CCD coffee table							
98. Met lab mobile cart							
99. Elect. box in chem lab hood							
100. PPT control rm coffee table							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	11/15-19/79	12/29/79	1/30/80	3/17/80	4/2/80	5/27/80	7/22/80
92. PPT water fountain						109 cpm	
93. PPT log book						62 cpm	
94. Surface labor shack table							7 cpm
95. Chem lab coffee table							2.8 cpm
96. Met lab - hot plate for YC mix							
97. CCD coffee table							
98. Met lab mobile cart							
99. Elect. box in chem lab hood							
100. PPT control rm coffee table							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	8/18/80	9/29/80	10/28/80	11/5/80	12/16/80	1/30/81	2/5/81
92. PPT water fountain							
93. PPT log book							
94. Surface labor shack table							
95. Chem lab coffee table							
96. Met lab - hot plate for YC mix							79 cpm
97. CCD coffee table							
98. Met lab mobile cart							
99. Elect. box in chem lab hood							
100. PPT control rm coffee table							

Table E-3 (Cont'd.)

Instantaneous Alpha Surface Contamination Monitoring (cont'd.)
($\mu Ci \times 10^{-3}$)

	3/23/81	4/15/81	5/19/81	7/30/81
92. PPT water fountain				
93. PPT log book				
94. Surface labor shack table				
95. Chem lab coffee table				
96. Met lab - hot plate for YC mix				
97. CCD coffee table		2.2 cpm		
98. Met lab mobile cart		92 cpm		
99. Elect. box in chem lab hood		35 cpm		
100. PPT control rm coffee table		1.6 cpm		

1 Sampling began 6/77
Sampling frequency: monthly, or more frequently, except during mill shut down (7/79 to 10/79).
Sampling location: varies; approximately 100 locations have been sampled since 1977.
Sampling method: surfaces are counted with Ludlum Model 43-5 Alpha Scintillator and Model 2 Geiger Counter. Instruments are standardized on a Th-230 source supplied by Eberline. Contamination greater than 100 cpm requires collection of a smear from approximately 6" x 6" area on contaminated surface.

Table E-4

Instantaneous Gamma Monitoring (μrem/hr)1*

Location	YC Bin Platform	YC Dryer Platform	YC Cntrifuge Platform	PCP Cntrl Rm/Ppt Tanks	Mtlurg Lab/YC Anal Lab	Chem Lab	Conveyor Belt/Griz Sump	Feed Belt Pltfm	Scale House/Bucking Room	Grinding/Control Room	YC Drum Storg.	YC Pkg	Ppt	Boiler Rm/Sand Filters	Leach Pltfm	CCD Grnd Fl	CCD 2nd Fl
5/23/77							13(6) 3			39(31) 3					25(4) 2		
5/23/77							51(35) 2			101(70) 2					110(14) 2		
6/15/77	2.6 1	38 1		27(34) 2			76(35) 2			124(72) 4		20(25) 2	38 1	51 1	110(14) 2	150 1	57(27) 2
6/21/77	38 1	76 1		27(36) 2			38 1			107(51) 4		39(52) 2	38 1	51 1	98(31) 2	51 1	64(18) 2
7/15/77	76 1	76 1		2.6 1			88(17) 2	150 1		137(106) 3		98(31) 2	51 1	76 1	88(17) 2		88(17) 2
7/26/77							113(52) 2	120 1		208(170) 4					76(0) 2	330 1	88(17) 2
7/27/77							125(35) 2	307 1		190(149) 4							
7/27/77	76(0) 2			100 1								101(70) 2	120 1	76 1	150(71) 2	200 1	113(52) 2
7/28/77	76 1	100 1		76(35) 2							200 1	150(71) 2	51 1	76 1	88(17) 2	410 1	64(18) 2
8/15/77	25 1	20 1		23(4) 2	25 1	10 1	25 1	75 1	28(4) 2	54(34) 4	1250 1	200 1	20 1	25 1	50(0) 2	80 1	18(11) 2
9/22/77	120 1	50 1		10(0) 2	50 1	30 1	45(7) 2	60 1	25(7) 2	55(24) 4	140 1	350 1		10 1	50(0) 2	70 1	50(0) 2
10/4/77	80 1	80 1		25(7) 2	20 1	30 1	50(42) 2	80 1	30(0) 2	50(22) 4	50 1	200 1	20 1	30 1	50(14) 2	70 1	25(7) 2
11/10/77	180 1	150 1		50(28) 2	20 1	20 1	35(21) 2	20 1	60(14) 2	73(17) 4	380 1	320 1	130 1	40 1	50(28) 2	250 1	30(0) 2
12/22/77	230 1	160 1		45(7) 2	30 1	30 1	33(23) 3	30 1	45(21) 2	85(90) 4	100 1	130 1	110 1	30 1	65(7) 2	190 1	35(7) 2
1/25/78	120 1	120 1		30 1								150(156) 2					

*Format of numbers:

Mean of values measured in areas listed (1 standard deviation)
number of readings

Table E-4 (Cont'd.)

Instantaneous Gamma Monitoring (μrem/hr) (cont'd.)

Location	YC Bin Platform	YC Dryer Platform	YC Centrifuge Platform	PCP Cntrl Rm/Ppt Tanks	Mtlurg Lab/YC Anal Lab	Chem Lab	Conveyor Belt/Gris Sump	Feed Belt Pltfm	Scale House/Bucking Room	Grinding/Control Room	YC Drum Storg.	YC Pkg	Ppt	Boiler Rm/Sand Filters	Leach Pltfm	CCD Grnd Fl	CCD 2nd Fl
1/16-18/78	110 1	160 1	60 1		80(42) 2	40 1	50(16) 4	40 1	50(28) 2	106(137) 5	270 1	40 1	70 1	30 1	47(15) 3	450 1	87(90) 3
2/23/78	180 1	170 1	90 1	40 1			60 1	50 1	50(30) 2	108(131) 5	210 1	85(78) 2	100 1	70 1	40 2	210 1	35(7) 2
3/1/78	160 1	130 1	80 1	40(0) 2			40 1	50 1	40(14) 2	38(10) 4	140 1	80(71) 2		40 1	40(0) 1	210 1	33(11) 2
4/6/78	140 1	170 1	90 1	50 1			60 1			50(14) 2	190 1	115(92) 2			40 1	250 1	
4/28/78	70 1	120 1		50 1							100 1	160 1	40 1	20 1		80 1	30(0) 2
5/12/78	160 1	180 1	120 1	60 1			40 1			58(0) 2	210 1	100(85) 2			40 1	520 1	50 1
7/7/78	280 1	500 1	300 1	40 1	100 1		223(112) 3	120 1		108(83) 6	400(141) 2	90(78) 3	60 1		100 1		
7/11/78									75(21) 2							767(306) 3	40 1
8/3/78		240 1		<50 1			<50 1			127(133) 3	160 1	180 1			50 1		50 1
9/22/78	220 1	200 1	180 1				65(21) 2			65(21) 2	150 1				55(7) 2	180 1	50 1
10/6/78	150(71) 2	500 1	125(35) 2		45(7) 2	30 1	70(0) 2		40 1	77(50) 3	200 1	55(42) 2			50 1	220(28) 2	30 1
11/6/78	200 1	400 1	160 1	40 1	100 1	50 1	173(31) 3	50 1	60(35) 3	322(384) 5	1,600 1	50 1	100(71) 2		50 1	160(115) 3	37(18) 2
12/29/78	250(212) 2	350(354) 2	100 1	80(71) 2	150 1	85(49) 2	190(57) 2		70(28) 2	242(328) 6	900 1	160(125) 3			110(14) 2	907(1,154) 4	45(21) 2
1/11/79	387(360) 3	330(282) 4	250(71) 2	80(82) 3	175(177) 2	22(0) 2	213(54) 4	100 1	43(12) 3	181(258) 8	1111(1540) 2	113(64) 3	40 1	140 1	100(0) 2	570(574) 4	37(6) 3
2/7/79	358(292) 4	460(481) 2	293(110) 3	220(255) 2			194(55) 5		35(7) 2	258(373) 6	640(509) 2	275(318) 2	40 1	40 1	100 1	583(950) 4	35(7) 2

Table E-4 (Cont'd.)

Instantaneous Gamma Monitoring (μrem/hr) (cont'd.)

Location	YC Bin Platform	YC Dryer Platform	YC Cntri-fuge Platform	PCP Cntrl Rm/Ppt Tanks	Mtlurg Lab/YC Anal Lab	Chem Lab	Conveyor Belt/Griz Sump	Feed Belt Pltfm	Scale House/ Bucking Room	Grinding/ Control Room	YC Drum Storg.	YC Pkg	Ppt	Boiler Rm/Sand Filters	Leach Pltfm	CCD Grnd Fl	CCD 2nd Fl
3/6/79	250(212) 2	400(424) 2	300(283) 2	190 1			133(105) 6	100 1		120(157) 5	1500 1	67(31) 3	75(35) 2	40 1	70(14) 2	493(443) 3	40 1
4/9/79	265(191) 2	485(445) 2	300(71) 2	460 1	232(379) 4	464(1118) 7	163(103) 4		80 1	433(648) 4			125(64) 2	50 1	150(0) 2	407(365) 3	45(7) 2
5/29/79	390(297) 2	575(601) 2	337(228) 3	263(265) 2	440(509) 2	2520(3507) 2	138(68) 3	85 1	65(14) 2	278(339) 10		166(126) 4	110 1	50 1	182(45) 3	1198(1369) 6	63(18) 2
6/28/79	140(113) 2	350(212) 2	317(161) 3	250(283) 2	140(108) 3	143(188) 6	84(75) 3		78(11) 2	229(344) 7	505(559) 2	260 1	80 1	40 1	107(51) 3	608(647) 9	80(28) 2
11/19/79	330(240) 2	580(594) 2	350(212) 2	210(198) 2	360(193) 3	408(779) 5	168(161) 4	140 1	75 1	288(452) 6	775(601) 2	255(262) 2	600 1	60 1	170(14) 2	173(184) 6	65(21) 2
12/21/79	300(173) 3	575(601) 2	407(341) 3	210(226) 2	167(126) 3	758(1233) 4	143(140) 5	75 1	80(0) 2	240(343) 10	325(389) 2	131(102) 4	143(95) 2	38(11) 2	135(21) 2	320(396) 5	60(14) 2
1/31/80	15(1	350(354) 2	430 1			930(1273) 3	216(143) 5	65 1	70(28) 2	322(395) 5	100 1	90 1	150 1	40 1	167(50) 3	348(351) 6	80(20) 3
2/18/80	115(33) 4	329(384) 5	174(212) 6	53(12) 3	29(21) 8	21(4) 8	93(70) 7	30(10) 3	45(21) 13	53(34) 15	235(377) 4	29(7) 7	36(7) 7	24(5) 7	88(63) 8	473(595) 11	28(10) 7
3/7/80 9	231(63) 8	403(380) 8	277(239) 7	107(51) 7	144(137) 15	2500 1	140(66) 8	73(31) 3	145(238) 15	329(578) 18	552(505) 5	102(51) 13	115(56) 10	34(18) 9	136(25) 9	900(1006) 18	63(23) 9
4/2/80	156(68) 7	308(214) 7	223(81) 5	144(98) 5	107(50) 9	189(446) 7	103(66) 11	72(26) 3	66(34) 13	186(307) 19	110(46) 3	65(38) 13	65(25) 6	31(4) 7	100(10) 9	319(306) 13	44(5) 6
5/1/80	145(33) 4	208(70) 5	226(212) 5	83(15) 3	94(52) 11	45(12) 6	118(72) 4	<40	68(19) 12	163(301) 12	128(66) 4	93(87) 9	99(31) 7	48(7) 8	94(10) 7	269(237) 16	57(49) 11
6/18/80	184(38) 6	230(24) 4	105(13) 4	57(6) 3	59(36) 13	39(8) 8	111(56) 7	70(14) 2	88(14) 12	196(285) 13	315(150) 4	68(22) 5	100(50) 3	53(5) 7	107(5) 7	183(157) 12	69(53) 8
7/22/80	151(39) 7	284(114) 5	180(84) 5	95(19) 4	112(73) 9	160 1	123(48) 7	90(14) 2	90(18) 12	205(296) 12	265(121) 4	73(23) 7	87(35) 7	43(5) 9	103(8) 7	223(191) 15	88(86) 8
7/22/80																223(186) 15	53(8) 6
8/18/80	156(40) 7	350(138) 6	184(91) 5	113(32) 4	118(72) 8	180 1	121(48) 7	95(7) 2	95(14) 13	225(323) 10	460(114) 5	85(31) 8	93(31) 6	42(4) 6	107(5) 6	226(192) 14	55(8) 6

Table E-4 (Cont'd.)

Instantaneous Gamma Monitoring (μrem/hr) (cont'd.)

Location	YC Bin Platform	YC Dryer Platform	YC Cntri-fuge Platform	PCP Cntrl Rm/Ppt Tanks	Mtlurg Lab/YC Anal Lab	Chem Lab	Conveyor Belt/Griz Sump	Feed Belt Pltfm	Scale House/ Bucking Room	Grinding/ Control Room	YC Drum Storg.	YC Pkg	Ppt	Boiler Rm/Sand Filters	Leach Pltfm	CCD Grnd Fl	CCD 2nd Fl
9/5/80	173(31) 3	297(105) 3	150(46) 3	50 1	178(108) 5	80 1	87(10) 7	65(7) 2	93(29) 6	216(359) 8	185(24) 4	86(29) 7	90(19) 5	47(6) 3	93(10) 6	409(404) 9	48(10) 6
10/10/80	183(37) 6	230(24) 4	105(13) 4	57(6) 3	69(43) 8	45(7) 2	134(59) 7	70(14) 2	87(12) 12	179(291) 12	464(166) 5	69(24) 5	83(29) 3	50(0) 2	106(5) 7	279(232) 12	89(85) 8
11/5/80	173(31) 3	425(167) 4	180(52) 3	55(7) 2	155(116) 6	55(30) 4	100(36) 7	75(7) 2	95(30) 6	220(359) 8	185(26) 4	86(29) 7	90(19) 5	47(6) 3	97(5) 6	302(276) 9	57(10) 6
12/8/80	183(34) 5	207(12) 3	140(74) 4	55(9) 3	61(38) 11	43(5) 6	129(48) 7	100 1	86(32) 8	171(285) 13	403(259) 3	116(81) 9	120(49) 4	47(23) 3	107(5) 6	256(213) 12	61(9) 7
1/14/81	210(42) 5	215(24) 4	130(20) 3	57(6) 3	67(37) 8	40(0) 4	113(45) 7	65(21) 2	89(15) 9	181(273) 11	385(114) 5	72(23) 5	83(29) 3	<50	104(5) 7	273(153) 9	94(95) 7
2/23/81	195(64) 2	200(0) 2	165(64) 2	98(39) 2	130(75) 3	35(5) 6	112(62) 6	50 1	95(29) 7	296(450) 5		85(19) 6	155(78) 2	40(0) 2	123(15) 3	113(88) 4	58(11) 5
2/26/81	258(62) 6	273(12) 3	135(45) 4	63(6) 3	71(40) 9	42(12) 6	120(60) 7	75(21) 2	95(14) 10	113(40) 12					103(5) 6	194(189) 9	83(52 7
3/23/81	195(33) 3	269(130) 4	255(44) 4	110(57) 2	94(110) 6	29(6) 7	126(72) 9	40 1	102(33) 5	200(318) 10	303(35) 3	120(62) 9	150(114) 3	39(3) 4	130(20) 6	507(360) 10	63(8) 6
4/15/81	200(42) 2	210(127) 2	273(94) 4	110(57) 2	85(63) 7	34(9) 7	114(60) 8	50 1	100(28) 5	269(412) 7	147(55) 3	87(25) 6	150(98) 3	54(8) 4	125(17) 4	387(314) 12	63(4) 5
5/11/81	195(33) 3	360(202) 4	255(60) 4	105(57) 2	89(92) 8	30(7) 7	113(75) 10	45 1	99(30) 7	284(449) 7		106(53) 8	146(83) 5	36(7) 5	134(23) 5	395(322) 14	61(5) 6
6/8/81	220(45) 4	251(88) 5	251(44) 6	156(52) 4	65(66) 10	23(14) 10	116(85) 7	67(13) 3	85(20) 9	88(38) 16		142(102) 9	145(81) 5	39(12) 8	143(23) 6	358(393) 16	73(14) 6
7/31/81	272(100) 5	326(143) 6	249(65) 5	113(52) 6					96(37) 10	70(35) 16		105(23) 3	126(65) 10	44(18) 13	111(19) 7	333(319) 15	54(11) 13
4/15/81			Env. Lab 16(4) 5	OCR-IX 49(19) 5	NECR-IX 108(58) 5	Change Room 30 1		Shifters Shack 20 1									
5/11/81			Env. Lab 14(4) 5	OCR-IX 40(19) 9	NECR-IX 89(61) 7	Mill Security Shack 17 1			Safety Room 20 1		Change Room (men) 25 1		(women) 16 1	Shifters Shack 19 1		Stair behind Warehouse 12 1	
6/8/81			Security <20 1														

[1] Monitoring began 5/77
Monitoring frequency: monthly, except during mill shut down (7/79-10/79)
Monitoring locations: approximately 116 locations throughout the mill, in 17 mill areas:

1. Yellowcake Bin Platform
2. Yellowcake Dryer Platform
3. Yellowcake Centrifuge Platform
4. Precipitation Control Room and Precipitation Tanks
5. Metalurgical Laboratory and Yellowcake Analysis Laboratory
6. Radiological Chemistry Laboratory
7. Conveyor Belt and Grizzly Sump
8. Feed Belt Platform
9. Scale House and Bucking Room
10. Grinding Control Room
11. 'ellowcake Drum Storage
12. 'ellowcake Packaging
13. fellowcake Precipitation
14. Boiler Room and Sand Filters
15. Leach Platform
16. CCD Ground Floor
17. CCD-Second Floor

Monitoring method: handheld Ludlum Model 19 Micro R (rem) meter (Appendix I)

Table E-5

Continuous Gamma Monitoring[1]
mrem/sampling interval

Monthly Monitoring Program

Mill Location	9000 Control	9001 Scale House	9002 SAG Mill	9003 SAG Control	9004 CCD	9005 CCD Control	9006 Centrifuge Platform	9007 Dryer	9008 Ppt. Control	9009 Ppt. Bin Platform	9010 YC Pkg	9011 YC Change Room	9012 Chem Lab	9013 YC Storage
Sampling Interval*														
11/29/78-1/26/7	11.0(3.7)**	22.8(3.8)	22.6(6.7)	22.2(5.2)	22.8(5.5)	25.0(5.3)	24.2(6.8)	23.8(3.3)	21.0(2.8)	21.4(2.3)	21.8(2.6)	23.6(5.8)	23.8(5.2)	22.8(4.8)
1/4/79-1/26/79	41.6(11.1)	32.2(8.3)	38.2(5.9)	31.8(5.2)	32.8(20.3)	34.6(11.5)	42.0(10.5)	31.2(8.8)	35.6(7.3)	30.6(8.6)	36.2(4.3)	31.4(4.6)	34.4(10.8)	34.4(12.5)
12/21/78-2/2/79	14.0(4.0)	49.6(7.7)	44.0(8.0)	35.0(7.3)	112.8(41.9)	33.8(5.0)	201.6(60.2)	160.8(17.8)	39.4(9.0)	246.6(78.6)	ND***	45.6(7.6)	44.2(10.1)	153.8(37.6)
1/20/79-3/22/79	ND	66.6(12.0)	63.6(20.0)	47.2(12.4)	81.2(17.1)	42.0(11.4)	208.6(48.2)	218.4(32.9)	52.6(14.0)	232.6(71.2)	208.0(46.6)	55.2(7.0)	55.8(6.5)	133.6(26.1)
1/17/79-4/2/79	22.0(3.7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2/1/79-3/7/79	11.4(2.3)	13.4(3.0)	12.6(3.0)	11.6(1.8)	11.8(3.8)	12.8(4.1)	12.8(2.6)	12.0(2.0)	12.0(3.7)	13.4(4.1)	12.0(1.4)	12.8(4.3)	11.6(1.8)	11.6(2.3)
3/5/79-4/26/79	15.8(4.3)	42.8(11.3)	34.4(9.4)	29.0(8.0)	43.4(12.7)	27.6(10.9)	96.0(26.5)	84.6(21.4)	32.8(9.7)	104.2(30.2)	62.4(12.5)	34.4(10.3)	36.6(5.9)	60.2(33.5)
3/23/79-5/11/79	15.4(1.8)	48.4(24.9)	41.8(7.9)	30.6(13.3)	60.6(15.0)	28.0(7.3)	183.6(45.6)	141.4(30.0)	34.0(2.8)	125.6(15.3)	76.4(19.4)	40.0(8.1)	36.8(7.3)	228.0(66.8)
4/20/79-6/5/79	12.8(2.6)	44.2(5.5)	35.4(3.0)	24.4(2.7)	56.2(10.5)	26.6(2.3)	133.6(21.2)	128.0(49.5)	31.2(7.5)	181.0(72.2)	86.4(12.9)	31.4(6.4)	35.2(6.8)	96.8(27.0)
5/22/79-8/1/79	23.0(5.8)	62.4(20.2)	50.4(11.4)	38.8(5.7)	71.4(14.6)	37.6(5.8)	182.6(33.4)	130.6(10.4)	41.4(14.2)	195.8(57.8)	107.8(37.5)	39.4(5.4)	39.6(9.2)	135.4(34.0)
6/25/79-8/9/79	15.6(3.9)	61.8(8.3)	53.4(10.4)	33.4(7.7)	85.8(12.1)	34.4(6.9)	114.0(15.4)	159.4(76.3)	45.2(31.2)	190.6(38.5)	110.0(36.0)	34.2(5.9)	175.8(51.4)	32.2(6.1)
7/19/79-9/5/79	17.6(6.1)	71.8(5.7)	42.0(6.5)	30.2(4.3)	84.4(17.1)	27.2(8.3)	266.0(67.6)	230.0(39.8)	60.0(9.5)	187.4(36.8)	106.0(17.8)	49.4(18.6)	41.0(7.9)	144.2(32.2)
8/17/79-10/30/79	28.8(10.6)	76.4(12.3)	57.0(11.9)	44.4(3.6)	75.4(5.9)	34.2(3.8)	216.6(58.8)	229.2(104.4)	57.6(16.7)	171.8(34.4)	116.0(17.0)	41.6(6.4)	39.8(7.7)	134.0(24.6)
9/21/79-11/7/79	15.4(3.6)	71.0(13.0)	45.2(11.0)	30.6(3.9)	75.0(14.6)	25.2(4.3)	157.2(60.3)	240.8(53.1)	32.8(3.0)	174.4(46.6)	142.8(25.0)	37.8(12.0)	41.8(9.5)	45.2(12.1)
10/19/79-12/12/79	18.4(1.8)	61.2(17.8)	45.8(7.1)	30.8(5.5)	110.4(56.8)	27.8(7.7)	198.8(38.1)	229.2(49.6)	40.6(12.7)	204.6(45.4)	135.0(29.9)	36.2(10.5)	39.8(16.5)	147.4(36.0)
11/12/79-1/21/80	19.4(3.0)	60.4(1.8)	47.8(6.7)	37.8(2.6)	75.6(8.6)	33.6(4.6)	156.4(33.5)	160.8(35.9)	34.6(4.8)	161.6(18.5)	87.8(11.8)	35.2(5.2)	36.6(6.6)	108.6(14.7)
12/14/79-2/8/80	19.6(1.1)	61.8(15.1)	51.6(5.8)	38.6(3.3)	79.2(13.1)	32.2(6.5)	101.6(28.9)	204.0(40.2)	44.2(10.1)	207.0(118.9)	107.4(11.9)	48.0(6.9)	38.8(6.8)	99.7(14.7)
1/17/80-3/6/80	16.8(3.3)	65.6(16.3)	55.6(9.8)	42.6(5.8)	83.0(6.5)	37.0(5.8)	186.4(33.8)	294.0(114.5)	46.6(13.5)	191.2(72.8)	86.8(37.0)	47.2(7.4)	39.4(5.0)	126.4(17.7)
2/12/80-4/28/80	64.8(25.4)	55.6(5.8)	61.6(14.4)	40.4(5.4)	87.0(22.5)	42.8(13.1)	481.2(281.0)	372.8(372.7)	51.6(6.6)	164.8(12.6)	80.2(16.5)	50.0(9.7)	42.4(5.4)	99.0(19.2)
3/26/80-5/7/80	15.4(3.0)	56.8(8.3)	50.6(17.5)	33.4(7.2)	74.0(14.4)	35.2(10.5)	130.4(7.3)	285.6(270.1)	41.6(5.8)	208.0(48.1)	69.8(21.1)	43.8(11.5)	37.6(3.0)	80.4(7.9)
4/22/80-6/21/80	20.8(2.6)	96.4(10.9)	77.6(16.2)	53.2(8.2)	126.0(32.2)	40.4(5.4)	205.2(17.5)	461.0(121.0)	73.4(11.6)	260.4(54.0)	115.2(7.4)	75.2(27.2)	55.6(10.8)	207.4(26.9)
5/19/80-7/17/80	21.4(5.8)	44.0(5.1)	32.2(5.7)	28.8(8.6)	57.6(15.0)	30.0(8.1)	71.8(18.9)	123.0(50.2)	32.4(8.1)	93.4(8.6)	64.0(16.3)	30.0(6.8)	28.6(5.8)	117.4(25.5)
6/17/80-9/16/80	ND	ND	83.0(17.2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/26/80-8/11/80	14.0(0.0)	80.8(6.2)	ND	32.6(5.2)	79.4(16.0)	31.4(3.0)	129.2(36.5)	216.4(61.6)	54.6(14.5)	202.4(15.1)	96.0(4.5)	58.0(24.7)	46.6(16.0)	221.4(44.9)
7/18/80-8/11/80	ND	ND	7.2(1.7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7/18/80-9/16/80	21.2(2.6)	57.8(14.9)	ND	* 33.0(4.9)	63.8(13.5)	28.8(4.4)	151.4(34.8)	204.4(26.1)	40.8(9.6)	170.8(34.9)	109.2(18.0)	38.2(13.1)	35.6(8.2)	297.2(51.1)
8/18/80-11/7/80	21.0(4.9)	55.0(12.0)	ND	28.4(4.1)	61.8(4.1)	35.2(2.6)	117.4(80.9)	222.8(55.7)	34.2(11.8)	120.4(10.9)	95.6(27.6)	39.0(6.9)	38.2(7.3)	217.4(57.2)
8/18/80-12/1/80	ND	ND	96.0(21.8)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9/15/80-11/10/80	ND	ND	19.8(0.9)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9/15/80-12/1/80	24.8(3.8)	107.0(5.1)	ND	50.8(9.4)	128.2(15.7)	48.4(4.4)	283.6(71.5)	562.4(118.5)	53.0(4.0)	360.0(75.4)	159.4(23.3)	66.0(18.3)	66.4(9.7)	281.8(29.3)
10/15/80-12/16/80	21.8(4.3)	47.6(11.3)	35.4(6.4)	36.2(1.7)	51.8(13.6)	35.0(4.2)	92.8(17.9)	157.2(20.7)	34.6(3.6)	141.8(57.5)	68.0(8.0)	36.8(6.2)	38.2(9.0)	114.0(10.3)
11/17/80-1/28/81	26.4(5.6)	77.2(7.8)	55.8(6.4)	40.0(6.8)	75.4(6.4)	41.0(2.0)	152.2(29.1)	203.2(17.5)	45.4(5.9)	189.4(31.7)	111.6(7.7)	43.6(4.1)	46.4(8.1)	146.4(29.3)
12/16/80-2/11/81	21.0(6.5)	72.8(14.4)	50.4(9.9)	45.4(14.0)	60.4(16.3)	43.0(14.7)	84.8(11.3)	246.6(37.7)	43.8(12.0)	185.8(35.8)	95.8(21.1)	41.8(4.6)	41.4(11.3)	173.6(16.6)
1/19/81-4/15/81	31.2(6.0)	154.9(30.5)	108.8(33.9)	66.5(6.6)	141.4(17.8)	66.8(7.4)	466.6(71.0)	405.5(85.4)	82.0(30.3)	381.4(91.3)	209.5(36.9)	72.8(21.4)	54.2(8.5)	483.7(92.0)
2/18/81-5/6/81	21.8(3.9)	46.3(34.7)	47.1(12.3)	37.4(15.6)	ND	40.8(13.6)	212.5(30.2)	194.0(21.1)	48.0(12.5)	232.2(70.9)	95.5(28.3)	39.1(11.9)	63.1(20.7)	146.6(22.9)
3/25/81-5/14/81	13.4(3.2)	33.5(6.8)	28.5(7.5)	19.4(5.2)	37.5(5.5)	20.9(5.3)	83.6(12.5)	139.7(36.8)	23.1(4.2)	125.4(24.0)	44.6(6.1)	24.3(5.8)	25.8(9.8)	54.5(10.4)
4/20/81-6/17/81	16.0(2.3)	67.5(25.3)	46.3(10.4)	29.4(4.3)	65.2(14.2)	30.5(7.4)	242.0(120.5)	282.5(83.2)	34.9(10.1)	277.8(74.6)	114.5(21.4)	42.5(11.1)	39.4(10.7)	224.0(46.9)

* Date annealed to date read
** Format of entries: mean of 5 readings (2 standard deviations)
*** ND - No Data

Table E-5 (Cont'd.)

Continuous Gamma Monitoring (cont'd.)

Quarterly Monitoring Program

Mill location	1000	1002	1003	1004	1005	1006	1007	1008	1009	1010	
Sampling Interval	Control	Conveyor	Leach Platform	Leach Control	Security	Met Lab	Env. Lab	IX Plant	Bucking Room	Floating TLD	
11/29/78-1/26/79	22.8(5.0)	21.8(2.6)	23.2(5.9)	23.8(4.3)	22.6(8.3)	23.6(4.6)	20.8(3.3)	22.4(5.9)	23.2(7.0)	23.4(3.6)	
12/20/78-4/26/79	33.2(24.6)	293.6(127.4)	155.8(32.7)	84.2(14.4)	ND	42.0(8.8)	37.0(3.2)	84.4(17.4)	86.0(12.6)	37.4(4.1)	
12/20/78-4/26/79	33.2(12.0)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1/4/79-1/26/79	32.6(10.4)	26.8(2.6)	36.8(9.6)	28.2(6.2)	36.4(9.4)	32.0(16.6)	34.0(6.9)	28.6(4.6)	33.8(6.5)	31.8(10.8)	
6/25/79-10/30/79	36.8(4.6)	289.8(79.2)	160.6(19.7)	87.6(38.8)	33.6(9.1)	48.8(9.0)	37.2(7.9)	ND	100.0(41.9)	344.8(76.2)	
9/18/79-1/21/80	44.8(13.8)	331.0(56.8)	155.2(21.7)	103.2(48.6)	36.0(4.0)	42.0(4.2)	31.8(5.2)	87.6(12.2)	88.4(31.2)	37.2(3.6)	
12/14/79-4/28/80	55.6(11.4)	341.6(49.2)	140.2(16.1)	104.2(6.2)	37.0(5.7)	49.2(9.8)	35.2(5.7)	73.0(22.3)	74.6(11.6)	63.6(8.3)	(tailings-operator's shack)
3/17/80-7/17/80	36.6(7.3)	338.4(126.8)	119.6(22.9)	98.8(19.8)	41.4(12.7)	47.8(10.1)	36.2(3.6)	87.2(16.0)	87.0(19.6)	87.2(14.5)	(cyclone shack)
6/26/80-11/10/80	32.4(5.8)	287.2(57.6)	155.2(20.4)	130.4(25.4)	35.0(6.0)	39.0(7.5)	28.8(3.0)	65.0(10.6)	91.0(14.8)	90.4(19.9)	
9/15/80-1/28/81	45.6(3.9)	520.2(46.3)	220.4(29.3)	ND	49.4(7.6)	55.6(5.8)	41.8(5.0)	75.2(13.1)	124.4(20.6)	105.4(8.6)	
12/16/80-5/6/81	42.6(10.2)	518.3(186.3)	325.1(106.3)	204.2(58.8)	42.8(3.9)	60.5(8.8)	42.2(11.6)	134.3(34.2)	136.6(21.6)	131.7(34.2)	

[1]Sampling began 11/78

Sampling frequency: fourteen TLD's are exchanged monthly; ten TLD's are exchanged quarterly.

Sampling locations:

MONTHLY EXCHANGE

9000 - CONTROL - Stored in an office in the administration building at the site.
9001 - Scale House-Operators shack north wall.
9002 - SAG Mill-south of conveyor on I-beam above sink.
9003 - SAG Mill Control Room - north wall above light switch.
9004 - CCD ground floor northwest side of cinder block wall next door to transformer room.
9005 - CCD Control Room on west wall inside left of window.
9006 - Precip. Centrifuge Platform on handrail corner post left or north of stairway.
9007 - Precip. Dryer Platform on north wall I-beam center of wall.
9008 - Precip. Control Room on north wall just above light switch.
9009 - Precip. Bin Platform on center I-beam.
9010 - Yellowcake Packaging on south wall across from packaging heads to the right of the door.
9011 - Yellowcake Change Room on south wall above left sink.
9012 - Chem. Lab. Yellowcake analysis room on south wall near scale.
9013 - Yellowcake drum storage on west fence approximately midway.

QUARTERLY EXCHANGE

1000 - CONTROL - Stored in an office in the administration building at the site.
1002 - 1/2 way up conveyor on west side of weightometer
1003 - Leach Platform on handrail above Tank #6 next to socket
1004 - Leach Control Room on south wall above light switch
1005 - Security Shack-east wall across from north door.
1006 - Met. Lab.-south wall over 480 Volt socket, west 1/3 of wall.
1007 - Environmental Lab.-east wall over desk until moved to new lab.
1008 - IX Plant on handrail at stairway.
1009 - Scale House-Bucking Room-east wall above table about 7 feet from north wall.
1010 - Floating TLD to be used in various areas.

Sampling method: LiF (100) TLD's supplied and analyzed by Eberline (Appendix 1)

Table E-6

Employees Gamma Exposure Monitoring -- Personnel TLD[1]

Employee No.	CY 1977 dose (mrem/period) whole body	CY 1977 skin	CY 1978 dose (mrem/period) whole body	CY 1978 skin	CY 1979 dose (mrem/period) whole body	CY 1979 skin	CY 1980 dose (mrem/period) whole body	CY 1980 skin	1-5/81 dose (mrem/period) whole body	1-5/81 skin
8080	22	22								
8037	11	11								
8036	37	70	61	153	21	21				
8029	ND	52								
84590	12	28	34	67	19	33				
8023	104	183	109	141	137	204	57	167		
3596	33	33								
6906	27	37								
3790	42	42								
3211	11	11								
8033	12	12	10	90	63	153				
8022	0	11	22	77	41	41	168	198		
8039	55	180	ND	17						
84410	43	74	32	87	37	37				
183**	209	252	521	840	71	118				
8002	18	281	41	66	72	30				
8090	0	17	0	10						
8026	24	73	103	183	14	49				
8100		0	0	21	63	74				
8020	0	21	82	260						
8145			87	284	78	78				
8032	0	16	24	124	35	35				
8024	50	50	113	170	98	238				
8156			24	82						
8161			204	341	11	30				
8027			11	42						
8121			56	99	46	119				
8064			10	10						
3785			12	59						
8154			12	12						
4439			72	84	12	53				
8099			62	86	10	44				
8247			0	33	0	12	25	25		
2744**		0	159	169	43	43				
9542**			195	195	59	73				
9602**			12	12	72	1391				
8143			0	28	46	187				
8132			17	56	32	42				
4295			10	24						
4386			0	60	170	520	504	2034		
9685			39	39	51	69				
8369			32	32			14	14		
8375					33	108				
8034					93	336	232	692	62	195
8343					76	168	32	66	39	57
8297							59	133		
8347							31	112		
8482							63	109	10	10
8432							16	44		
8539									0	14

* ND No data
** worker outside mill area

[1] Sampling began 2nd quarter 1977.
Sampling frequency: quarterly with annual summaries; workers with no exposure during period are not tabulated.
Sampling methods: whole body badges; total TLD net counts and penetrating net counts are recorded.
Total net counts = skin dose (mrem)
Penetrating net counts = gamma dose (mrem) = whole body dose (mrem)
Total net counts = penetrating net counts = beta dose (mrem)
LiF (100) TLD's are supplied and analysed by Eberline (Appendix I)

Table E-7

Uranium Inhalation Exposure Monitoring[1]
exposure (rem/year)

Year Ending Employee #	12-31-78 annual exposure	12-31-78 %limit	12-31-79 annual exposure	12-31-79 %limit	12-31-80 annual exposure	12-31-80 %limit	TOTAL EXPOSURE (rem) 1978-1980
8351	0.034	0.23					0.034
8145	1.647	10.98					1.647
3785	0.805	5.37	0.282	1.88			1.087
8089	0.024	0.16					0.024
8364	0.020	0.13					0.020
8176	0.558	3.72	0.211	1.41			0.769
8033	2.645	17.63	1.282	8.55			3.927
8113	0.090	0.60	0.215	1.43			0.305
8024	1.373	9.15	0.354	2.36			1.727
8347	0.037	0.25					0.037
8297			0.354	2.36			0.354
8137	0.728	4.85					0.728
8383	0.011	0.07	0.435	2.89			0.446
8417			0.237	1.58			0.237
8312	0.002	0.01					0.002
8018	0.012	0.08					0.012
8390			1.718	11.45			1.718
8074	0.913	6.07	0.311	2.07			1.224
8052	0.267	1.78					0.267
8441			0.203	1.35			0.203
8036	0.889	5.93					0.889
D-14	0.645	4.30					0.645
8126	1.784	11.89					1.784
8339	0.043	0.29					0.043
8045	0.346	2.31	0.154	1.03			0.500
8504					0.359	2.4	0.359
3128	0.218	1.45					0.218
D-17	0.010	0.07					0.010
8333	0.005	0.03					0.005
8082	0.101	0.67	0.212	1.41			0.313
8138	0.726	4.84	0.399	2.66			1.125
8472			0.219	1.45			0.219
8239			0.207	1.38			0.207
2918	0.418	2.79	0.169	1.13			0.587
8022	2.378	15.85	1.602	10.68			3.980
8023	5.522	36.81	3.396	22.64	1.321	8.8	10.239
8304					0.131	0.9	0.131
D-44	0.837	5.58					0.837
8172			0.373	2.49			0.373
8328	0.309	2.06					0.309
8032	1.375	9.17					1.375
8173	1.924	12.83	1.598	10.65	1.402	9.3	4.924
8007	0.020	0.13			0.078	0.5	0.098
8289	0.403	2.69					0.403
8414			0.197	1.31			0.197
D-45	0.087	0.58					0.087
D-49	0.014	0.09					0.014
8238	0.684	4.56	0.135	0.90			0.819
8050	0.081	0.54					0.081
6564	0.005	0.03					0.005
8482					0.262	1.7	0.262
8254	0.166	1.11					0.166
8388			0.184	1.23			0.184
8111	0.060	0.40	0.625	4.17			0.685
8330	0.125	0.83					0.125

Table E-7 (Cont'd.)

Uranium Inhalation Exposure Monitoring (cont'd.)
exposure (rem/year)

Year Ending Employee #	12-31-78 annual exposure	%limit	12-31-79 annual exposure	%limit	12-31-80 annual exposure	%limit	TOTAL EXPOSURE (rem) 1978-1980
D-46	0.394	2.63	0.234	1.56			0.628
8046	0.588	3.92	0.170	1.13			0.758
D-47			1.234	8.23			1.234
8049	0.070	0.47					0.070
D-48	0.024	0.16					0.024
8026	2.003	13.35	0.484	3.23	0.300	2.0	2.796
8083	0.856	5.71					0.856
6310					0.473	3.2	0.473
8081	0.403	2.69					0.403
8362	0.014	0.09					0.014
8121	0.052	0.35					0.052
8437			0.104	0.69			0.104
8399			0.225	1.50			0.225
8146	0.028	0.19					0.028
4439	0.323	2.15	0.344	2.29			0.667
8271			0235	1.57			0.235
8284	0.599	3.99	0.447	2.98			1.046
8253	0.632	4.21	0.180	1.20			0.812
8357			0.243	1.62			0.243
8117			0.283	1.89			0.283
8143	2.010	13.40	1.657	11.05			3.667
8228	0.290	1.93					0.290
8132	2.145	14.30					2.145
8450			0.179	1.19			0.179
8153	0.058	0.39					0.058
8296	0.014	0.09					0.014
4207	0.005	0.03			0.042	0.3	0.047
8354	0.237	1.58					0.237
8034	3.104	20.69	2.748	18.32	1.391	9.3	7.243
8395			0.234	1.56			0.234
4525	0.002	0.01					0.002
8102	0.751	5.01					0.751
8225	0.016	0.11					0.016
D-50	0.010	0.07					0.010
8085	0.021	0.14					0.021
8345	0.077	0.51					0.077
8262	0.005	0.03					0.005
8148	0.004	0.02					0.004
D-51	0.064	0.43					0.064
D-16	0.012	0.08					0.012
D-52	0.002	0.01					0.002
8127	0.101	0.67					0.101
8090	0.034	0.23					0.034
8156	0.781	5.21					0.781
D-20	0.155	1.03					0.155
8006	0.031	0.21					0.031
8467	0.079	0.53					0.079
D-53	0.009	0.06					0.009
8352	0.076	0.51					0.076
8174	0.014	0.09					0.014
8140	0.719	4.79					0.719

Table E-7 (Cont'd.)

Uranium Inhalation Exposure Monitoring (cont'd.)
exposure (rem/year)

Year Ending Employee #	12-31-78 annual exposure	12-31-78 %limit	12-31-79 annual exposure	12-31-79 %limit	12-31-80 annual exposure	12-31-80 %limit	TOTAL EXPOSURE (rem) 1978-1980
8020	0.164	1.09					0.164
8123	0.004	0.02					0.004
D-54	0.022	0.15					0.022
D-55	0.036	0.24					0.036
8301	0.012	0.08					0.012
8224	0.100	0.67					0.100
D-19	0.108	0.72					0.108
3966	0.004	0.02					0.004
8195	0.005	0.03					0.005
4125	0.066	0.44					0.066
D-56	0.335	2.23					0.335
D-57	0.122	0.81					0.122
8114	0.129	0.86					0.129
D-32	0.018	0.12					0.018
8043	0.385	2.57					0.385
8027	0.425	2.83					0.425
8329	0.092	0.61					0.092
D-33	0.167	1.11					0.167
8209	0.008	0.05					0.008
8227	0.022	0.15					0.022
8151	0.020	0.13					0.020
8005	0.559	3.73					0.559
8305	0.019	0.13					0.019

No. Exposed 129
Max. Quarterly Exposure: 2.346

[1]Monitoring began third quarter of 1977.
Monitoring frequency: quarterly, with annual summaries.
Monitoring method: calculated exposure for all employees in contact with yellowcake dust; time cards used to determine duration of exposure, factored by the uranium concentration in low volume air samples collected in the mill for airborne particulate monitoring.

Table E-8

Bioassay[1]
(mg U/liter urine)

Measurement of uranium accumulation in the urine of workers.

Sample Date / Employee ID	8/77	11/77 to 12/31/77	1/78 to 3/31/78	5/79	12/79	2/80	4/80	12/80 (ppb U_3O_8)
0725	0.0078		<0.005					
2042		0.009+*	<0.005					
2448			<0.005					
2631		0.010+*						
2879		<0.005+*						
2918	0.0082		<0.005					
2959	0.0075							
3279	0.033*		0.005					
3777	0.0001		0.016					
3785	0.0079		<0.005					
3873			<0.005+*					
3892	0.0068		<0.005					
3943	0.034							
3966			<0.005+*					
4125		0.07+*	0.039					
4207	0.039		<0.005					
4439	0.11		<0.005					
4441	0.066*		<0.005					
4486	0.049*		<0.005					
4525	0.037		0.047					
4526	0.068		0.023					
5002		0.07+*	<0.005					
6122		0.010+*						
6153	0.013*		<0.005					
6310								0.014
6407			<0.005					
6500			<0.005+					
6564			<0.005					
6572			0.074					
6692								0.004
8000	0.0078		<0.005					
8001	0.0075		0.079					
8002	0.0079		0.115					
8003	0.0079							
8004	0.0078		<0.005					
8005	0.12		<0.005					
8006	0.068		<0.005					
8007	0.023*		<0.005					
8008	0.0082		<0.005					
8009		<0.005+*						
8010	0.034							
8011	0.016		<0.005					
8012	0.016		0.024					

Table E-8 (Cont'd.)

Bioassay
(mg U/liter urine)
(cont'd.)

Sample Date / Employee ID	8/77	11/77 to 12/31/77	1/78 to 3/31/78	5/79	12/79	2/80	4/80	12/80 (ppb U_3O_8)
8013	0.034							
8014	0.033		<0.005					
8018	0.0087		<0.005					
8019	0.0075							
8020	0.0087		<0.005					
8022	0.0087	0.026	0.007			0.018		
8023	0.0079	0.039	<0.005	0.023**		0.021		
8024	0.0087		<0.005					
8026	0.0087	0.050	<0.005	0.008				
8027	0.0068		0.103*					
8030	0.0078		<0.005					
8032	0.0087	0.005	<0.005					
8033	0.034*		<0.005	0.007				
8034	0.021	0.011	0.005			0.028		0.017
8036	0.0087		0.010					
8037	0.05							
8039	0.068							
8041	0.041							
8042	0.0079							
8043	0.040		0.107					
8045	0.0032*		0.111					
8046	0.034		<0.005					
8048	0.087							
8049	0.0087		<0.005					
8050	0.033		0.047					
8052	0.0079		<0.005					
8053	0.016							
8057	0.015		0.039					
8062		0.010+*						
8067	0.0068							
8068	0.034		0.023					
8074	0.137		0.031					
8075	0.103							
8078	0.016*							
8080	0.08							
8081	0.014		0.022					
8082	0.068		<0.005					
8083	0.0078		<0.005		0.012			
8084	0.066*							
8085			<0.005+*					
8089	0.0082		<0.005					
8090	0.062		<0.005					
8094	0.143		0.017					
8099	0.033*		<0.005					

Table E-8 (Cont'd.)

Bioassay
(mg U/liter urine)
(cont'd.)

Sample Date / Employee ID	8/77	11/77 to 12/31/77	1/78 to 3/31/78	5/79	12/79	2/80	4/80	12/80 (ppb U_3O_8)
8100	0.15		0.061					
8101	0.033*							
8102	0.0078		<0.005					
8104	0.0078		0.037					
8107	0.075		<0.005					
8108	0.0078		<0.005					
8109	0.068							
8110	0.014							
8111	0.087		<0.005					
8112	0.0066		<0.005					
8113	0.016		<0.005					
8114	0.058*		0.031					
8115	0.0066		<0.005					
8116	0.065							
8117	0.022**		<0.005					
8118			<0.005					
8119	0.049							
8121	0.119		<0.005					
8122	0.0087							
8123	0.103		0.111					
8124	0.072		<0.005					
8125	0.076		<0.005					
8126	0.0079		<0.005					
8127	0.103		<0.005					
8129		0.090+*						
8130	0.0082		<0.005					
8131	0.068							
8132	0.103		<0.005	<0.005				
8133	0.016							
8135			<0.005+**					
8136	0.014							
8137	0.068		0.084					
8138	0.043*		0.040					
8139	0.062		0.010					
8140	0.0079		<0.005					
8141	0.033*							
8142		<0.005+*						
8143	0.034		<0.005	0.006				
8144	0.0075							
8145		0.19+	<0.005	0.304**				
8146		0.080+*						
8147		<0.005+*						
8148		0.13+	0.018					
8150		0.19+	<0.005					

Table E-8 (Cont'd.)
Bioassay
(mg U/liter urine)
(cont'd.)

Sample Date / Employee ID	8/77	11/77 to 12/31/77	1/78 to 3/31/78	5/79	12/79	2/80	3/80	4/80	12/80 (ppb U_3O_8)
8151		<0.005+*							
8153		<0.005+*							
8155		<0.005+*							
8156		0.100+*							
8157		0.14+	0.005		0.007				
8159		0.19+	0.039						
8162			<0.005						
8167			<0.005+*						
8168			<0.005+*						
8172			<0.005						
8173			<0.005+*			0.076	0.062	0.006	
8174			0.010+*						
8176			<0.005+*						0.006
8181			<0.005						
8182			<0.005						
8183			<0.005						
8187			<0.005						
8191			0.016						
8192			<0.005						
8203			<0.005						
8235					0.007				
8241						<0.005			
8327					<0.005				
8344					<0.005				
8388					<0.005				
8441					<0.005				
8446									<0.001
8467			<0.005						
8469					<0.005				
8504						<0.005			
8537						0.005			
8539									0.006
8550	0.064								
9143		<0.005+*							
9147	0.013		0.098						
80366			<0.005+*						
80414									<0.001
82326	0.016		<0.005+**						
83357	0.0075		0.046						
83503	0.068								
83681	0.0078								
84209	0.0066		0.122						
84221	0.0075		<0.005						
84263	0.072		0.153						
84410	0.013		<0.005						
84590	0.0066		0.032						
84592	0.0078		<0.005						

Table E-8 (Cont'd.)

Bioassay
(mg U/liter urine)
(cont'd.)

Sample Date / Employee ID	8/77	11/77 to 12/31/77	1/78 to 3/31/78	5/79	12/79	2/80	4/80	12/80 (ppb U_3O_8)
85051	0.013		0.102					
85053	0.0066		<0.005					
85054			<0.005					
85077	0.0075		<0.005					
D-1	0.068							
D-2	0.041							
D-3	0.034		<0.005					
D-4	0.0082		0.017					
D-5	0.016		<0.005					
D-6	0.016		<0.005					
D-7	0.033*		<0.005					
D-8	0.039		<0.005					
D-9	0.020		<0.005					
D-10	0.0066		0.021					
D-11	0.026		0.081					
D-12	0.033*							
D-13		<0.005+*						
D-14		0.18+	<0.005					
D-15		0.100+**						
D-16		<0.005+*						
D-17		0.12+	0.047					
D-18		0.23+	0.038					
D-19			<0.005+*					
D-20			<0.005+*					
D-21			<0.005+*					
D-22			<0.005+*					
D-23			<0.005+*					
D-24			<0.005+*					
D-25			<0.005+*					
D-26			<0.005+*					
D-27			0.008					
D-28			0.028					
D-29			0.027					
D-30			<0.005					
D-31			<0.005					
D-32			<0.005					
D-33			0.007					
D-34			<0.005					
D-35			0.044					
D-36			<0.005					
D-37			0.016					
D-38			<0.005					
D-39			0.023					
D-40			<0.005					

Table E-8 (Cont'd.)

Bioassay
(mg U/liter urine)
(cont'd.)

Sample Date / Employee ID	8/77	11/77 to 12/31/77	1/78 to 3/31/78	5/79	12/79	2/80	4/80	12/80 (ppb U_3O_8)
D-41			0.023					
D-42			0.026					
D-43			<0.005					

+ New employee
* More than one analysis. Latest value recorded. If more than one analysis for same date, the lower value is recorded.
** Multiple analyses performed. Uranium present is probably due to external contamination of sample.

[1]Sampling began 8/77
Sampling frequency: biannual
Sampling method: samples are currently reported for employees exposed to >30% limit (about 10% of the work force). Analyses are performed fluorometrically by Core Laboratories, Albuquerque(12/80 - present); analyses performed by CEP, Inc., (1979-6/1980); analyses performed colorimetrically in-house (1977-1978). Samples were initially collected from all mill employees and incoming employees (1977-1978).

APPENDIX F

TABLE OF CONTENTS

Appendix F

Spill-Related Environmental Radiological Monitoring Data[1]

---

(1) Surface and groundwater (alluvial well) spill-related data in Section B3 Tables as referenced in text. Sediment data is also referenced in text.

Table F-1

Suspended Particulates Monitoring - High Volume and Continuous Low Volume Air Samples

Station	Date	Volume liters x 10^3	U-natural μCi/ml x 10^{-13}	U_3O_8 μg/m_3	Ra-226 μCi/ml x 10^{-13}	Th-230 μCi/ml x 10^{-13}	Pb-210 μCi/ml x 10^{-13}	Po-210 μCi/ml x 10^{-13}
16K-336	9/14/79	159.58	<2.0	ND*	0.2	<0.1	ND	ND
	10/26/79	128.15	0.26	ND	0.02	<0.1	ND	ND
	11/12/79	130.27	2.08	ND	<1.0	<0.1	ND	ND
	12/31/79	163.12	<2.0	ND	<0.1	<0.1	ND	ND
	1/28/80	158.59	<2.0	ND	<0.1	<0.1	ND	ND
	2/28/80	152.93	2.0	ND	<0.1	0.9	ND	ND
	3/17/80	154.06	<2.0	ND	0.1	0.2	ND	ND
	4/8/80	163.12	<2.0	ND	<0.1	<0.1	ND	ND
	5/31/80	152.93	6.2	ND	<0.1	0.5	ND	ND
	6/30/80	152.93	3.32	ND	<0.1	<0.1	ND	ND
	7/25/80	217.0	ND	0.044	0.044±0.018	1.46±0.76	0.203±0.452	0.22±0.115
	8/8/80	228.0	ND	0.110	0.075±0.022	1.38±0.79	0.41±0.56	0.243±0.115
	8/22/80	136.0	ND	0.014	1.2±0.4	9.6±5.5	1.2±2.66	3.04±1.42
	9/3/80	138.0	ND	0.068	1.3±0.4	3.2±3.8	0.00±2.73	0.72±0.55
	9/18/80	138.0	ND	0.028	0.04±0.01	0.82±0.28	0.09±0.12	0.08±0.04
	10/3/80	122.0	ND	0.037	ND	ND	ND	ND
	10/31/80	339.8	0.04	ND	0.03±0.03	0.05±0.06	0.45±0.22	0.0±0.11
	11/14/80	226.5	0.04	ND	0.02±0.04	0.14±0.14	0.93±0.41	0.04±0.22
	11/26/80	0.231	0.25	ND	0.01±0.04	0.18±0.12	0.69±0.28	0.55±0.37
	12/12/80	135.8	0.01	ND	0.01±0.04	0.04±0.17	0.01±0.04	0.15±0.15
	12/30/80	135.8	0.04	ND	0.01±0.03	0.15±0.1	0.01±0.04	0.01±0.22
	1/8/81	135.8	0.02	ND	0.15±0.05	0.36±0.09	0.08±0.03	0.34±0.23
	1/81**	135.92	0.30	ND	0.10±0.03	0.155±0.036	0.389±0.0206	0.103±0.138
	2/81***	241.88	0.383	ND	0.053±0.0145	0.264±0.058	0.368±0.0130	0.255±0.100
	3/81****	178.40	0.206	ND	0.0643±0.0214	0.0662±0.0303	0.171±0.150	0.107±0.107

* ND - No Data

** LLD's (μCi/ml) are: U-natural ($3x10^{-15}$), Ra-226($4x10^{-15}$), Th-230($3x10^{-15}$), Pb-210($4x10^{-14}$), Po-210($2x10^{-14}$)

*** LLD's (μCi/ml) are: U-natural ($1x10^{-15}$), Ra-226($2x10^{-15}$), Th-230($5x10^{-15}$), Pb-210($3x10^{-14}$), Po-210($9x10^{-15}$)

****LLD's (μCi/ml) are: U-natural ($2x10^{-15}$), Ra-226($3x10^{-15}$), Th-230($2x10^{-15}$), Pb-210($3x10^{-14}$), Po-210($1x10^{-14}$)

Table F-1 (Cont'd.)

Suspended Particulates Monitoring - High Volume and Continuous Low Volume Air Samples (cont'd.)

Station	Date	Volume liters x 10^3	U-natural $\mu Ci/ml \times 10^{-13}$	U_3O_8 $\mu g/m_3$	Ra-226 $\mu Ci/ml \times 10^{-13}$	Th-230 $\mu Ci/ml \times 10^{-13}$	Pb-210 $\mu Ci/ml \times 10^{-13}$	Po-210 $\mu Ci/ml \times 10^{-13}$
Pinedale	9/15/79	250.63	<2.0	ND	0.2	<0.1	ND	ND
Crossing	10/24/79	127.46	2.39	ND	0.05	<0.1	ND	ND
	11/13/79	101.95	<2.0	ND	<1.0	<0.1	ND	ND
	12/21/79	178.42	<2.0	ND	0.1	<0.1	ND	ND
	1/24/80	175.81	<2.0	ND	<0.1	<0.1	ND	ND
	2/7/80	116.82	2.1	ND	<0.1	<0.1	ND	ND
	3/14/80	163.12	<2.0	ND	<0.1	1.0	ND	ND
	4/8/80	163.12	5.8	ND	0.1	0.2	ND	ND
	5/21/80	603.22	<2.0	ND	<0.1	0.2	ND	ND
	6/16/80	152.93	<2.0	ND	<0.1	<0.1	ND	ND
	7/4/80	ND	ND	ND	0.081±0.021	2.27±0.85	0.76±0.63	0.267±0.119
	7/17/80	163.12	<2.0	ND	0.004	0.1	ND	ND
	7/21/80	217.0	ND	0.092	0.060±0.023	0.95±0.59	0.558±0.487	0.39±0.14
	8/4/80	236.0	ND	0.042	ND	ND	ND	ND
	8/18/80	254.0	ND	0.039	1.4±0.4	79.1±84.5	0.85±3.04	1.70±1.23
	9/3/80	245.0	ND	0.175	1.0±0.3	13.7±8.3	1.52±2.79	0.50±0.50
	9/18/80	245.0	ND	0.357	0.12±0.03	1.17±0.52	0.49±0.26	0.18±0.12
	10/3/80	208.0	ND	0.170	ND	ND	ND	ND
	10/31/80	277.51	0.04	ND	0.01±0.04	0.03±0.02	0.43±0.36	0.55±0.23
	11/14/80	416.5	1.4	ND	0.00±0.02	0.06±0.07	0.0±0.22	0.1±0.14
	11/26/80	237.86	0.01	ND	0.06±0.03	0.0±0.07	0.4±0.16	0.01±0.13
	12/12/80	135.8	0.26	ND	0.01±0.03	0.21±0.13	0.47±0.05	0.1±0.08
	12/23/80	146.6	0.06	ND	0.01±0.04	0.29±0.12	0.01±0.06	0.03±0.1
	1/8/81	135.8	0.23	ND	0.01±0.03	0.15±0.13	1.0±0.1	0.05±0.08
	1/81*	231.06	0.082	ND	0.0370±0.0153	0.0667±0.0207	0.243±0.135	0.0936±0.0866
	2/81**	460.43	0.228	ND	0.0237±0.0093	0.0868±0.0117	0.211±0.070	0.0836±0.0475
	3/81***	124.59	1.12	ND	0.0944±0.0292	0.0311±0.0047	0.262±0.218	0.0882±0.1351

* LLD's ($\mu Ci/ml$) are: U-natural (2×10^{-15}), Ra-226(3×10^{-15}), Th-230(2×10^{-15}), Pb-210(3×10^{-14}), Po-210(1×10^{-14})

** LLD's ($\mu Ci/ml$) are: U-natural (8×10^{-16}), Ra-226(2×10^{-15}), Th-230(9×10^{-16}), Pb-210(1×10^{-14}), Po-210(5×10^{-15})

***LLD's ($\mu Ci/ml$) are: U-natural (3×10^{-15}), Ra-226(3×10^{-15}), Th-230(4×10^{-15}), Pb-210(5×10^{-14}), Po-210(2×10^{-14})

Table F-1 (Cont'd.)

Suspended Particulates Monitoring - High Volume and Continuous Low Volume Air Samples (cont'd.)

Station	Date	Volume liters x 10^3	U-natural $\mu Ci/ml \times 10^{-13}$	U_3O_8 $\mu g/m_3$	Ra-226 $\mu Ci/ml \times 10^{-13}$	Th-230 $\mu Ci/ml \times 10^{-13}$	Pb-210 $\mu Ci/ml \times 10^{-13}$	Po-210 $\mu Ci/ml \times 10^{-13}$
16K-340	9/14/79	169.92	<2.0	ND	0.2	0.1	ND	ND
	10/26/79	127.44	0.80	ND	0.07	<0.1	ND	ND
	11/12/79	101.95	<2.0	ND	<1.0	0.2	ND	ND
	12/20/79	178.42	<2.0	ND	<2.0	<0.1	ND	ND
	1/27/80	131.40	<2.0	ND	<0.1	<0.1	ND	ND
	2/11/80	163.12	<2.0	ND	<0.1	<0.1	ND	ND
	3/15/80	163.12	<2.0	ND	<0.1	0.8	ND	ND
	4/9/80	163.12	7.9	ND	<0.1	<0.1	ND	ND
	5/23/80	152.93	<2.0	ND	<0.1	<0.1	ND	ND
	6/30/80	152.93	3.10	ND	<0.1	<0.1	ND	ND
	7/23/80	217.0	ND	0.046	0.078±0.023	3.99±1.72	0.216±0.49	0.25±0.12
	8/6/80	263.0	ND	0.038	0.049±0.019	1.05±0.58	0.41±0.44	0.160±0.084
	8/20/80	231.0	ND	0.016	0.7±0.3	0.0±11.2	0.84±2.99	0.18±0.49
	9/3/80	263.0	ND	0.017	0.8±0.4	1.5±11.2	0.56±2.65	2.43±0.96

Table F-1 (Cont'd.)

Suspended Particulates Monitoring - High Volume and Continuous Low Volume Air Samples (cont'd.)

Station (Stake #)	Date	Volume liters x 10^3	U-natural $\mu Ci/ml \times 10^{-13}$	U_3O_8 g/m_3	Ra-226 $\mu Ci/ml \times 10^{-13}$	Th-230 $\mu Ci/ml \times 10^{-13}$	Pb-210 $\mu Ci/ml \times 10^{-13}$	Po-210 $\mu Ci/ml \times 10^{-13}$
Rio Puerco								
(31)	11/16/79	148.28	<2.0	ND	<1.0	0.6	ND	ND
(37-38)	11/28/79	63.44	5.9	ND	<2.0	0.2	ND	ND
(41)	11/30/79	154.4	2.0	ND	<2.0	<0.1	ND	ND
(70)	12/20/79	148.68	<2.0	ND	<2.0	<0.1	ND	ND
(118-119)	2/29/80	152.93	2.4	ND	0.1	<0.1	ND	ND
(118-119)	3/15/80	163.12	<2.0	ND	<0.1	0.5	ND	ND
(149-159)	4/9/80	163.12	<2.0	ND	<0.1	<0.1	ND	ND

Table F-1 (Cont'd.)

Suspended Particulates Monitoring - High Volume and Continuous Low Volume Air Samples (cont'd.)

Station	Date	Volume liters x 10^3	U-natural $\mu Ci/ml \times 10^{-13}$	U_3O_8 $\mu g/m_3$	Ra-226 $\mu Ci/ml \times 10^{-13}$	Th-230 $\mu Ci/ml \times 10^{-13}$	Pb-210 $\mu Ci/ml \times 10^{-13}$	Po-210 $\mu Ci/ml \times 10^{-13}$
Gallup	10/27/80-11/3/80	604.8	0.005	ND	0.01 ± 0.01	0.09 ± 0.01	0.01 ± 0.03	0.15 ± 0.06
	11/3/80-12/1/80	2.410	0.002	ND	0.01 ± 0.003	0.04 ± 0.05	0.02 ± 0.07	0.01 ± 0.03
	12/1/80-12/29/80	2419	0.008	ND	0.05 ± 0.04	0.03 ± 0.03	0.04 ± 0.01	0.05 ± 0.04
	1/81*	3024	0.0080	ND	0.0019 ± 0.0015	0.0093 ± 0.0014	0.266 ± 0.020	0.147 ± 0.019
	2/81**	2086	0.0158	ND	0.0053 ± 0.0016	0.0192 ± 0.0016	0.112 ± 0.019	0.0550 ± 0.0151
	3/18***	1969.2	0.0072	ND	0.0044 ± 0.0017	0.0246 ± 0.0028	0.119 ± 0.020	0.0292 ± 0.0119

* LLD's ($\mu Ci/ml$) are: U-natural(1×10^{-16}), Ra-226(3×10^{-16}), Th-230(1×10^{-16}), Pb-210(2×10^{-15}), Po-210(8×10^{-16})

** LLD'S ($\mu Ci/ml$) are: U-natural(2×10^{-16}), Ra-226(2×10^{-16}), Th-230(2×10^{-16}), Pb-210(3×10^{-15}), Po-210(1×10^{-15})

***LLD's ($\mu Ci/ml$) are: U-natural(2×10^{-16}), Ra-226(2×10^{-16}), Th-230(2×10^{-16}), Pb-210(3×10^{-15}), Po-210(1×10^{-15})

[1] Sampling began 9/79, following tailings dam break
Sampling frequency: monthly (1979 through 8/80); approximately biweekly since 8/80
Sampling locations: originally four locations; presently two locations.

Pinedale Road Crossing: southeast of mill.
Rio Puerco: varies with the stretch of river being worked on, as indicated; stakes are located at 500' intervals from UNC property, starting with #1; discontinued.
16K-336: North bank of Rio Puerco, about 3 mile upstream of confluence with South Fork Rio Puerco, T16N, R17W, Sec. 33.
16K-340: South bank of Rio Puerco, about 2000' north of White Rock Mesa, T16N, R17W, Sec 25; discontinued.
Gallup: at Houston Lumber

Sampling Methods: high volume air samples (all sites except Gallup), are pumped about 3 hours using Staplex air sampler at 840 lpm. Filters (02-10 μm opening) are counted at UNC Church Rock. Gallup station is continuously pumped at 60 lpm using RAS-2 pump.

Table F-2

Vegetation Monitoring - 1979[1]

Sample Site	Sample Date	Total Uranium µg/g	Radium-226 pCi/g	Thorium-230 pCi/g	Lead-210 pCi/g
Veg 1	11/16/79	2.1	1.6±0.1	9.3±0.2	3.7±0.1
Veg 2	11/28/79	0.63	0.67±0.05	0.50±0.04	0.46±0.05
Veg 3	11/21/79	0.32	0.46±0.04	1.9±0.1	0.34±0.08
Veg 4	11/21/79	0.20	0.11±0.03	0.38±0.03	0.25±0.07
Veg 5	11/21/79	2.1	3.8±0.2	13.0±1	1.9±0.1
Veg 6	11/26/79	1.3	1.3±0.1	10.0±1	0.93±0.10
Veg 7	11/26/79	0.38	0.69±0.06	1.2±0.1	0.57±0.09
Veg 8	11/26/79	0.24	0.13±0.04	0.06±0.03	0.37±0.07
Veg 9	11/27/79	0.88	0.46±0.04	1.5±0.9	0.62±0.07
Veg 10	11/27/79	0.20	0.12±0.03	0.22±0.04	1.10±0.08

[1]Sampling date: occurred once in 11/79, after the tailings spill
Sampling locations: ten sites (Veg 1-10) at 5 mile intervals inside the streambank of Pipeline Canyon Arroyo and Rio Puerco from point of spill (Veg 1) to the Arizona state line at the Rio Puerco (Veg 10).
Sampling method: see Appendix D All samples are air dried until no weight change occurs before analysis.

Table F-3

NMEID Ambient Radon Monitoring[1]

Station 600: Springstead Trading Post

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
9/10/79	0.4549±0.0706	
10/15/79	0.5238±0.0744	
10/29/79	0.3903±0.0711	
		0.4563±0.0668 (3 mos.)
12/3/79	0.6085±0.0745	
12/17/79	0.6448±0.1039	
1/14/80	0.162±0.0677	
1/28/80	0.048±0.0660	
2/11/80	0.1504±0.0664	
		0.3227±0.2812 (3 mos.)
		0.3728±0.2264 (6 mos.)
4/21/80	0.012±0.0537	
5/5/80	0.462±0.0680	
5/19/80	0.321±0.0794	
		0.265±0.2302 (3 mos.)
		0.343±0.2214 (9 mos.)
6/2/80	0.166+0.0552	
6/16/80	0.307±0.0800	
6/30/80	0.165±0.0670	
7/14/80	0.965±0.0963	
7/28/80	0.462±0.0806	
8/18/80	0.075±0.0737	
		0.357±0.3274 (3 mos.)
		0.348±0.2533 (1 yr.)
10/6/80	1.084±0.1018	
10/20/80	0.8747±0.0990	
11/10/80	0.8439±0.0997	
		0.934±0.1306 (3 mos.)
12/8/80	1.6604±0.1355	
1/26/81	0.0355±0.0591	
2/9/81	0.4153±0.0826	
2/23/81	0.6811±0.0880	
		0.6981±0.6941 (3 mos.)
		0.799±0.5124 (6 mos.)
3/23/81	0.6257±0.0900	
4/20/81	0.2469±0.0967	
5/11/81	0.3707±0.0823	
		0.4144±0.1931 (3 mos.)
		0.684±0.4667 (9 mos.)
6/1/81	0.3221±0.0791	
7/6/81	0.1442±0.0655	
7/27/81	0.2935±0.0849	
		0.2533±0.0955 (3 mos.)
		0.585±0.4478 (1 yr.)

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 601: Near Pinedale Road

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
8/20/79	0.2979±0.0744	
9/10/79	0.3351±0.0762	
10/15/79	0.6232±0.0762	
10/29/79	0.4655±0.0657	
		0.430±0.1472 (3 mos.)
12/3/79	0.7219±0.0828	
12/17/79	0.0957±0.0123	
1/14/80	0.670±0.0952	
1/28/80	0.461±0.0808	
		0.487±0.2843 (3 mos.)
		0.459±0.2118 (6 mos.)
4/21/80	0.098±0.0555	
5/5/80	0.130±0.0682	
		0.114±0.0226 (3 mos.)
		0.390±0.2368 (9 mos.)
5/19/80	0.447±0.0856	
6/2/80	0.508±0.0878	
6/16/80	0.285±0.0910	
6/30/80	0.235±0.0739	
7/14/80	0.267±0.0691	
7/28/80	0.474±0.0962	
		0.369±0.1199 (3 mos.)
		0.382±0.1963 (1 yr.)
8/18/80	0.135+0.0656	
10/6/80	0.454±0.0889	
10/20/80	1.044±0.1086	
		0.544±0.4612 (3 mos.)
11/10/80	1.6277±0.1088	
12/8/80	1.3543±0.1045	
1/5/81	0.6264+0.1050	
1/26/81	0.4607±0.0864	
		1.0173±0.5624 (3 mos.)
		0.815±0.5412 (6 mos.)
2/9/81	0.1651+0.0842	
2/23/81	0.7379±0.0968	
3/23/81	0.3172±0.0749	
4/20/81	0.0535±0.0627	
		0.3184±0.2998 (3 mos.)
		0.634+0.5152 (9 mos.)
5/11/81	0.3369±0.0689	
6/1/81	1.5102+0.1429	
7/6/81	0.1678±0.0677	
7/27/81	0.8696±0.1091	0.7211±0.6051 (3 mos.)
		0.657±0.5192 (1 yr.)

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 602: Western Boundary of UNC Mill Site

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±) standard deviation of means)
7/14/80	2.055±0.1300	
7/28/80	0.518±0.0809	
3/30/81	0.6531±0.1072	
		0.905±1.014 (3 mos.)
10/680	3.859±0.1576	
10/20/80	3.5725±0.1892	
11/10/80	3.1179±0.1512	
12/8/80	1.3523±0.0986	
		2.975±1.1243 (3 mos.)
		2.088±1.4830 (6 mos.)
1/26/81	0.4578±0.0842	
2/9/81	1.2926±0.1141	
2/23/81	3.8839±0.1786	
3/23/81	0.7544±0.1107	
		1.5971±1.5632 (3 mos.)
		1.910±1.4539 (9 mos.)
4/20/81	0.616±0.0955	
5/11/81	1.0661±0.1065	
6/1/81	1.8090±0.1336	
		1.1637±0.6024 (3 mos.)
		1.750±1.3352 (1 yr.)
7/6/81	0.2110±0.0678	

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 603: North Fence of Mill Site

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
7/28/80	0.557±0.0993	
8/18/80	0.312±0.0635	
9/15/80	1.580±0.1207	
		0.816±0.6726 (3 mos.)
10/20/80	2.345±0.1453	
11/10/80	0.8461±0.1050	
		1.596±1.0599 (3 mos.)
		1.128±0.8302 (6 mos.)
1/26/81	1.2622±0.1112	
2/9/81	0.4708±0.0793	
2/23/81	1.2076±0.1212	
3/23/81	0.9969±0.114	
		0.9844±0.3610 (3 mos.)
		1.064±0.6318 (9 mos.)
4/20/81	0.6696±0.0793	
5/11/81	0.5383±0.0923	
6/1/81	0.9644±0.1053	
		0.7241±0.2182 (3 mos.)
		0.979±0.5680 (1 yr.)
7/6/81	0.6687±0.0998	
7/27/81	1.1486±0.1104	

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 604: Northeast Corner of Mill Site

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
7/14/80	1.318±0.1097	
7/28/80	0.149±0.0614	
8/18/80	0.295±0.0641	
9/15/80	0.934±0.1087	
10/6/80	2.248±0.1346	
		0.989±0.8491 (4 mos.)

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 605: Southeast of Tailings

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
7/14/80	1.255±0.1105	
7/28/80	0.233±0.0761	
8/18/80	0.153±0.0754	
9/15/80	1.545±0.1162	
		0.797±0.7076 (3 mos.)
10/6/80	1.393±0.1186	
10/20/80	1.6530±0.1245	
11/10/80	1.9254±0.1258	
12/8/80	0.4308±0.0712	
		1.351±0.6506 (3 mos.)
		1.074±0.6955 (6 mos.)
1/5/81	1.1418±0.1034	
1/26/81	0.3253±0.0701	
2/23/81	1.3776±0.1455	
3/23/81	0.4141±0.0832	
		0.8147±0.5240 (3 mos.)
		0.987±0.6316 (9 mos.)
4/20/81	0.1452±0.0803	
5/11/81	0.0702±0.0635	
6/1/81	0.7793±0.0977	
		0.3316±0.3896 (3 mos.)
		0.856±0.6394 (1 yr.)
7/6/81	0.2658±0.0849	
7/27/81	1.1393±0.0908	

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 606: East Boundary, Northeast Side of Tailings Piles

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
7/28/80	0.271±0.0711	
8/18/80	0.178±0.0642	
9/15/80	0.825±0.1057	
		0.425±0.3498 (3 mos.)
10/6/80	2.784±0.1589	
10/20/80	0.6838±0.1058	
11/10/80	1.7459±0.1238	
12/8/80	0.6408±0.1066	
		1.464±1.0179 (3 mos.)
		1.018±0.9313 (6 mos.)
2/9/81	0.1438±0.0738	
2/23/81	1.2679±0.1179	
3/23/81	0.1324±0.0800	
		0.5147±0.6523 (3 mos.)
		0.867±0.8555 (9 mos.)
4/20/81	0.7492±0.0990	
5/11/81	0.1303±0.0963	
6/1/81	0.5093±0.0918	
		0.4629±0.3120 (3 mos.)
		0.774±0.7724 (1 yr.)
7/6/81	0.3102±0.0816	

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 607: North of Site at Ford Across Arroyo

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
1/26/81	0.7677±0.0861	
2/23/81	1.5397±0.1102	
3/30/81	0.6531±0.1072	
		0.9868±0.4822 (3 mos.)
4/20/81	0.2150±0.0636	
5/11/81	0.8000±0.0960	
6/1/81	1.0036±0.1070	
		0.6729±0.4094 (3 mos.)
		0.8299±0.4355 (6 mos.)
7/6/81	0.4684±0.0794	
7/27/81	0.6091±0.0728	

Table F-3 (Cont'd.)

NMEID Ambient Radon Monitoring (cont'd.)

Station 610: 0.8 Miles Southwest of UNC Boundary Near NM566

Sampling Date	Ambient Radon Activity (pCi/l ± standard deviation of readings)	Periodic means (±1 standard deviation of means)
1/26/81	0.4596±0.0903	
2/9/81	0.0669±0.0708	
2/23/81	1.446±0.1090	
3/23/81	0.9142±0.1043	
		0.722±0.5942 (3 mos.)
4/20/81	0.4696±0.0805	
5/11/81	0.4296±0.0989	
6/1/81	0.6391±0.0873	
		0.5128±0.1112 (3 mos.)
		0.632±0.4394 (6 mos.)
7/6/81	0.1956±0.0743	
7/27/81	0.7824±0.5580	

[1] Sampling began following the tailings dam breach in 7/79. Additional sites have been added in 1980 and 1981 by the New Mexico Environmental Improvement Division (NMEID), Milan, NM.

Sampling frequency: monthly.

Sampling locations: Nine sites, which do not correspond to UNC monitoring sites are:

- 600: Springstead Trading Post, at windmill
- 601: N of Pinedale Rd., 1/2 mile east of old Churchrock Mine
- 602: Western boundary of site at NM566
- 603: Middle of northern boundary of site, east of NM566
- 604: Northeastern corner of site boundary
- 605: Southeast of tailings impoundment
- 606: Eastern boundary of site, northeast of tailings near borrow pits
- 607: North of site boundary, east of NM566, at ford across Pipeline Arroyo
- 610: 0.8 mile southwest of site on NM566

Sampling method: 48 hour air samples are collected in Tedlar bag, and counted for radon in Lucas Chamber.

APPENDIX G

APPENDIX G

RADIOLOGICAL MONITORING SAMPLING METHODS
(With Safety Procedures)

TABLE OF CONTENTS

UNC MINING AND MILLING

SAFETY PROCEDURES FOR SAMPLING PERSONNEL

A - Respirators

1. Wear a fitted and approved respirator when packaging is in operation.
2. Wear a dust mask when windy conditions exist at the tailings area.
3. Wear fitted and approved respirator during set-up and removal of low volume air sample in yellowcake drying area when dryer is open.
4. Wear fitted and approved respirator when working in the bucking room at the scale house.
5. Wear fitted and approved respirator or dust mask if you feel you need the protection.

B - Ear Protection

1. Wear ear plugs or ear muffs when entering an area requiring ear protection and other areas if you feel you need the protection.

C - Eye, Head and Feet Protection

1. Wear safety glasses, hard hat and steel toed shoes at all times when in the mine, mill and IX property proper.

D - Sampling at Grizzly Sump and Feed Belt

1. Do Not enter if fan light is not on.
2. Recommend that a second individual be present when sampling, for safety purposes.
3. If light is not on check with maintenance as to when it will be operating again.

E. General Radiation Safety

1. Be aware of radiation symbols and signs.
2. Be aware that radioactive material is present in all areas of the mill.
3. Do not eat, smoke or drink in any of the process buildings except in control rooms.
4. Do not eat, smoke or drink in any of the labs with the exception of the lab offices.
5. Be aware of the density gauges in CCD and grinding. Do not loiter in the vicinity.
6. While working around yellowcake be careful not to cause a dusty condition.
7. If you get yellowcake on your hands or body, wash it off immediately using soap and water.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s):
1			[signature]	10/30/81	1, 2

8. Should you get yellowcake in your mouth, eyes, nose, etc., wash them with water and report to the Radiation Safety Coordinator.
9. Should your clothes come in contact with yellowcake it can be removed with a damp cloth or paper towel.
10. Should your clothes, other than coveralls, become greatly soiled with yellowcake it will be necessary to remove them and have them laundered on site. DO NOT take yellowcake soiled clothing home for laundering.
11. All radioactive material in the mill is labeled. Should you have any questions contact the Radiation Safety Coordinator.
12. If you swallow yellowcake it may be necessary for you to give a urine sample.
13. All areas are monitored for airborne particulate contamination. Should you have any questions contact the Radiation Safety Coordinator.
14. All yellowcake cleanup must be performed with water, not by sweeping. If you see sweeping, report it immediately to your supervisor or the Radiation Safety Coordinator.
15. If a density gauge appears to be malfunctioning or out of place notify the Radiation Safety Coordinator. Under no condition attempt to correct the situation.
16. Do not loiter in any areas of the mill - especially in the process building.
17. Do not loiter in the tailings area.
18. If a very dusty condition exists at tailings, one should leave the area or obtain equipment to filter the dust, such as a respirator.
19. Should you see yellowcake spilled on the ground, clean it up or notify your supervisor.
20. If in areas where yellowcake is processed and a dusty or dirty condition is found, notify the Radiation Safety Coordinator.
21. Clean your shoes prior to leaving the Precip or Packaging areas.
22. Do not loiter on the ore pad or in the scale house.
23. If an extremely dusty condition is present at the ore pad, it may be necessary to wear an appropriate respirator.
24. DO NOT - UNDER ANY CIRCUMSTANCES CARRY ORE OR YELLOWCAKE OFF THE MILL SITE.

UNC MINING AND MILLING

ENVIRONMENTAL THERMOLUMINESCENT DOSIMETERS

Frequency - Quarterly (Change no later than the first week of the quarter)

The purpose is to evaluate environmental radiation levels. This system combined with the air monitoring system allows for the evaluation of the release of radiation and radioactive materials from the mill operation. Dosimeters are obtained from Eberline Instrument Corporation, Santa Fe, New Mexico, who will send the dosimeters routinely. The dosimeters are Thermoluminescent Dosimeters (TLD). TLD's are attached to the radon monitoring stations by use of hose clamps. Care must be used to insure proper exchange and proper mounting. Care must be used to insure that the TLD is not covered by the clamp when attaching the TLD holder to the station.

Procedure

1. Receive TLD's from supplier. Check to make sure all eighteen (18) TLD's are present. Report any discrepancies to the supplier. (Refer to Table 1.)
2. Replace TLD's at all environmental air sampling sites with appropriately identifiable TLD. (Refer to Table 1.)
3. Check TLD numbers and location identifiers to insure proper exchange.
4. Package all TLD's and return to supplier in shipping package provided.
5. Review results when obtained from supplier. Investigate any results in excess of 10 mrem/week.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/10/81	1-14

UNC MINING AND MILLING

MILL AREA THERMOLUMINESCENT DOSIMETERS

Frequency - Quarterly, Monthly (Change out 1st week of quarter or month)

The purpose of area TLD's (Thermoluminescent Dosimeters) is to ascertain gamma radiation levels at the work area. This system gives a more realistic determination of the radiation associated with certain areas of the mill. The system allows for the determination of radiation in certain areas. The dosimeters are obtained from Eberline Instrument Corporation, Santa Fe, New Mexico, who will routinely ship the TLD's. TLD's are attached to the monitoring points with the use of duct tape or tape which is similar.

Procedure

1. Receive TLD's from supplier. Check to make sure all TLD's are present. Report any discrepancies to supplier. (Refer to Table 1).

2. Enter areas and replace TLD's with appropriately identifiable TLD. (Refer to Table 1).

3. Check TLD numbers and location identifiers to insure proper exchange.

4. Package all TLD's and return to supplier in the shipping package provided.

5. Review results when obtained from supplier. Investigate any readings in excess of 168 mrem/week.

Table 1

ENVIRONMENTAL TLD LOCATIONS

QUARTERLY EXCHANGE

1000-CONTROL Environmental office
1001-X-RAY Inside door of X-ray room (figure 2-1)
1002-HWUC ½ way up conveyor on west side of weightometer (figure 2-4)
1003-LP Leach Platform on east wall I-beam above tank #5(figure 2-6)
1004-LCR Leach Control room on south wall above light switch (figure 2-6)
1005-SS Security office next to administration building on north wall fire alarm box across from North door (figure 2-12)
1006-ML Met Lab on south wall over 480 Volt socket, west 1/3 of wall (figure 2-10)
1007-EL Environmental Lab, Radiological section, behind north door (figure 2-2)
1008-IX NECR IX plant on stairway I-beam base, south side (figure 2-11)
1009-SHBR Scale House-Bucking Room, north wall behind door (figure 2-3)
1010- Floating TLD - currently located on southeast corner of tailings shack (figure 2-12)
1011- Site A (figure 2-13)
1012- Site B1 (figure 2-13)
1013- Site C (figure 2-12)
1014- Site D (figure 2-12)
1015- Site E (figure 2-12)
1016- Site F (figure 2-12)
1017- Spring S (Springstead at sewage treatment plant)
1018- O C R/IX (Old Church Rock Mine Ion Exchange)

MONTHLY EXCHANGE

9000-CONTROL (Environmental Office)
9001-SH Scale House-Operators shack north wall (upstairs) (figure 2-3)
9002-SM Sag Mill Feed Point, south of conveyor in I-beam above sink (figure 2-5)
9003-SMCR Sag Mill Control Room, north wall above light switch (figure 2-5)
9004-CCD CCD ground floor, northwest side, on door to transformer room (figure 2-7)
9005-CCDER CCD Control Room, west wall inside left of window (figure 2-7)
9006-PCP Precip. Centrifuge Platform, on handrail left or north of stairway (figure 2-9)
9007-PBP Precip. Bin Platform, on center I-beam (figure 2-9)
9008-PCR Precip. Control Room north wall just above light switch (figure 2-9)
9009-PDP Precip. Dryer Platform, north wall, center I-beam (figure 2-9)
9010-YCP Yellowcake Packaging on south wall across from packaging heads to the right of the door (figure 2-9)
9011-YCCR Yellowcake Change Room, south wall above left sink (figure 2-9)
9012-YCCL Yellowcake Chem. Lab, south wall near thermostat control (figure 2-10)
9013-YCDS Yellowcake drum storage, west fence approximately midway (figure 2-8)

NOTE: Locations are illustrated in figures 2-1 through 2-13 for all other than environmental stations.

Figure 2-1

ENVIRONMENTAL TLD LOCATIONS

Mill Operations Building
Chemistry Lab

Q - denotes quarterly exchange

M - denotes monthly exchange

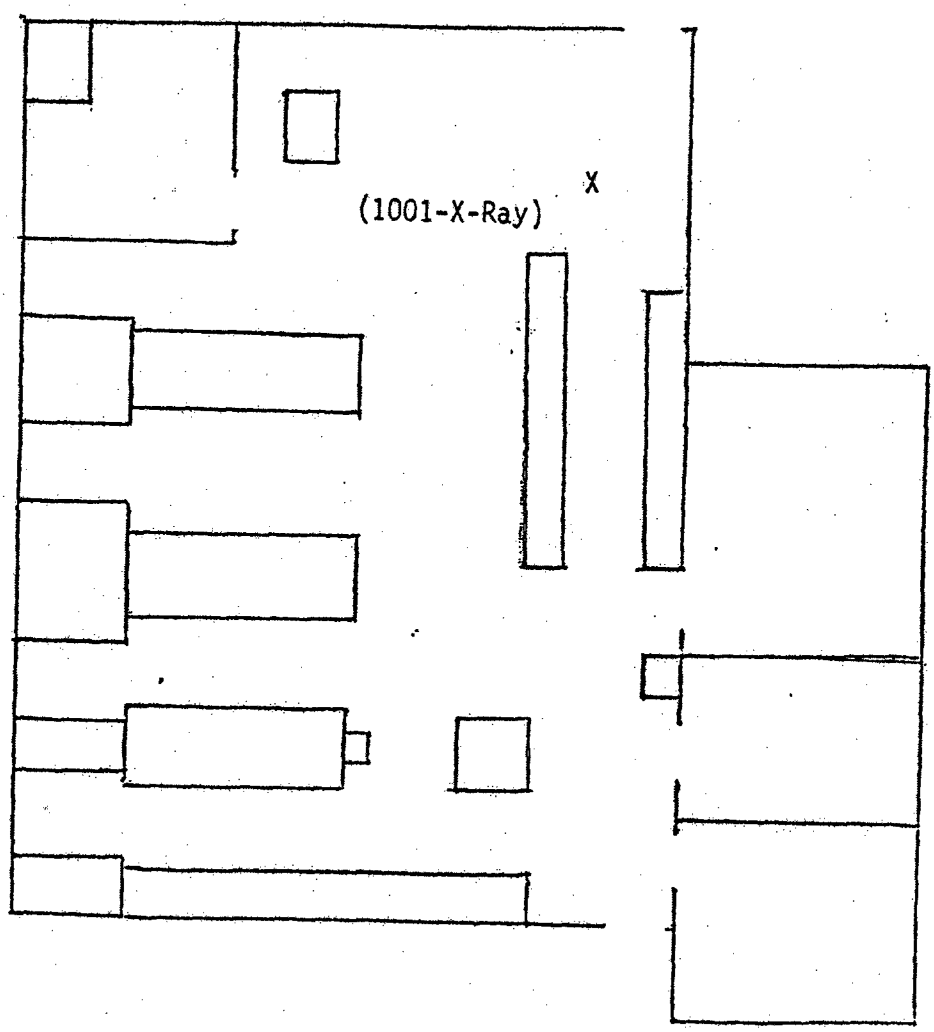


Figure 2-2

ENVIRONMENTAL TLD LOCATIONS

Administration Building
Environmental Lab

Q - denotes quarterly exchange

M - denotes monthly exchange

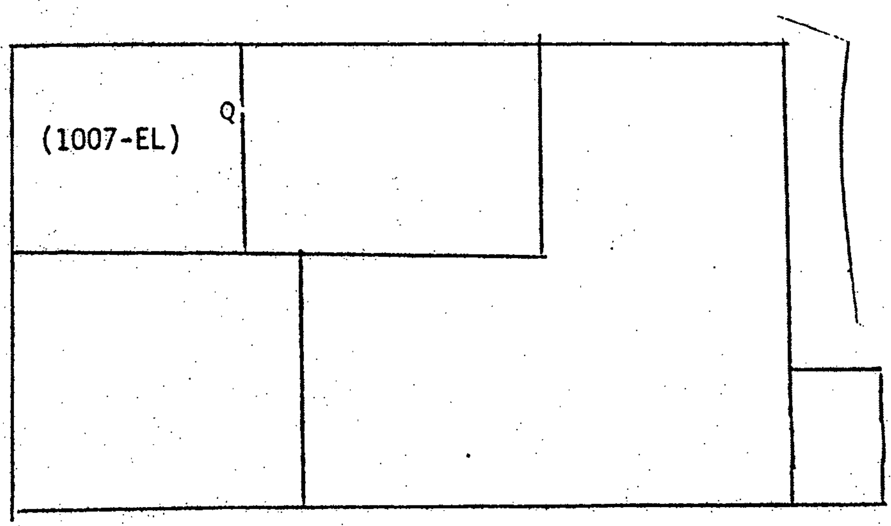


Figure 2-3

ENVIRONMENTAL TLD LOCATIONS
Scale House/Bucking Room

Q - denotes quarterly exchange

M - denotes monthly exchange

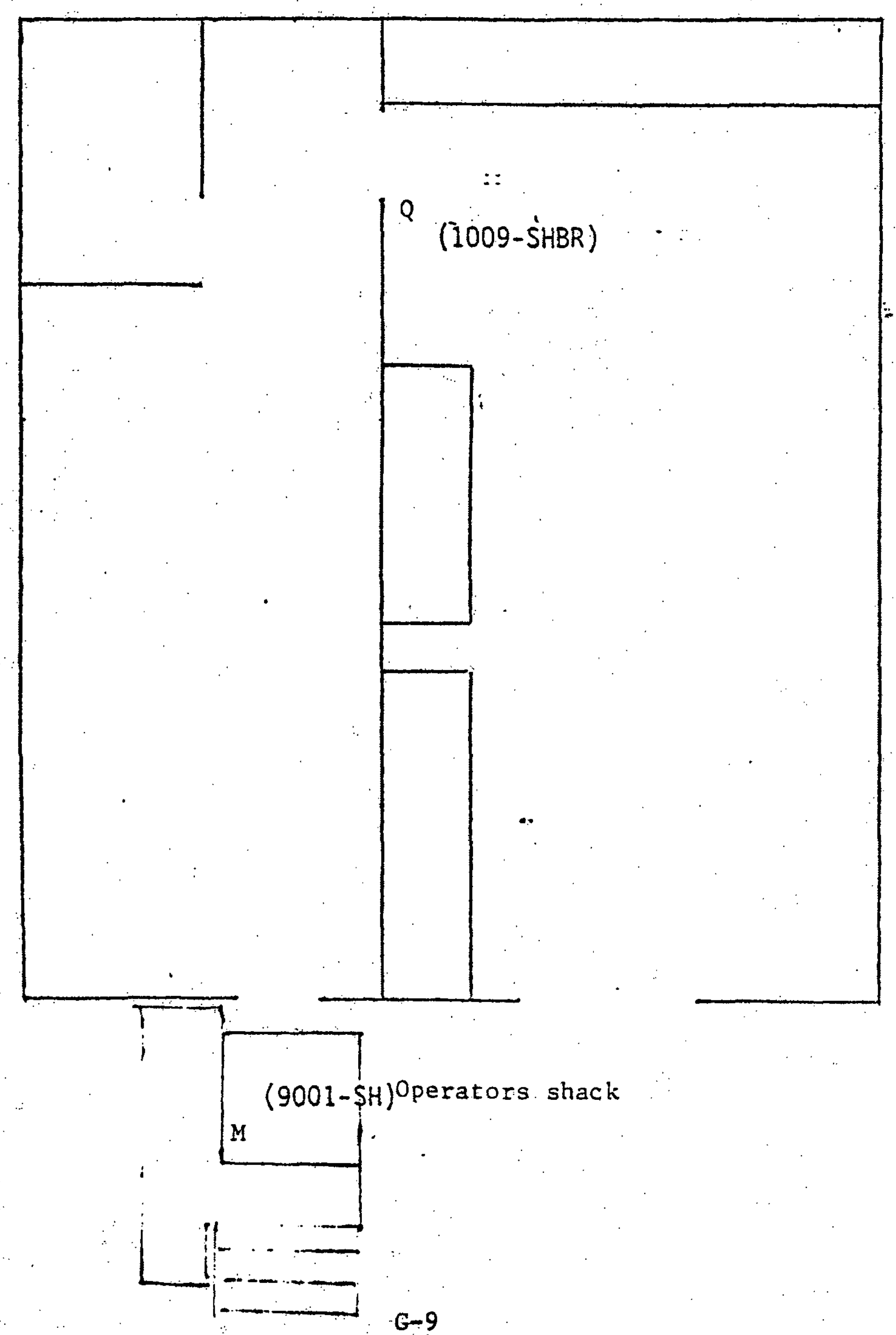


Figure 2-4

ENVIRONMENTAL TLD LOCATIONS
Conveyor Belt to Grinding Building

Q - denotes quarterly exchange

M - denotes monthly exchange

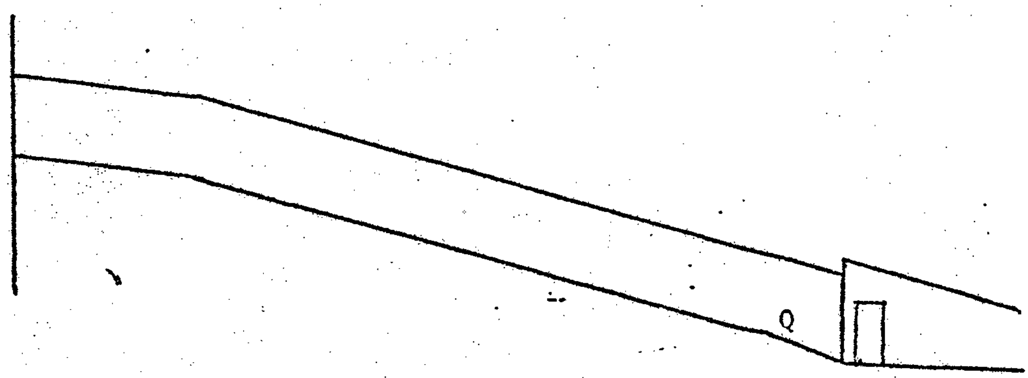
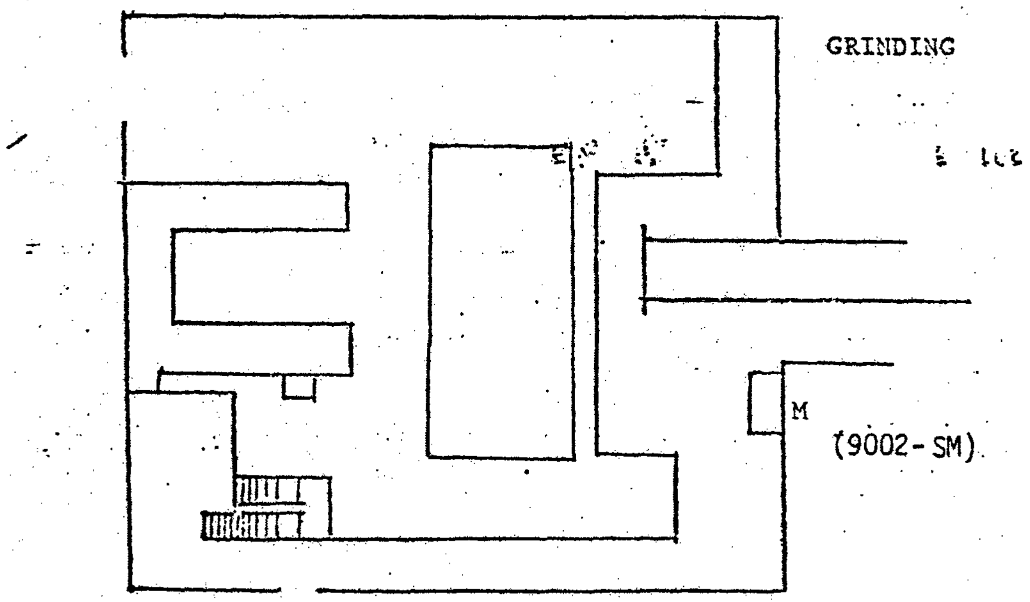


Figure 2-5

ENVIRONMENTAL TLD LOCATIONS
Grinding Building

Q - denotes quarterly exchange

M - denotes monthly exchange



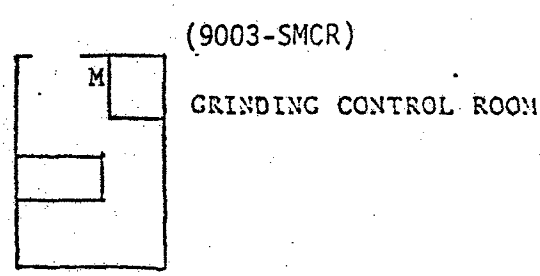


Figure 2-6

ENVIRONMENTAL TLD LOCATIONS
Leach Platform

Q - denotes quarterly exchange

M - denotes monthly exchange

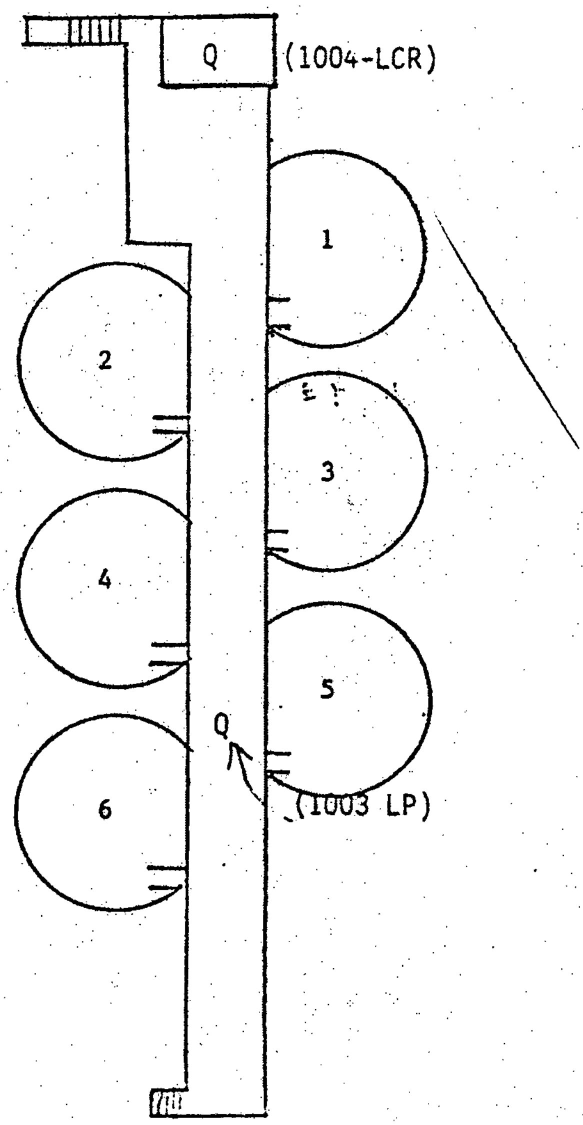


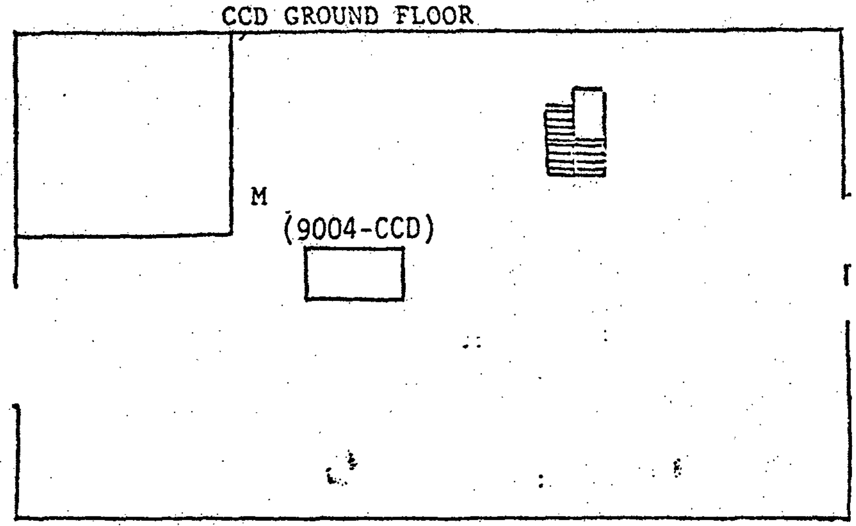
Figure 2-7

ENVIRONMENTAL TLD LOCATIONS
Counter Current Decantation Building (CCD)

Q - denotes quarterly exchange

M - denotes monthly exchange

CCD GROUND FLOOR



CCD 2nd FLOOR

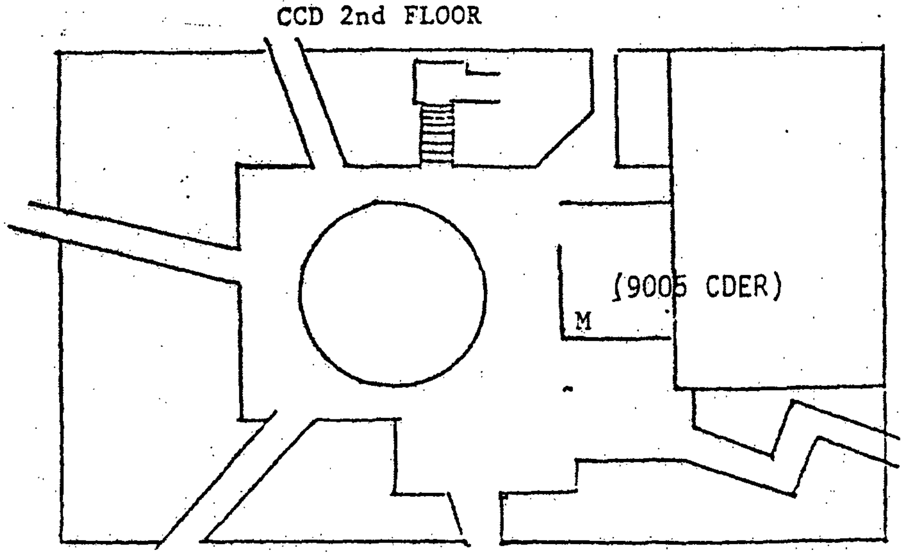


Figure 2-8

ENVIRONMENTAL TLD LOCATIONS
Yellowcake Packaging/Precipitation Building

Q - denotes quarterly exchange

M - denotes monthly exchange

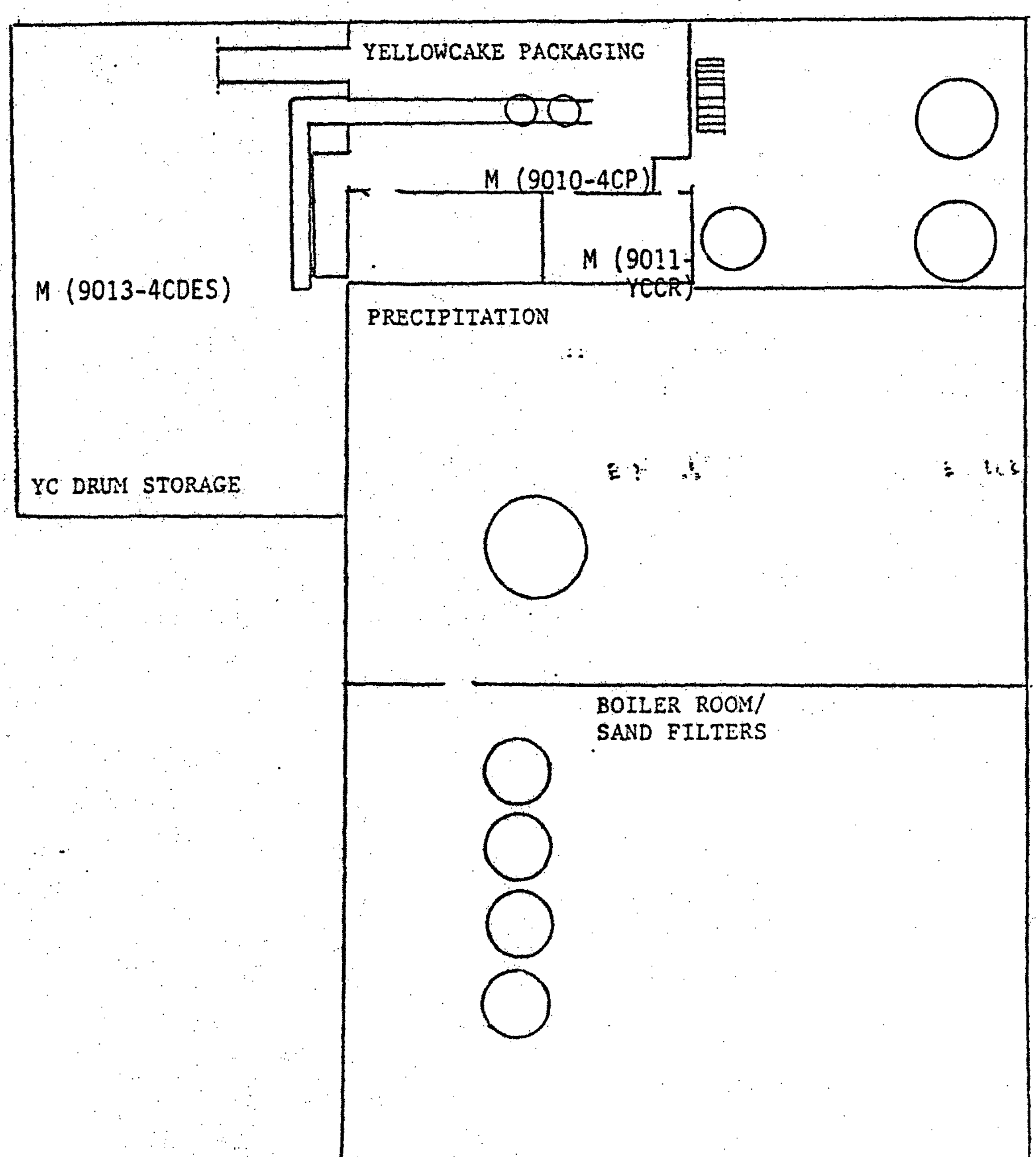


Figure 2-9

ENVIRONMENTAL TLD LOCATIONS
Precipitation Building

Q - denotes quarterly exchange

M - denotes monthly exchange

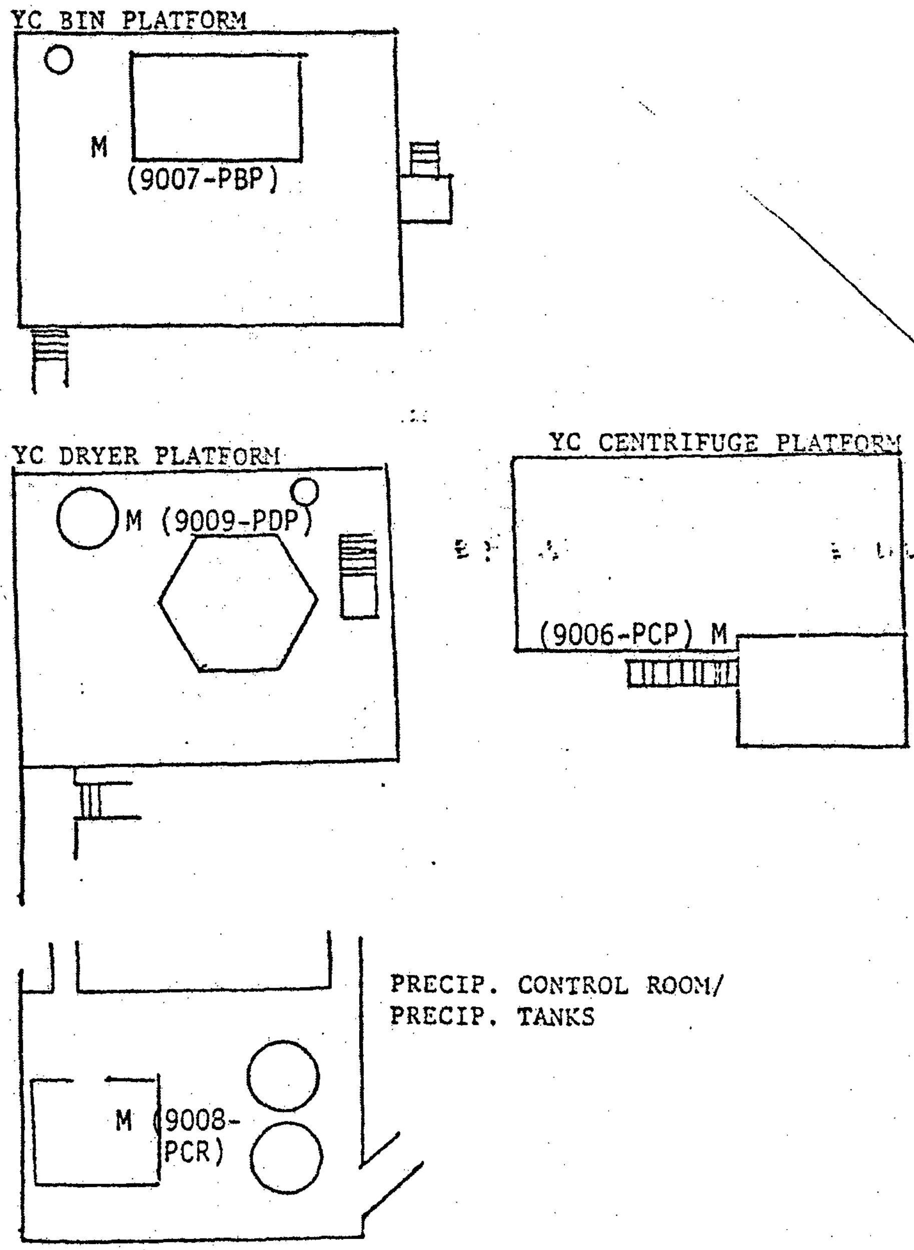


Figure 2-10

ENVIRONMENTAL TLD LOCATIONS
Mill Operations Building

Q - denotes quarterly exchange

M - denotes monthly exchange

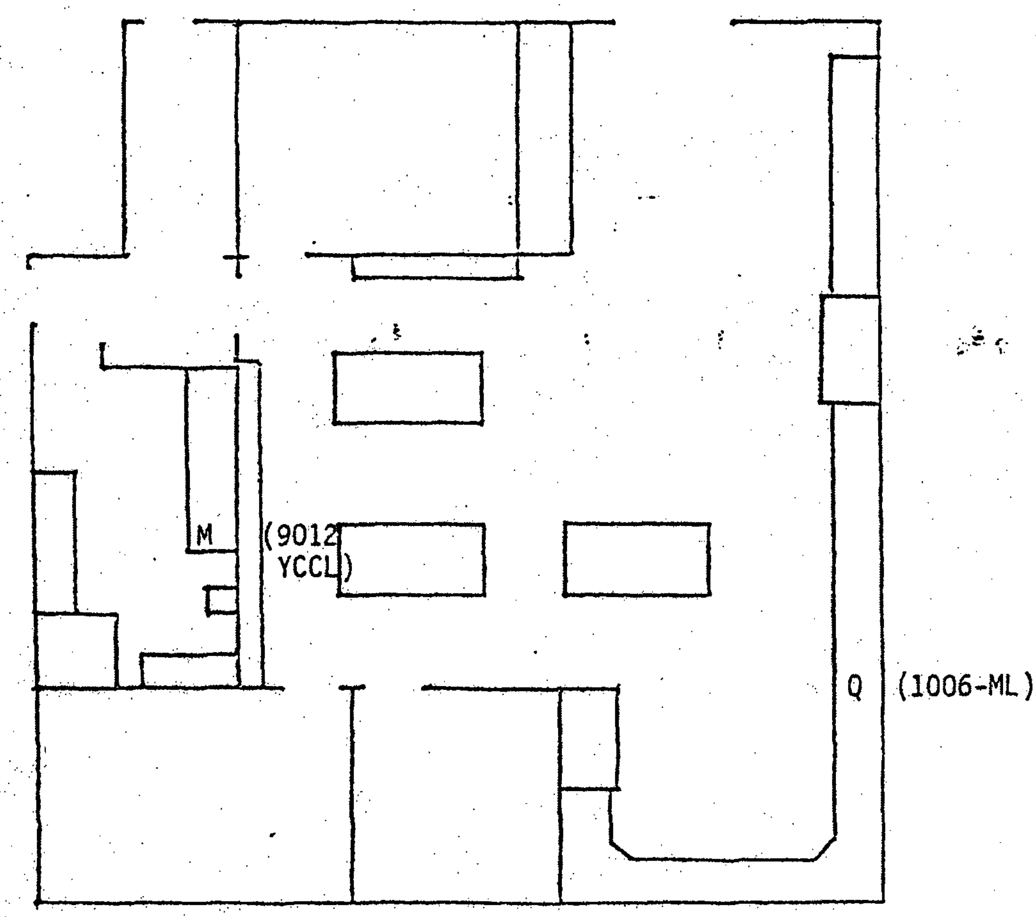
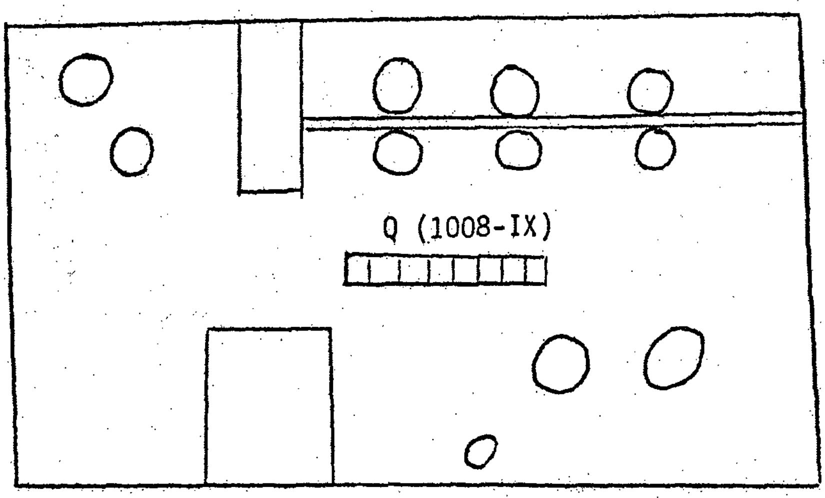


Figure 2-11

ENVIRONMENTAL TLD LOCATIONS
NECR IX

Q - denotes quarterly exchange

M - denotes monthly exchange



UNC MINING AND MILLING

RADON MONITORING

Frequency - Monthly (Change 1st week of each month)

The purpose is to ascertain the amount of radon gas released from milling operations. This monitoring, combined with TLD's and particulate air, will allow for the radiation dose assessment to the population outside the boundaries of the mill operations. Care must be taken to insure against loss, damage or contamination of the sample cup. Sample cups are provided by Terradex Corporation, Walnut Creek, California.

Procedure

1. Obtain track etch cups from supplier.
2. Open foil pouch to insure that the correct numerical sequence of cups have been received and that chips are attached to bottom. Report any discrepancies to supplier.
3. Reseal pouch to prevent contamination and exposure to sunlight.
4. Log all serial numbers on log sheets which are provided by supplier, (Columns 1 through 6). See attachment A.
5. Figures 12 and 13 in EMP - 1 and Table 1 illustrate the sampling sites.
6. Remove cup (serial numerical sequence) from pouch, record date installed (columns 8 through 15), and record site code and month in columns 32 through 54. NOTE: Keep away from direct sunlight.
7. Place white filter patch over opening of cup and hold in place with red retainer ring. NOTE: This filter must be on in order to eliminate influence from daughter products.
8. Remove wing nuts from bottom of sample cup holder and remove holder retaining plate.
9. Remove sample cup and replace with new sample cup. Caution - Check to insure proper assigned sample cup is being placed in sample holder.
10. Note sample removal date on sheet for the set of samples being removed.
11. Remove red retaining ring and white filter patch from cup which was removed from the cup holder.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/30/81	1-3

12. Stack sample cups inside each other with yellow plastic separator sheet between each cup.

13. Pack radon cups in foil packing. Limit 10 cups to foil packet.

14. Return radon cups to supplier with copies of sample log sheets. Care should be taken to insure log sheets are legible and concise. Ship UPS Blue.

15. Review data sheets when received from supplier, attach to and retain with appropriate log sheet copies.

Table 3-1

RADON MONITORING STATIONS

Site	Identification
A	NECR Trailer Park
B-1	Kerr McGee Sewage Treatment at Administration Building.
C	East Side of Tailings.
D	Near Mesa, Southeast side of Tailings.
E	Across from Shaft Construction headquarters.
F	Half-way point on east/west road north of Tailings Pond.
OCR-IX	Southwest corner of grounds at Old Church Rock Ion Exchange Plant.
Springstead Trailer Park	North of Sewage treatment plant Springstead Trailer Park.
Sandfill A	Loading tailings point on southeast corner of building.
Sandfill B	Unloading tailings, NECR west side of building.
NECR Parking	NECR Parking Lot are at old Mine Waste Dump.

R/76 TERRADEX TRACK ETCH FIELD DATA SHEET PROGRAM: ____________ FIELD MAN ____________ PAGE NO. ______

	Serial Number	Installed Mo.	Installed Da.	Installed Yr.	Removed Mo.	Removed Da.	Removed Yr.	Customers Notes and Additional Data	Lab Use	
	1–6	8–9	11–12	14–15	17–18	20–21	23–24	26–54	56–65	
1										1
2										2
3										3
4										4
5										5
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
	1–6	8–9	11–12	14–15	17–18	20–21	23–24	26–54	56–65	

UNC MINING AND MILLING

LOW VOLUME AIR SAMPLE

Frequency - Bi-weekly during the mill operations.

The purpose of the low volume air sample is to determine the particulate content of air in various areas of the mill. It is from these samples that radiation exposure to the lungs is determined. Sampling equipment consists of an Eberline RAS-1 air sampler, glass fiber filter patches, stopwatch and extension cord (if needed). The samples are analyzed for UNC's Alpha, Beta and Total Uranium. Analysis is performed by the Environmental Radiochemistry lab. All samples are taken for at least 60 minutes. Care should be taken in the handling of sample patches to eliminate the possibility of contamination and erroneous results. Samples should sit for approximately one week prior to being analyzed to allow for the decay of short-lived radon daughters.

Sampling Preparation

1. Preweighed Gelman 2 inch in diameter filter patches and place in plastic petri dishes. NOTE: Handle filters with forceps at all times.

2. Using masking tape secure the lids on the petri dish.

3. Label dish with following information: location, rate, time-on, time-off and date.

Sampling Procedure

1. There are ten routine sample locations (see figure 4-1 and 4-5), however, non-routine samples may be requested.

2. Place sampler in location as illustrated in the attached figures, or if non-routine place in area which is not on the floor. If the sampler is on the floor the sample is taken of the air around the feet, not at head level. It is important to remember that the sample is a breathing zone sample, therefore, collect at least three (3) feet above the floor.

3. Place filter in holder, switch on sampler, read flow meter (on top of sampler) 30LPM ±20% is ideal. Note: location, start time, flow rate, date on the petri dish.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/13/81	1-7

4. Note ending time on petri dish. After sample is complete remove patch, place back in petri dish, reweigh and take sample to lab.

5. Repeat Steps 2 through 4 until all samples are taken.

6. Be sure samples are entered in lab log.

Non-Routine Samples

1. These are special samples such as when the yellowcake dryer is open or when requested by operations, the Radiation Safety Coordinator or the Director of Environmental Operations.

2. These samples are always run for at least 60 minutes.

Notes:
1. Easiest to sample, Sag Mill, Grizzly Sump, Feed Belt Platform, Leach Platform in one set, on one day and
2. Sample 4 in precip. (PBP, PCP, PDP, under main yellowcake Thickner and 2 in yellowcake, (change room and packaging) in one set on a different day.
3. Since 3 samples in precip. yellowcake area require heavy three pronged plug and 3 require normal plug, try to set up 1 of each at a time.

Figure 4-1

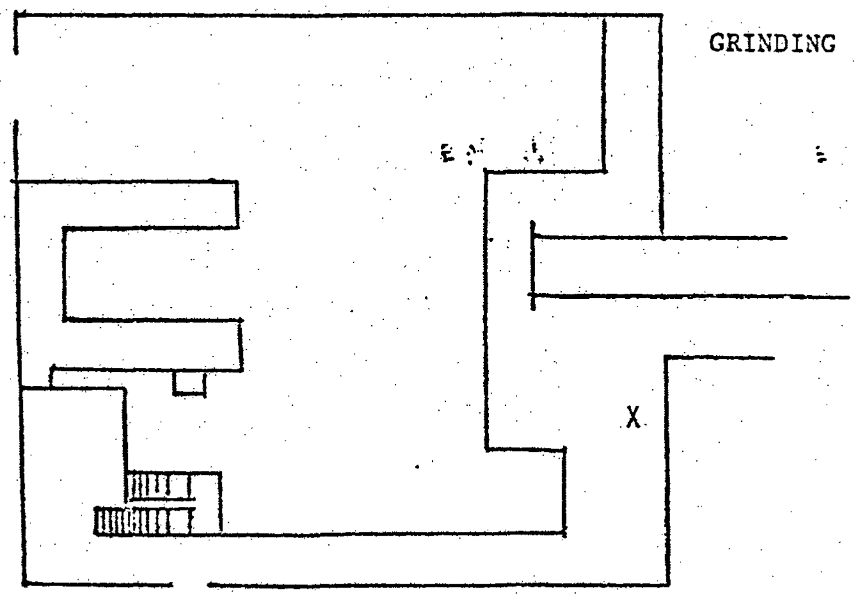
LOW VOLUME AIR SAMPLE

Grinding Building

1 Sample in area shown (X) "Sag Mill Feed Point"

"e" shows electrical outlet

"He" shows need for heavy, three pronged plug



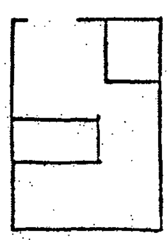


Figure 4-2

LOW VOLUME AIR SAMPLE

Leach Platform

1 Sample in area shown (X) "Leach Platform"

"e" shows electric outlet

"He" shows need for heavy, three pronged plug

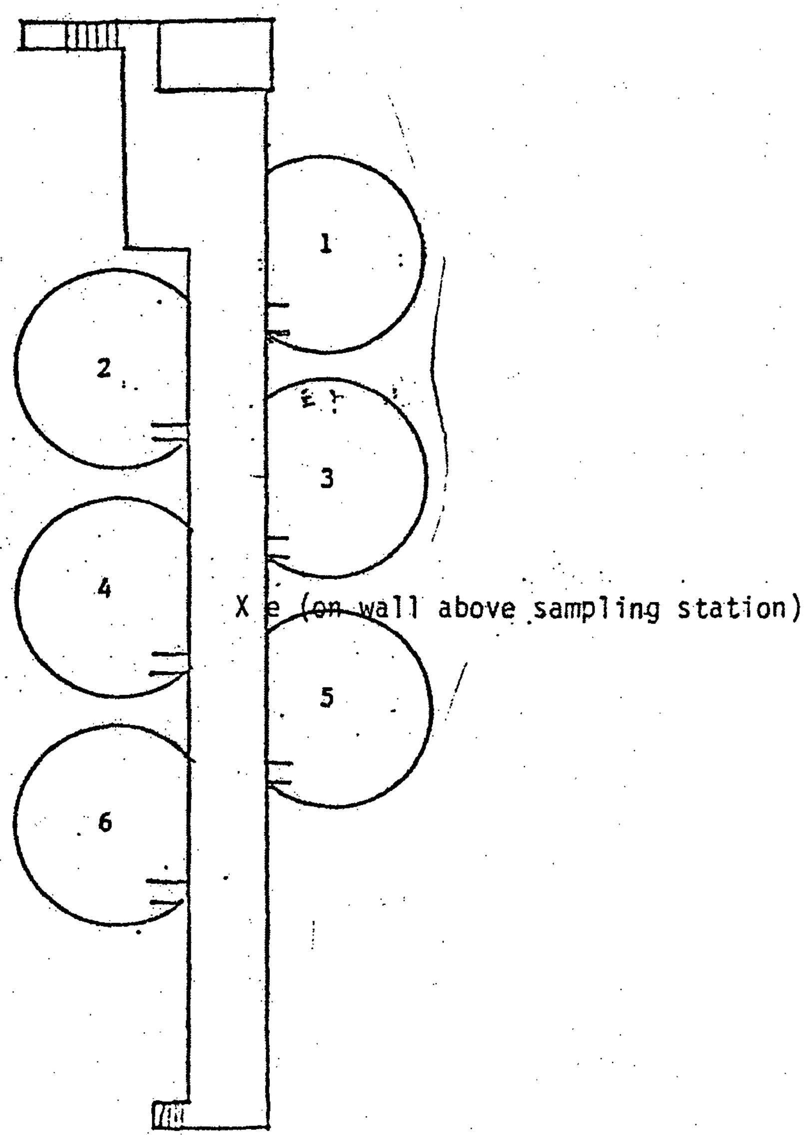


Figure 4-3

LOW VOLUME AIR SAMPLE

Conveyor Belt to Grinding Building

2 Samples in areas shown (X) "Grizzly Sump, Feed Belt Platform"

"e" shows electrical outlet

"He" shows need for heavy, three pronged plug

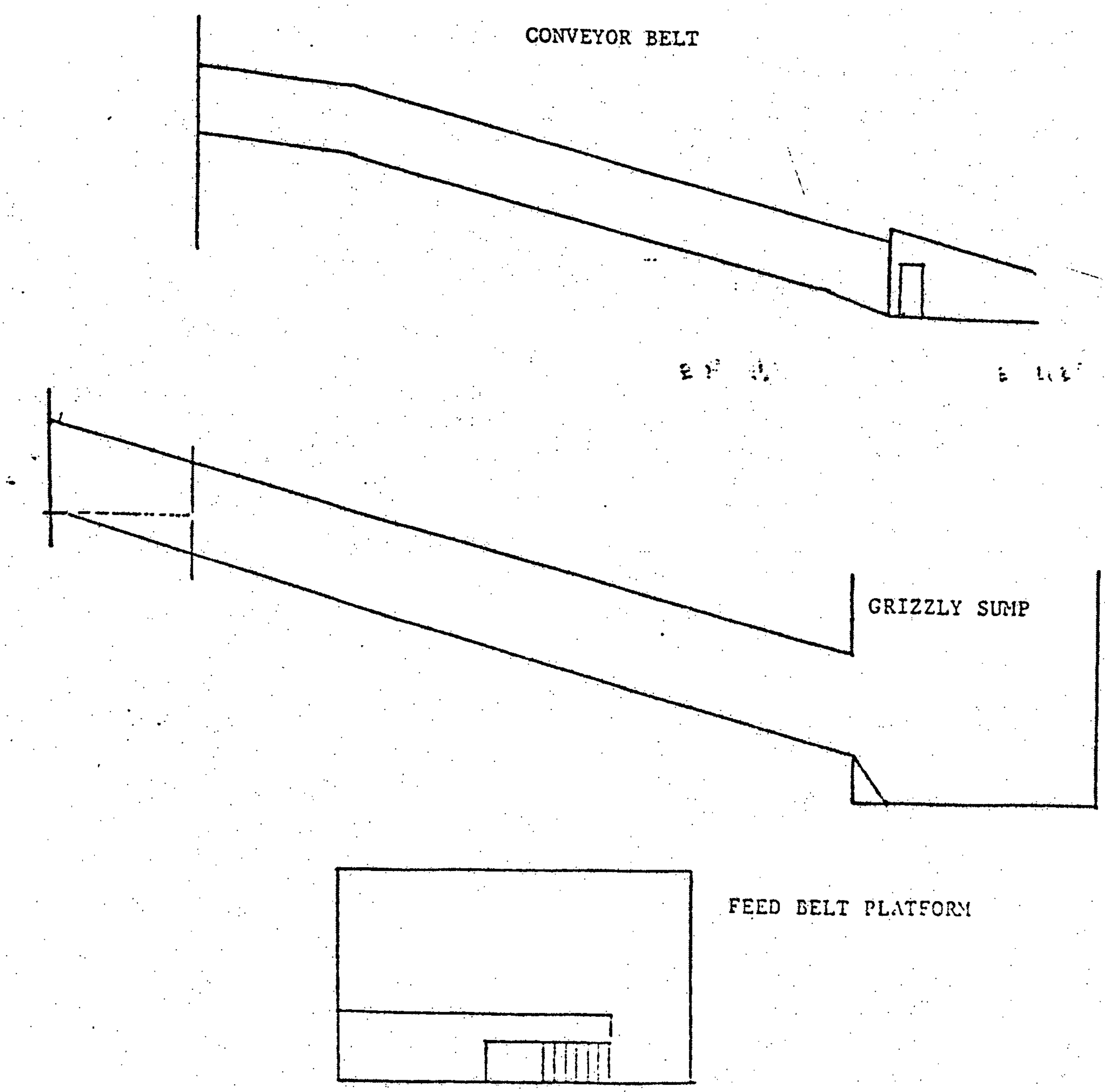


Figure 4-4

LOW VOLUME AIR SAMPLE

Yellowcake Packaging/Precipitation Building

3 Samples in areas shwn (X) "YCP - Yellowcale Packaging, YCCR - Yellowcake Change Room, Under main YC Thickner"

"e" shows electrical outlet

"He" shows need for heavy, three pronged plug

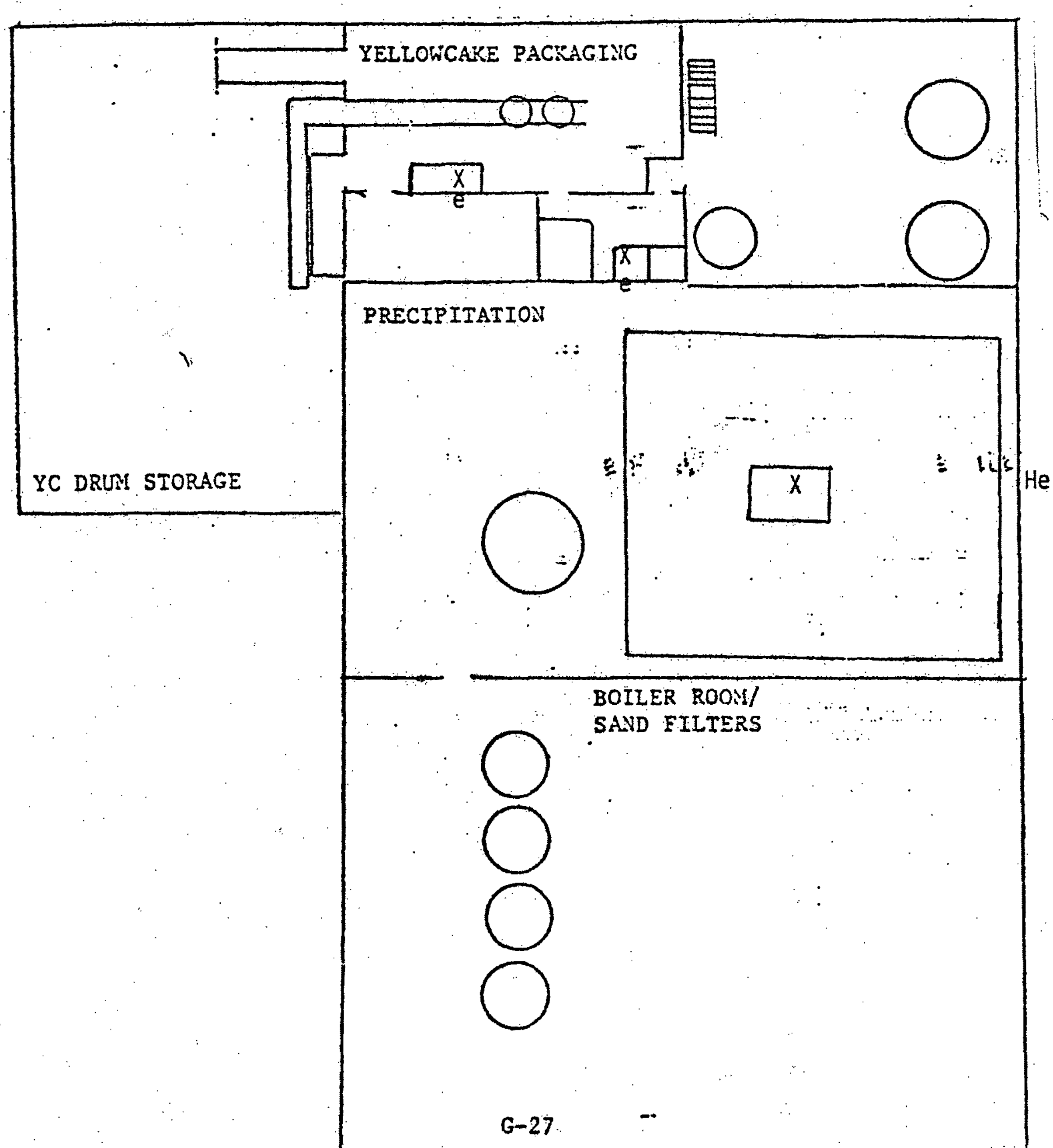


Figure 4-5

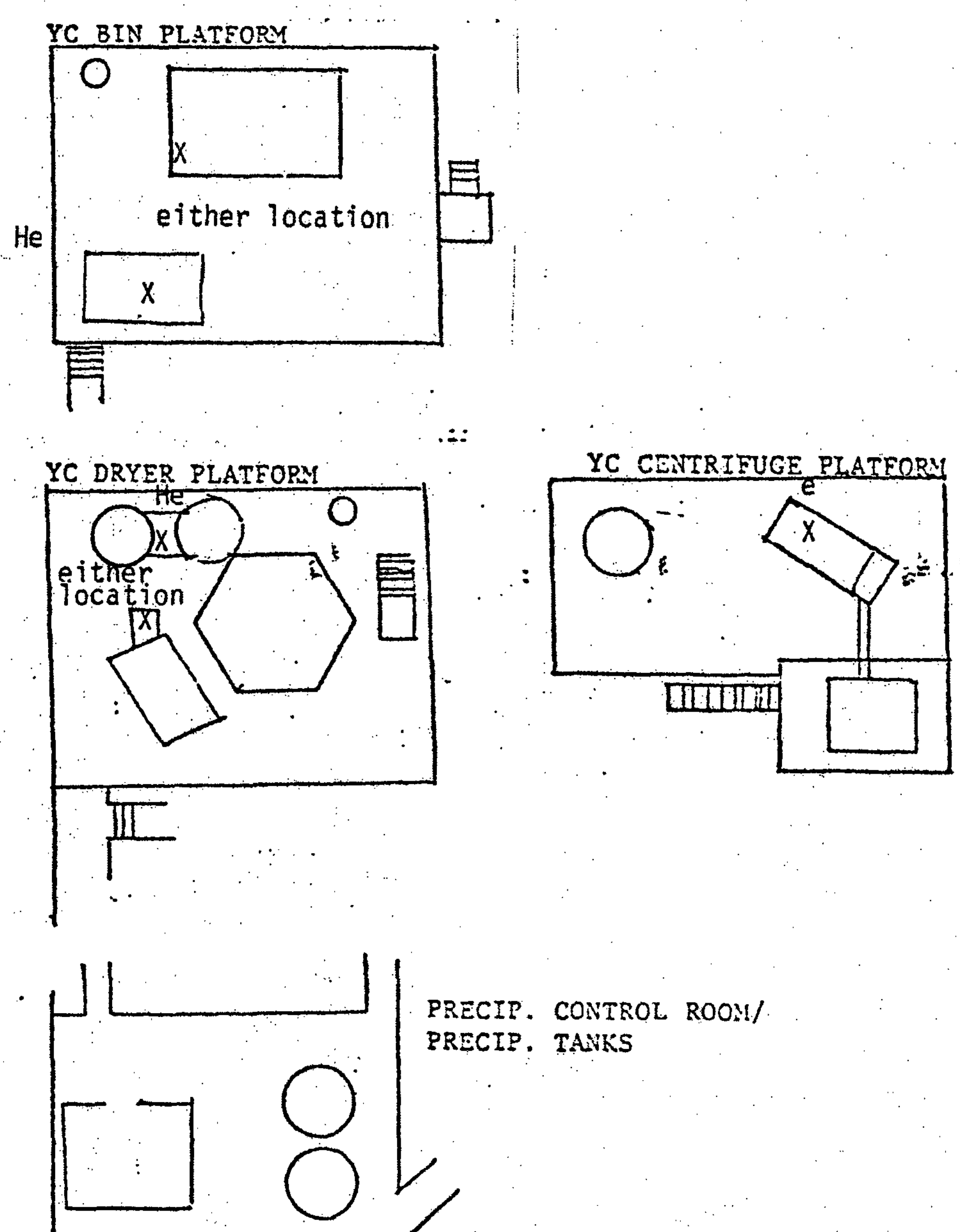
LOW VOLUME AIR SAMPLE

Precipitation Buildings

2 Samples in areas shown (X) "PBP - Bin Platform, PDP - Dryer Platform, PCP - Centrifuge Platform"

"e" shows electrical outlet

"He" shows need for heavy, three pronged plug



UNC MINING AND MILLING

ALPHA CONTAMINATION SURVEY

Frequency - Monthly

The purpose of the alpha contamination survey is to determine the cleanliness of non-controlled areas. The areas include all mill control rooms, labs and lunch rooms. The reason they are considered un-controlled is that it is essential for correct operation that these areas remain uncontaminated. It is also important to insure that personnel do not knowingly ingest uranium or its daughter products. The survey consists of using a Ludlum alpha survey meter, Model 2 with Detector Model 43-5, and cloth contamination smears. Specific training must be conducted in the use and care of the instrument and proper sampling technique.

Procedure

1. Prepare approximately 10 smear packets before beginning survey by attaching smear pad to smear folder.

2. Check instrument battery response prior to leaving instrument storage area.

3. In each area check all table tops and/or work surfaces using the alpha survey instrument.

4. Readings must be taken at approximately 1 inch above the surface, due to the limited range of the alpha particles. Caution: Detector is easily damaged. Do not allow sunlight to hit detector surface or handle window because it is extremely fragile.

5. If alpha particles are detected in excess of 100 counts per minute then a smear will be taken of 100 square centimeters, approximately 4 inches x 4 inches. The smear packet will be noted as to specific location. The purpose is to determine when detected contamination is fixed to the surface or loose.

6. All smear packets, which were used, will be returned to the environmental lab for analysis using the Tennelec 5100 - Low Background Proportional Counter.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s):
1			[illegible signature]	10/30/[illegible]	1-3

7. Any detectable alpha contamination will be reported on the Alpha Survey Contamination sheet.

8. Any area exhibiting loose alpha contamination will be reported to the operator in charge, the shift foreman or the Operations Superintendent and the Radiation Safety Coordinator, both verbally and via memorandum.

9. Cleanup will be performed in the affected department immediately with surveys performed after each cleanup attempt. Cleanup will be performed until all loose contamination is removed.

<u>Survey Sheet (See attachment 5A)</u>

1. List all smear numbers, locations, and record alpha counts reported by the Environmental Lab.

2. In comment section list people notified, cleanup performed and results, if appropriate and attach copies of memorandums.

3. Survey sheets must be neat and concise.

4. Because of the few numbers of smear samples usually taken, all errors should be corrected by redoing the survey sheet.

Attachment 5A

SURFACE CONTAMINATION

Instrument: ______________ Date: ________ Shift: ________

Sample No.	Site Description	Alpha Count

Comments: ____

Sampler Initials: ______________

UNC MINING AND MILLING

GAMMA SURVEY

Frequency - monthly

The purpose of the gamma survey is to spot check all areas to determine the possibility of increasing radiation levels. The survey is a backup to the area TLD program. The sampling consists of walking through all work and lab areas of the mill and noting the highest readings in these areas. Specific training in instrument use and care, and in proper survey techniques is performed prior to conducting unsupervised sampling. Systems should be recalibrated yearly.

Procedure

1. Prior to leaving office check battery of Ludlum Micro-R Model 19 instrument. Battery must be in the operating range.
2. All readings taken at approximately 1 meter above the ground, i.e. waist level at 10 foot intervals. The only exception is to check specific areas where the head or upper body may be more susceptible to exposure.
3. Only those readings which are greater than 20 micro-R/hr or .02 mrem/hour need be noted.
4. Any readings greater than 1,000 micro-R/hr or 1 mrem/hr must be investigated and noted on survey sheets.
5. Any readings greater than 3,000 micro-R/hr or 4 mrem/hr should be checked with the higher range Ludlum Geiger-Mueller Model 19 counter.

Survey Sheet

1. All readings should be noted on area survey sheet. See specific area drawings (figures 6-1 through 6-10).
2. Survey sheets must be neat and legible.
3. All errors will be corrected by placing a single line through the error and initialing the strike out. The correction will be made next to the initials. Liquid paper correction fluid shall never be used for corrections.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/20/81	1-12

GAMMA SURVEY - MONTHLY

DATE:____________________ SIGNATURE:__________________________

INSTRUMENT:_____________

All readings are recorded in micro-R per hour. Only those areas with readings >20υR/hr are listed. All other areas have readings <20υR/hr.

LOCATION	READING

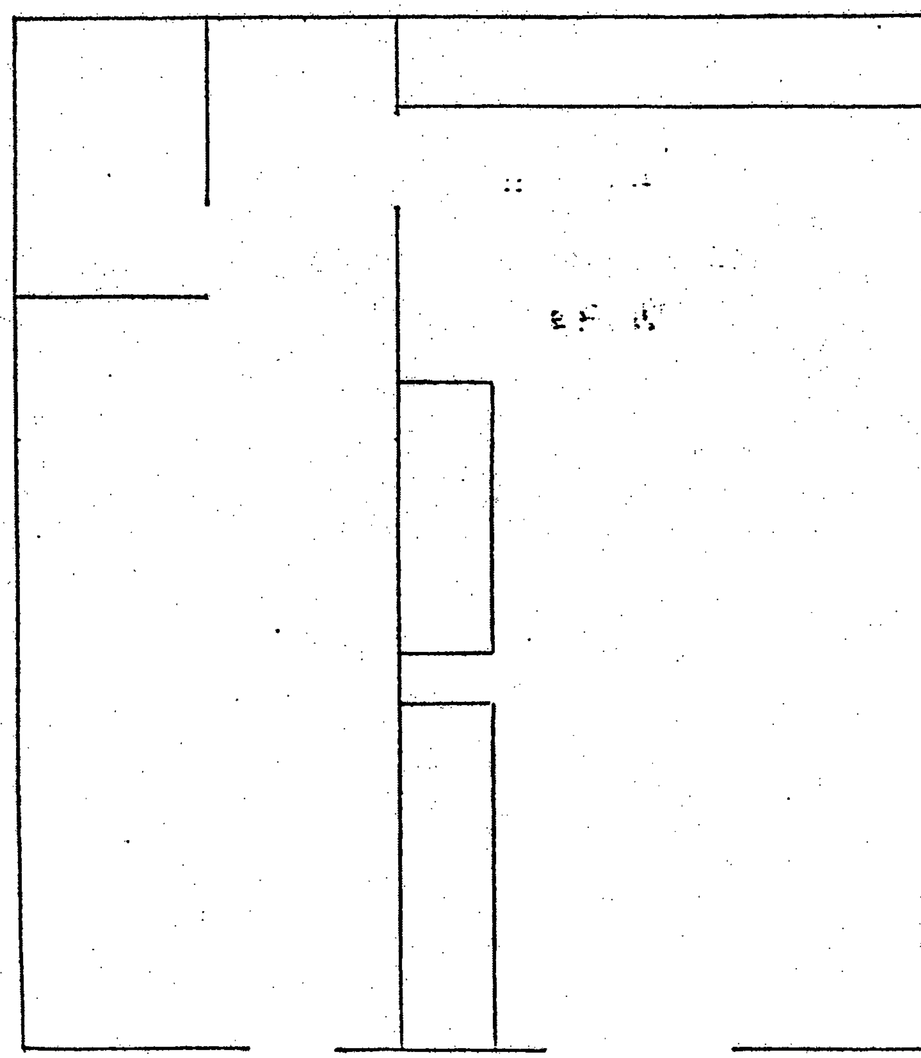
Figure 6-1

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as< 20 or omitted entirely.

DATE: ____________________ SIGNATURE: ____________________

SCALE HOUSE/BUCKING ROOM



Comments: ____________________

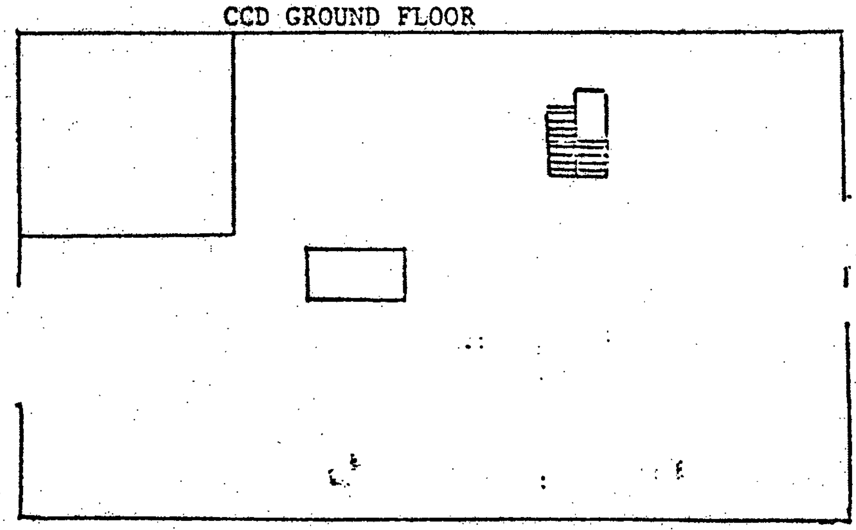
Figure 6-2

GAMMA SURVEY

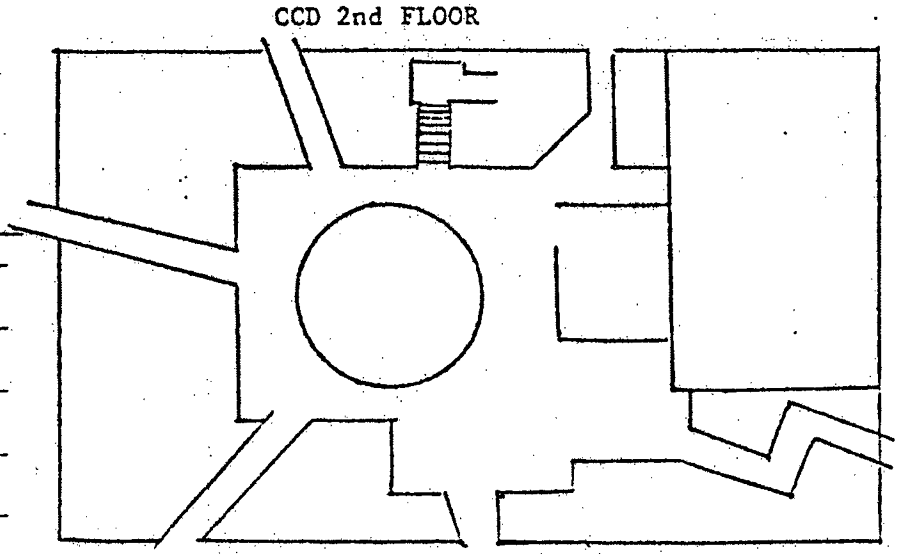
Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ______________________ SIGNATURE: ______________________

CCD GROUND FLOOR



CCD 2nd FLOOR



Comments: ______________
____
____
____
____
____

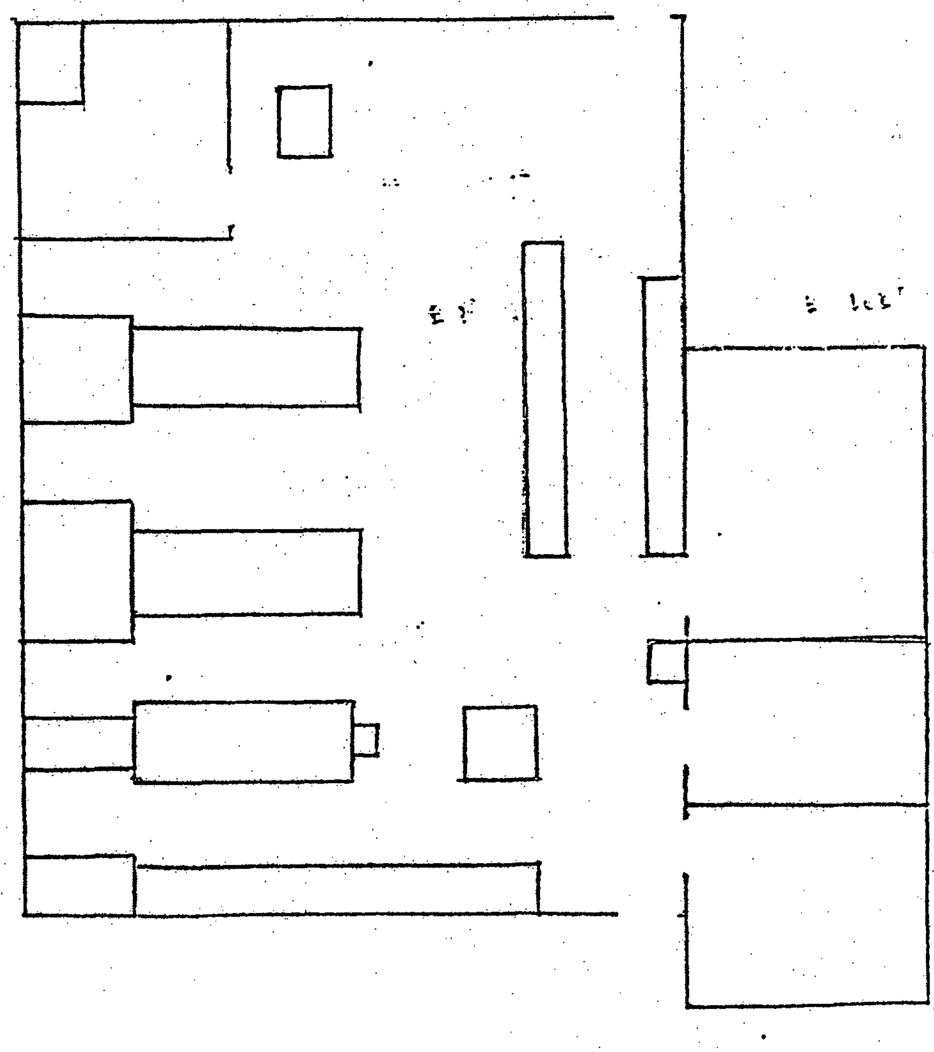
Figure 6-3

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ____________________ SIGNATURE: ____________________

CHEM. LAB



Comments: ____

____

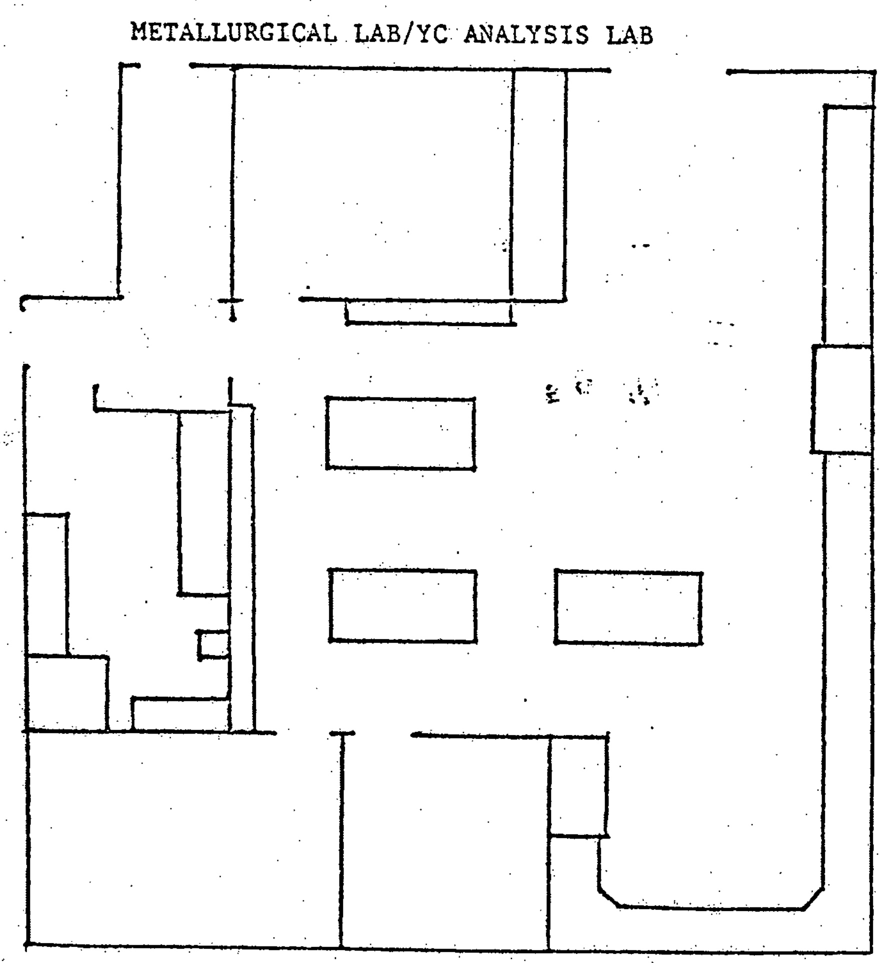
____

Figure 6-4

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less that 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ____________________ SIGNATURE: ____________________



Comments: ____________________

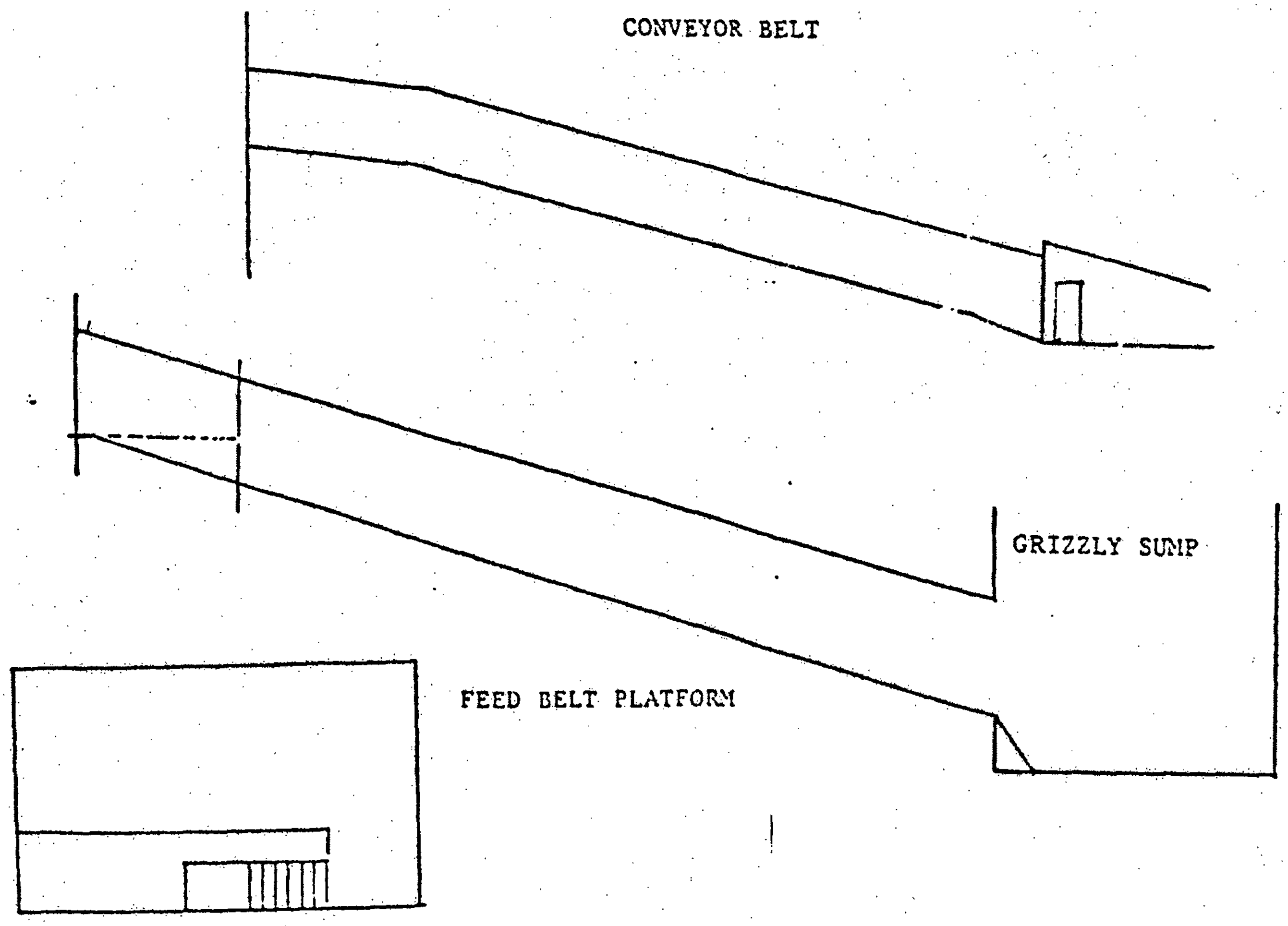
Figure 6-5

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ______________________ SIGNATURE: ______________________

Note: Perform surveys on walkways only



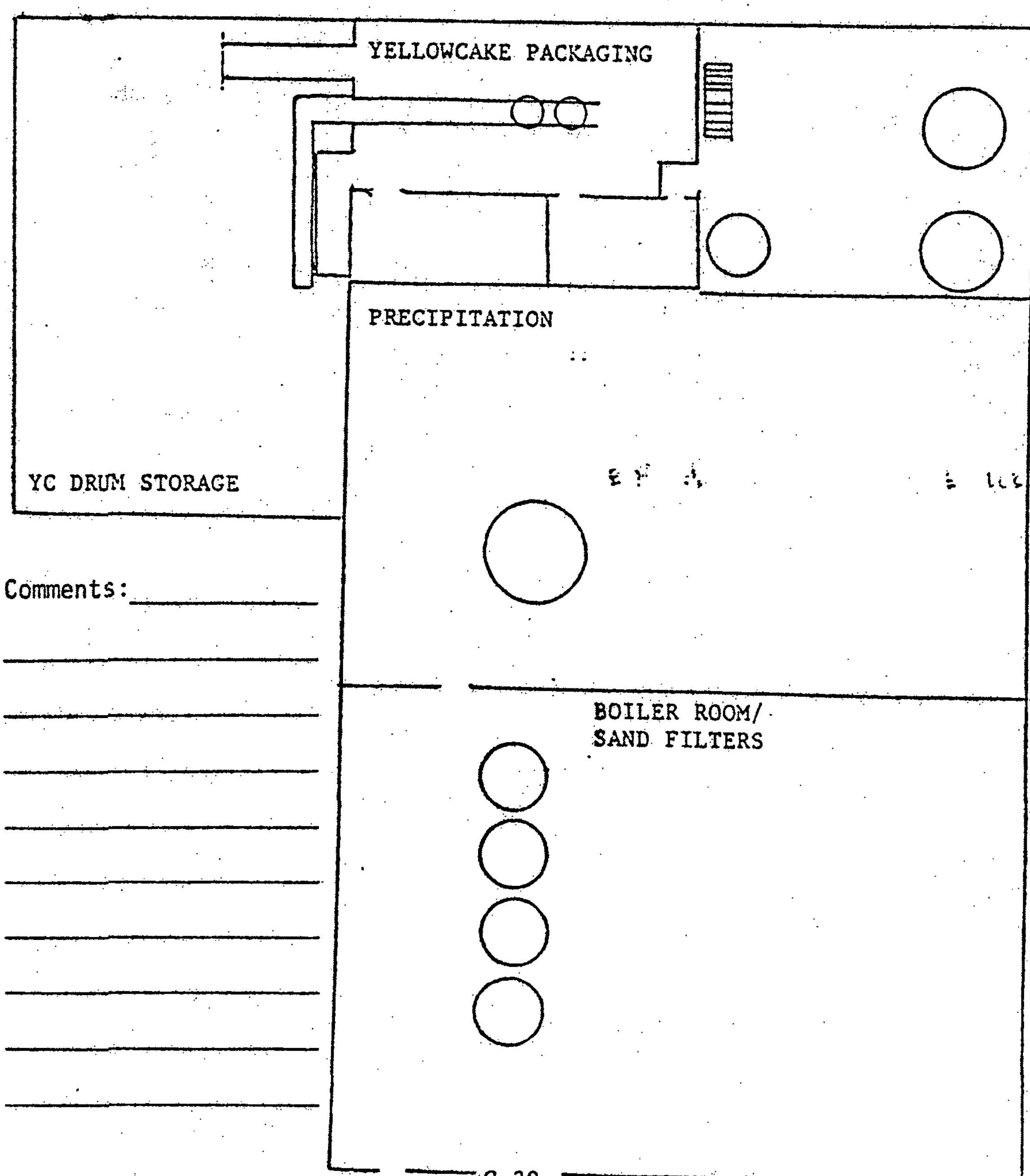
Comments: ____

Figure 6-6

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less that 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ____________________ SIGNATURE: ____________________



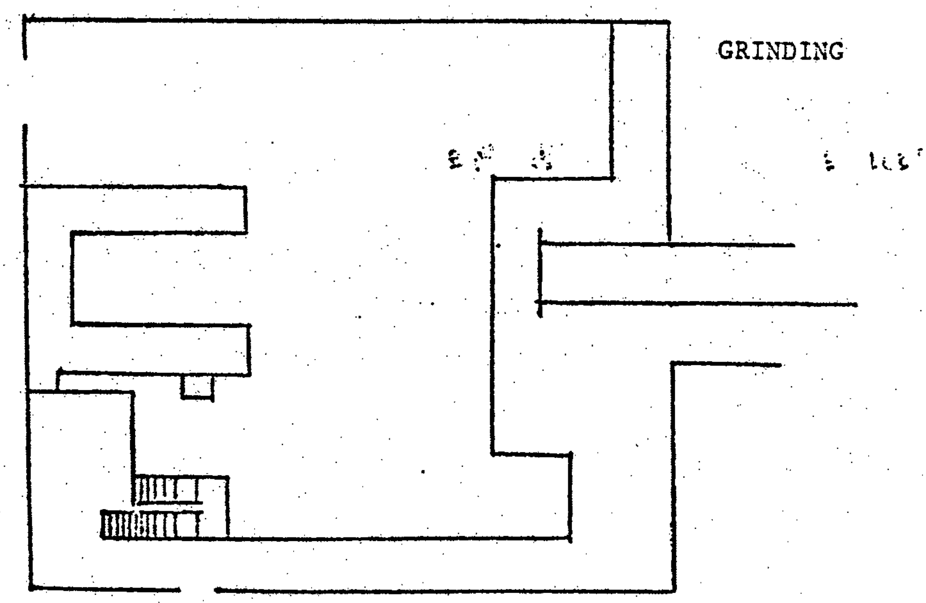
Comments: ____________________

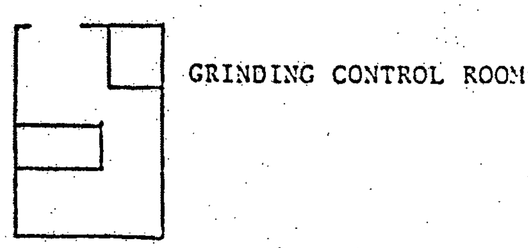
Figure 6-7

GAMMA SURVEY

Survey performed using a Ludlum Mirco-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ____________________ SIGNATURE: ____________________





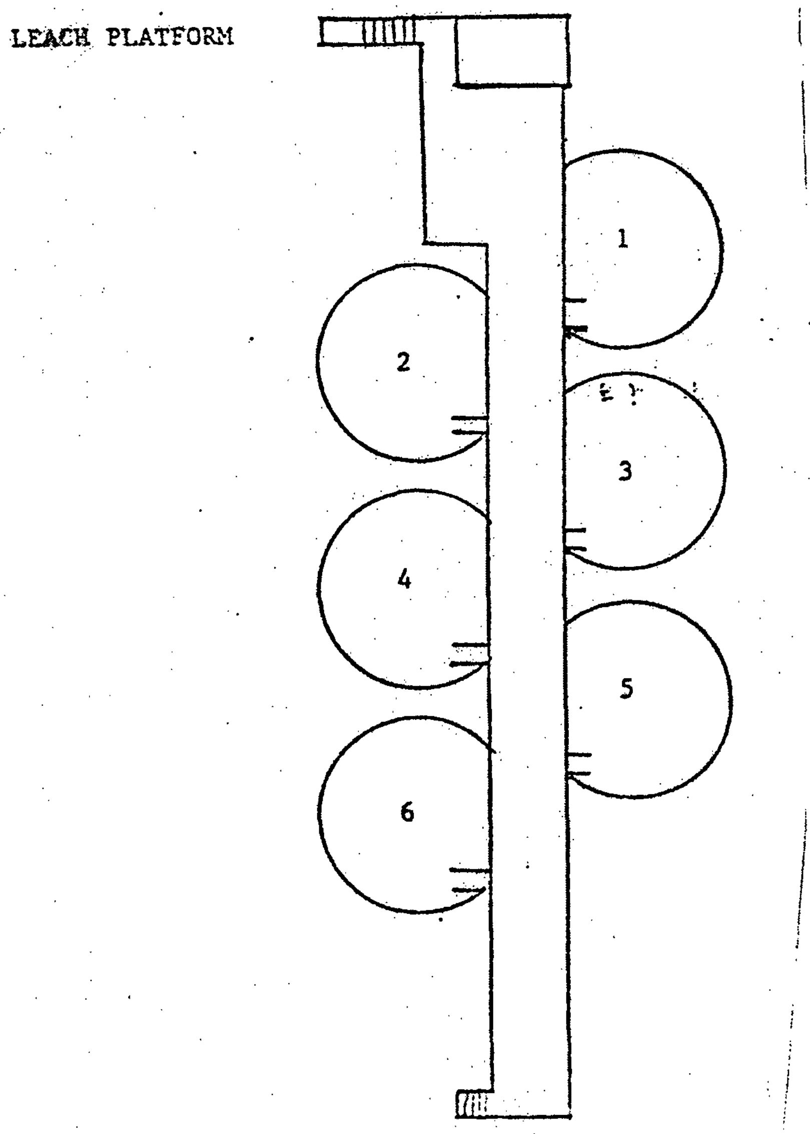
Comments: ____________________

Figure 6-8

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ____________________ SIGNATURE: ____________________



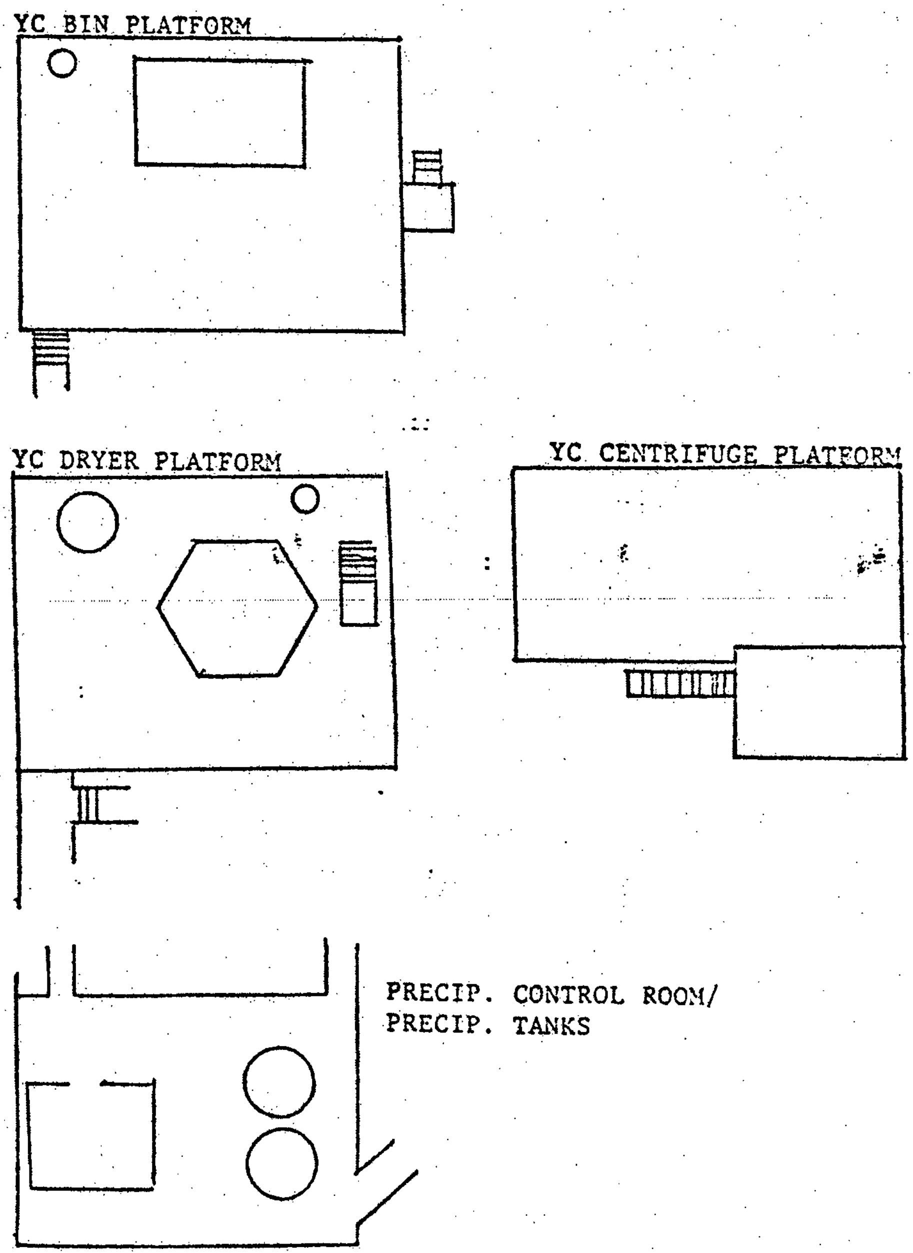
Comments: ____________________

Figure 6-9

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as < 20 or omitted entirely.

DATE: ______________________ SIGNATURE: ______________________



Comments: ____________________

____

____

____

____

____

____

____

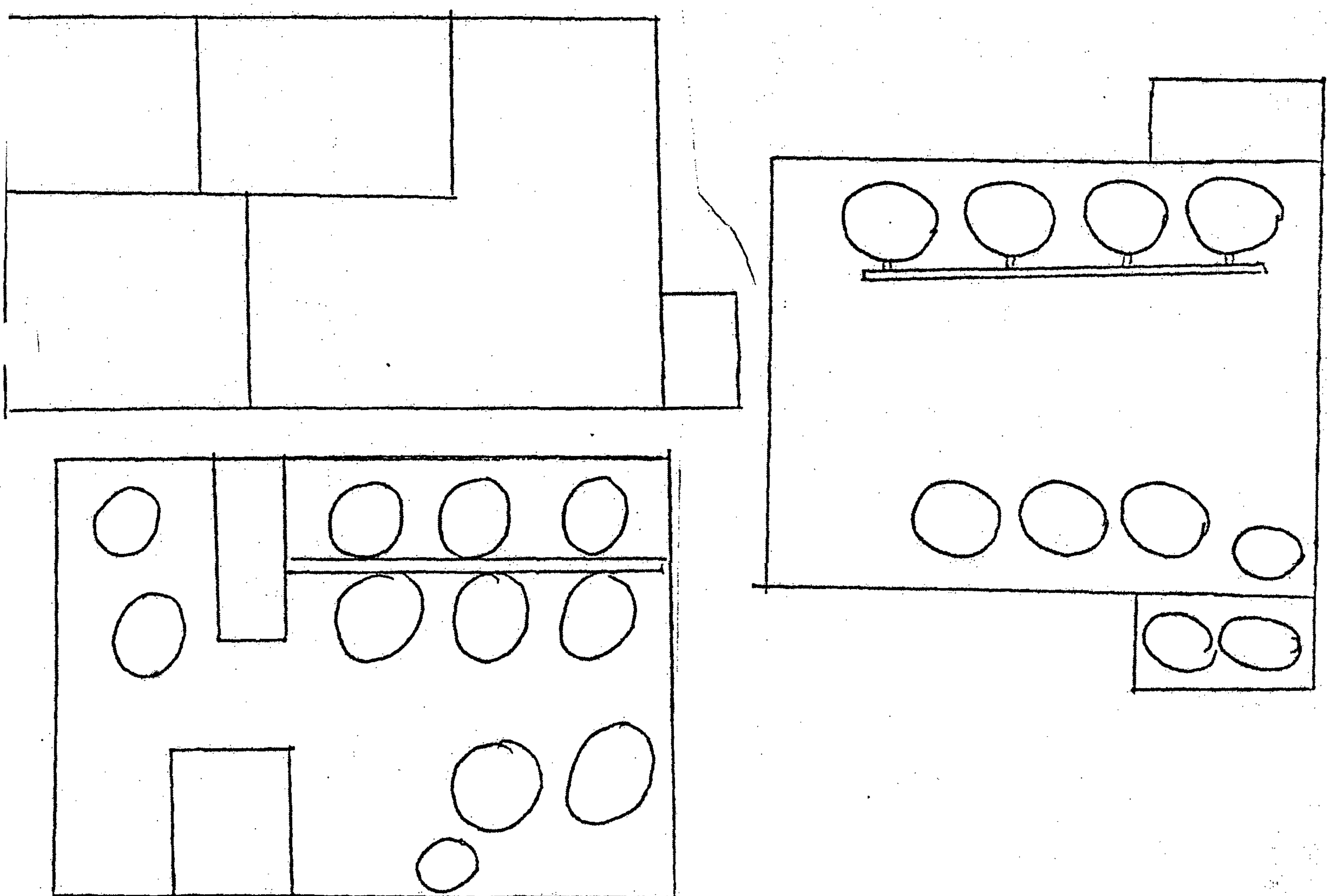
____

Figure 6-10

GAMMA SURVEY

Survey performed using a Ludlum Micro-R Meter. All readings listed in Micro-R/hr. All readings less than 20 Micro-R/hr are listed as <20 or omitted entirely.

DATE: ______________________ SIGNATURE: ______________________



Comments: ______________________

UNC MINING AND MILLING

CONTINUOUS ENVIRONMENTAL AIR MONITORING

Frequency - Continuous, changed weekly

The continuous air sampling system is used to determine compliance with release criteria. The system consists of nine samplers located in proximity to the mill tailings area and Gallup. The continuous air samplers are Eberline RAS-II samplers. These samplers operate at low volume, 60 liters per minute, and use 0.45 micron glass fiber filters. Samples are particulate and are analyzed for Total Suspended Particulates, Thorium-230, Natural Uranium, Radium-226, Lead-210 and Polonium-210. Care must be taken in the exchange of filter patches which is done weekly to insure that no loss of sample or contamination occurs.

Sample Preparation

1. Preweigh Gelman 0.45 micron filter patches and place in petri dish. Note: Once filter has been preweighed do not handle with fingers or allow to come in contact with material that would cause an increase in weight.

Sampling Procedure

1. Turn sampler off. (Switch located inside of weatherproof case).
2. Carefully remove old filter with forceps and place in petri dish. Take care not to dislodge particulate matter.
3. Place new filter in sample holder using forceps.
4. Log data requested in Field Data Log Sheet (Figure 7-1).
5. Fill in information requested in Analysis data sheet (Figure 2).
6. Note reading from totalizing flow meter.
7. Switch sampler on, check flow meter. Flow should be 60 liters per minute.
8. Reweigh filters and take samples to environmental lab.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/30/81	1-4

Data Sheets

1. Within six weeks after the end of the quarter all results for the preceeding quarter must be reported to the New Mexico Environmental Improvement Division.

Sites

Site	Refer to figure 12 in EMP-1 for all locations other than Springstead and Gallup #1.
A	NECR Trailer Park
B-1	Kerr McGee Sewage Treatment at Administration Bldg.
C	East side of tailings - below well #203
D	Near Mesa, southeast side of tailings
E	Across from Shaft Const. headquarters
F	Half-way point on east/west road, north tailings
OCR-IX	OCR-IX Plant - southwest corner of grounds
Springstead	Springstead Trailer Park - at sewage treatment plant
Gallup #1	A.C. Houston Lumber - back lot - Gallup

Maintenance: Refer to Manufacturers manual for routine maintenance

Figure 7-1
Continuous Environmental Air Monitoring
Field Data Log

No.	Site	Flow	Start Hours	Start Date	Stop Hours	Stop Date	Comments

Figure 7-2 ENVIRONMENTAL AIR SAMPLE ANALYSIS DATA Sheet

Technician:__________ Date:__________ Analyst:__________ Date:__________

Site:__________ Sample I.D. Number:__________ Sample Period:__________

Wt. Before:__________ Hours - Start:__________ Rate (lpm):__________

Wt. After:__________ Hours - Stop:__________ Volume (L):__________

TSP:__________ Total Hours:__________

NAT - U	Ra - 226	Th - 230	Pb - 210	Po - 210
(mg/l)	(pCi/l)	(pCi/l)	(pCi/l)	(pCi/l)
(μCi/ml) x 10^{-13}	(μCi/ml) x 10^{-13}	(μCi/ml) x 10^{-13}	(μCi/ml) x 10^{-13}	(μCi/ml) x 10^{-13}

[illegible]

CALCULATIONS: Nat. U $= \frac{U(mg/L) \times 6.77 \times 10^{-7}}{\text{vol. of air (L)} \times 2}$ μCi/ml. Ra-226 $= \frac{Ra(pCi/L) \times 10^{-9}}{\text{vol. of air (L)} \times 2}$ μCi/ml; Th-230 $= \frac{Th(pCi/l) \times 10^{[illegible]}}{\text{vol. of air (L)} \times 2}$

1 ft^3/m = 28.32 liters/m; 1 mg/L.U = 6.77 x 10^{-4} μCi/L.U; 1 pCi/L = 1 x 10^{-9} μCi/ml * μCi/ml

UNC MINING AND MILLING

HIGH VOLUME AIR MONITORING

Frequency - (a) Pinedale & 16K-336 - every other Friday (generator required).
(b) Sandfill loading, tailings, unloading - NECR Mine - Monthly (No generator needed).

High volume air samples are taken when grab samples may suffice for continuous sampling. The samples are used to draw large amounts of air in a short time. The analysis performed will be determined based on the reason for sampling. Staplex high volume air samplers are used and Reeves Angel 1 micron glass filters are the collecting medium. All samples should be run for a minimum of 180 minutes.

Sample Preparation

1. Filters must be weighed. Once filter has been preweighed handle with forceps only.
2. Place filters in large petri dish and record weight on petri dish.
3. Pick up generator from environmental storage trailer. Note: Check oil and gas.
4. Fill gas container so that tanks on generator can be refilled. Generators normally run 2.5 to 3 hours on a single tank of gas.

Sampling Procedure

1. Set sampler approximately 1 meter off the ground. It may be necessary to provide some sort of stand.
2. Place filter in sampler. Care must be used to prevent contamination, use forceps at all times.
3. Start generator and plug in sampler. Generator must not be started with sampler plugged in because it will short out the sampler.
4. Turn sampler on, check flow meter on back and record rate. Note flow, date and time on petri dish as well as analysis data sheet (see attachment A).
5. After completion of sampling, record rate prior to turning off sampler and generator.
6. Remove filter being careful not to lose or contaminate sample filter.
7. Note stop time.
8. Reweigh sample filter, calculate total volume, record weight and take to environmental lab.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/30/81	1-2

ENVIRONMENTAL AIR SAMPLE ANALYSIS DATA SHEET

Technician:__________ Date:__________ Analyst:__________ Date:__________

Site:__________________ Sample I.D. Number:______________ Sample Period:______________

Wt. Before:__________________ Hours - Start:______________ Rate (lpm):______________

Wt. After:__________________ Hours - Stop:______________ Volume (L):______________

TSP:__________________ Total Hours:______________

NAT - U	Ra - 226	Th - 230	Pb - 210	Po - 210
(mg/l)	(pCi/l)	(pCi/l)	(pCi/l)	(pCi/l)
(μCi/ml) $\times 10^{-13}$	(μCi/ml) $\times 10^{-13}$	(μCi/ml) $\times 10^{-13}$	(μCi/ml) $\times 10^{-13}$	(μCi/ml) $\times 10^{-13}$

REMARKS

CALCULATIONS: Nat. U $= \frac{U(mg/L) \times 6.77 \times 10^{-7}}{\text{vol. of air (L)} \times 2}$ μCi/ml; Dis Ra-226 $= \frac{Ra(pCi/L) \times 10^{-9}}{\text{vol. of air(L)} \times 2}$ μCi/ml; Th-230 $= \frac{Th(pCi/l) \times 10^{-9}}{\text{vol. of air(L)} \times 2}$*

1 ft^3/m = 28.32 liters/m; 1 mg/L.U = 5.77 $\times 10^{-4}$ μCi/L.U; 1 pCi/L = 1 $\times 10^{-9}$ μCi/ml * μCi/ml

UNC MINING AND MILLING

GAMMA SURVEY OF YELLOWCAKE SHIPMENTS

Frequency: Upon request of mill office. After truck is packed and ready for shipment, gamma readings need to be taken.

Procedure

1. Starting at 500 micro-rems take 3 readings across the back and front of the truck. (If need be, switch to 5000 at any point). Record the readings at each point (See figure 1).

2. Check side of truck switch 1st to 5000 uR/hr and take high point, then back to 500 and take low point, back to 5000 for high point, record highest and lowest readings (see figure 9-1).

3. Convert results from microrems to millirems (i.e. move decimal point three places to the left, for example a reading of 200 microrems equals 0.2 millirems) and complete gamma survey sheet (see Attachment A).

4. Limit for release is 2000 microrems per hour exposure to driver in the cab. (If readings exceed the 2000 uR/hr limit, the load on the truck must be rearranged to reduce the levels.

5. When truck passes inspection a release must be signed so the operator may remove the truck from the area. The operator must go to the mill statisticians office and have the release signed.

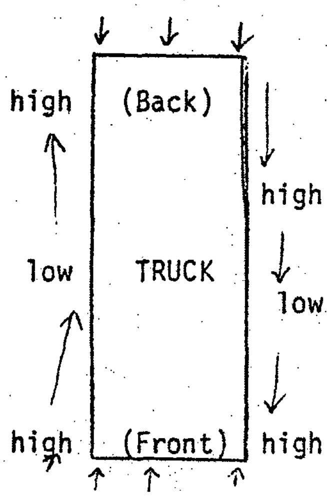


Figure 9-1

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1				10/30/81	1-2

Attachment A

YELLOWCAKE TRAILER

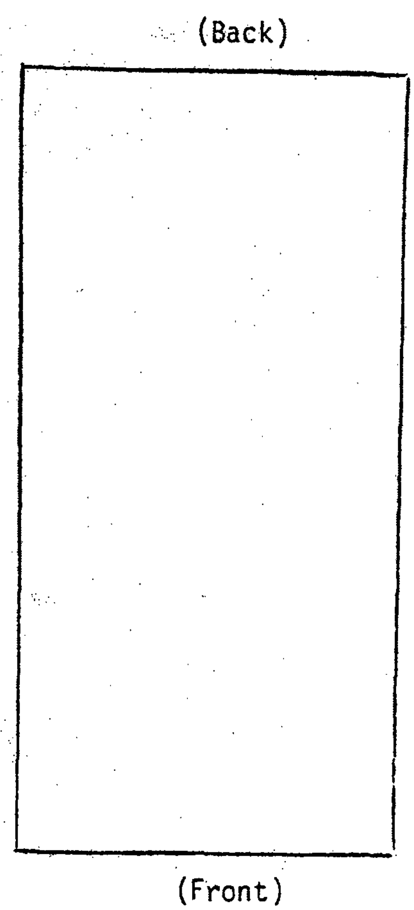
GAMMA SURVEY

Date:__________________ Lot Number:____________

Survey performed by:_____________________ Number of Drums:________
(Signature)

All readings are recorded in millirems per hour (mr/hr). All readings less than .02 mr/hr are recorded as <.02 mr/hr. .02 mr/hr is equivalent to 2X background for the mill area. The limit for contact with the trailer is 200 mr/hr and 2 mr/hr to driver in the cab

---



UNC MINING AND MILLING

RADON DAUGHTERS WORKING LEVELS

Frequency - Monthly

The purpose of taking working level samples is to determine the amount of radon daughters detected in the sampling area. The sample is a particulate air sample taken using a MSA portable pump, Model G, and a 1 inch glass filter patch. Samples are taken in areas where people are exposed to ore. All samples are taken for 2 minutes with analysis using the Instant Working Level Meter (IWLM). All samples must be inserted into IWLM within 30 seconds after sampling is complete. Care should be used in sampling to avoid contaminating sample patches which could give erroneous results.

Calibration (only <u>authorized</u> personnel)

1. Before using the IWLM for calibration and service be sure the batteries are completely charged. (Note: The charging time for instrument approximately 12 hours, do not charge for more than 18 hours or damage may result to charger or batteries).

2. Run the cycle on the IWLM a couple of times to remove excess voltage. (Optional, depending on whether it has been used previously during the day).

3. Run the IWLM for one complete cycle (3.5 minutes) timing it with a stop watch. (Note: If timing cycle is off by ± 1 second, timing screw must be changed until it is acceptable).

4. Take 5 readings with the alpha source and average. This reading should fall within the limits recorded on the source. (±5%)

5. Take 5 readings with the beta source and average. This reading should fall within the limits recorded on the source. (±5%)

6. Check date of calibration on the beta source and make sure that it has been calibrated within the past twelve (12) months.

7. Place one 25mm fiberglass filter (Gelman Type A/E) into the circular recess of the holder and close to the holder position. Note: Be careful not to spring the hinge on the sample holder by opening it more than 180 degrees.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
0			[signature]	10/30/81	1-4

8. Place the sample holder in the sampling head by first loosening the knurled screw clamp, then slide the filter end of the sample holder into the open slot on the side of sampling head until firmly seated.

9. The alpha side of the filter is facing the air inlet side (towards the knurled screw clamp) of the sample head and the beta side is facing the connector tubing leading to the sample pump.

10. When the sample holder is properly installed, retighten the knurled screw clamp, hand tight. This will ensure that the top and bottom "O" rings in the sampling head makes a tight seal on the sample holder.

11. Connect the sampling head, with filter in place, to a pump calibrated to pull 2½ LPM throught the filter.

12. Operation Sequence (See figure 1).
The built-in timing circuit and indicating LED's alert the user to all necessary functions needed to obtain a useful working level measurement. Look at the top of the IWLM.

"Read Light" - indicates that alpha and beta counter displays should be read and recorded by pushing the read switch.

"Pump Light" - indicates 2 minutes duration of sampling period. Light goes on when reset switch is initiated, times the proper 2 minute sampling period. The sample holder should then be transferred from the sampling heat to the counting slot of the IWLM within 30 seconds or less.

"Count Light" - indicates that counting is taking place and the appropriate alpha and beta counts are being accumulated in the IWLM.

Other Top Panel Controls
Off Position - no power to circuit

On Position - power to circuit

Reset Position - Spring loaded to return to "O" position when released. Resets all circuit functions and both alpha and beta counters to zero.

Read Switch - provides power to alpha and beta display lights. It is used only when counting sequences are finished and final values are available. (Read light is on).

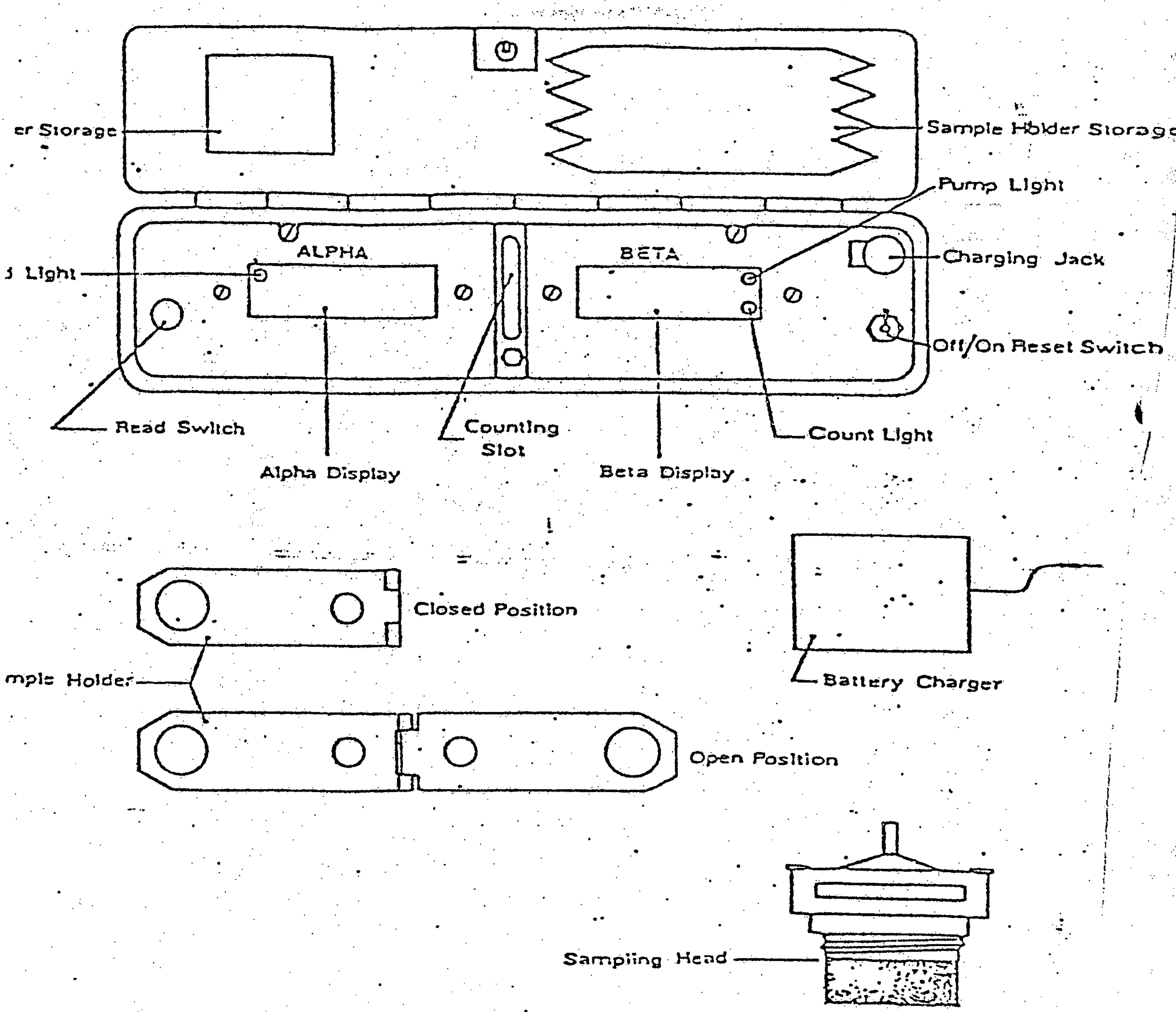
To obtain a working level measurement, add the value of the alpha display to that of beta display. The sample reads directly in working level units. Consult figures and for further information on timing sequence and operational procedures.

13. Record readings on working levels log sheet.

14. If a high reading is found, $\geq$0.2 WL repeat sampling.

Figure 1

INSTANT WORKING LEVEL METER AND CONTROLS



WORKING LEVELS

INSTRUMENT: ____________ DATE: ____________ SHIFT: ____________

TIME	LOCATION	α	B	BKG	WL

UNC MINING AND MILLING

GROUNDWATER SAMPLING PROCEDURE

Freguency - Various (See table 1)

The purpose of this phase of the environmental monitoring program is to provide data for compliance reporting. In addition, the data provides a vehicle by which the quality of the groundwater may be monitored.
Note: It may be advantageous for the lab to receive those samples with a twenty-four hour holding time first (i.e. splits A, C, and E) and sampling for remaining splits on another day.

Procedure

1. Rinse bailing equiment thoroughly with deionized or distilled water. If the well is equipped with a pump then turn the pump on and allow to run for at least five minutes.

2. Rinse sample bottles and boiling equipment thoroughly with the water to be sampled and discard the rinse water. Note: If volume of water is limited, rinse with deionized or distilled water.

3. Take water depth measurement.

4. Take a pH and specific conductance measurement of the water.

5. Transfer a minimum of 250 milliliters of unfiltered sample to a 250 ml bottle, cap and label with sample location, date, time, "A", and cool 4°C. Place sample container in an ice chest and cool, using ice.

6. Draw water with the bailer that will provide you with a total of 5 to 6 liters of sample and initiate filtering water through a 0.45 micron filter. Filtering is best performed using a vacuum pump equipped with a filtration flask, trap and funnel. Filter sample inside field vehicle.

7. Transfer filtered sample to parent container for homogenizing. Container should be capable of holding 5 to 6 liters of filtered sample.

8. Cap the parent container and shake vigorously for at least five (5) minutes.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/30/81	1-5

9. From the filtered parent sample take 250 milliliters of water and place in a 250 ml bottle. Add five (5) milliliters of concentrated ultra pure nitric acid and shake. Check pH of sample with pH paper to insure it is below pH2. Cap and label with sample location, date, time,"B" preservative added. Place sample container in an ice chest; this sample does not require being kept cold.

10. From filtered parent sample take 100 milliliters and transfer to a four ounce bottle. Cautiously, add two (2) milliliters concentrated sulfuric acid to sample, cap and shake. Check pH of sample with pH paper to insure it is less than 2. Label with location, date, time, "C" and preservative added. Place sample in ice chest and keep cooled to $4^{0}C$.

11. From filtered parent sample take 500 milliliters and transfer to a 500 ml bottle. Cap bottle and label with sampling location, date, time, "D" and cooled to $4^{0}C$.

12. From filtered parent sample take 100 ml and transfer to a four (4) ounce bottle. Add sodium hydroxide solution to pH12, shake, and check pH with pH paper. Label with location, date, time, "E" and preservative. Place in ice chest and keep cold to $4^{0}C$.

13. From parent sample transfer enough sample to fill a one (1) gallon cubitainer. Add ten (10) milliliters concentrated reagent grade nitric acid, cap and shake. Check pH and insure that it is less than 2, if not, add more acid. Label with location, date, time, "F" and preservative. This sample is not required to be kept cold.

14. The bailer should be thoroughly rinsed with deionized or distilled water as soon as sampling at the site has been completed.

15. Rinse filtering equipment thoroughly with deionized or distilled water. Pass water through filtering base.

Table I

Frequencies and Locations

Frequency	Site
Quarterly	GW - 1
	GW - 2
	GW - 3
	GW - 4
	GW - D-1
	OCR A
	OCR B North
	OCR B South
	OCR C
	16 K336
	16 K340
	16 T339
	Parker Springs
	Sunnyside
Monthly	NECR Mine
	NECR Mill
	Springstead Trailer Park
Weekly *	201
	202
	203
	204
	205

*Note: Wells 201-205 require only a limited number of analysis, not those listed of page 4 of 4.
These are:

a) 250 ml unfiltered, cold for pH, Specific conductance and salinity
b) 250 ml filtered, cold for TDS, sulfate, and chloride
c) 250 ml filtered, HNO_3 to pH<2 for uranium and gross alpha

List of Analysis

Split	Parameters
A	pH, Specific Conductance, Bicarbonate, TSS (TSS on surface waters only)
B	Aluminum, Arsenic, Borium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Total Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Vanadium, Zinc
C	Ammonia, Nitrate, Nitrite
D	Uranium, Boron, Chloride, Fluoride, Sulfate, TDS
E	Cyanide
F	Polonium-210, Lead-210, Radium-226, Thorium-230, Radium-228, (Ra-228 on OCR groundwaters only).

Equipment & Reagents Required

1. Vacuum Pump
2. 1000 ml capacity side arm filtration flask
3. 0.45 micron filters
4. Filtration funnels
5. 500 ml graduated cylinder
6. Ultra pure concentrated nitric acid
7. Reagent grade concentrated nitric acid
8. Reagent grade concentrated sulfuric acid
9. Saturated sodium hydroxide solution
10. Ice
11. Deionized distilled water
12. Funnel
13. 4 ounce bottles
14. 250 ml bottles
15. 1 gal. cubitainers
16. Parent container
17. pH paper
18. pH meter
19. Specific Conductance meter
20. Ice chests
21. Cupric sulfate (required when RWS-27 is to be collected).
22. Phosphoric acid (required when RWS-27 is to be collected).

SURFACE WATER & GROUNDWATER SAMPLING SHEET

Location	Date	Time	A 250 ml un-filtered Cool 4^0C	B 250 ml filtered HNO_3(Ultra Pure) to pH<2	C 100 ml filtered H_2SO_4 to pH<2 and cold	D 500 ml filtered cold	E 100 ml filtered NaOH pH12, cold	F 1 gal. HNO_3(Re-agent) pH<2	G* Phenols Cool 4^0C H_3PO pH<2 1 gm Cu SO_4 per liter	pH of water	Specific cond. of water	Depth

* Is only required for sample from RWS-27

Technician:

UNC MINING AND MILLING

SURFACE WATER SAMPLING PROCEDURE

Frequency - Quarterly

The purpose of this phase of the environmental monitoring program is to provide data for compliance reporting. In addition, the data provides a vehicle by which the quality of the goundwater may be monitored.

Note: It may be advantageous for the lab to receive those samples with a twenty-four hour holding time first (i.e. splits A, C, and E) and sampling for remaining splits on another day .

<u>Procedure</u>

1. Rinse the sampling containers thoroughly with the deionized or distilled water or water to be sampled.

2. Take a pH and specific conductance measurement of the water.

3. Transfer a minimum of 250 milliliters of <u>unfiltered</u> sample to a 250 ml bottle, cap and label with sample location, date, time, "A" and cool 4^{0}C. Place sample container in an ice chest and cool using ice. (Note: For RWS-27 collect 1 gal. unfiltered and keep cold).

4. Filter and transfer filtered water to parent container that will contain 5 to 6 liters of filtered sample.

5. Cap the parent container and shake vigorously for at least five (5) minutes.

6. From the filtered parent sample take 250 milliliters water and place in a 250 milliliter bottle. Add five (5) milliliters of concentrated ultra nitric acid and shake. Check pH of sample with pH paper to insure it is below pH2. Cap and label with sample location, date, time, "B" and preservative added. Place sample container in an ice chest; this sample requires being kept cold.

7. From filtered parent sample take 100 milliliters and transfer to a four ounce bottle. Cautiously, add two (2) milliliters concentrated sulfuric acid to sample, cap and shake well. Check pH of sample to insure it is less than 2. Label with location, date, time, "C" and preservative added. Place sample in ice, keep cold at 4^{0}C.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	12/30/81	1-5

8. From filtered parent sample take 500 milliliters and transfer to a 500 milliliter bottle. Cap bottle and label with sampling location, date, time, "D" and keep cold to 4^{0}C.

9. From filtered parent sample take 100 ml and transfer to a four (4) ounce bottle. Add sodium hydroxide solution to pH12, shade and check pH with alk acid paper. Label with location, date, time "E", and preservative added. Place in an ice chest and keep cold to 4^{0}C.

10. From parent sample transfer enough sample to fill one (1) gallon cubitainer. Add ten (10) milliliters concentrated reagent grade nitric acid, cap and shake. Check pH to insure that it is less than 2, if not, add more acid. Label with location, date, time "F", and preservative. This sample is not required to be kept cold.

11. This is required for RWS-27 only. Transfer 1000 milliliters of filtered sample to a one (1) liter glass bottle with teflon lined or foil lined cap. Add phosphoric acid to pH less than 2, one (1) gram cupric sulfate per liter of sample and keep cool to 4 C. Place this sample in a seperate ice chest so that it may be shipped out.

12. The filtering equipment should be thoroughly rinsed with deionized or distilled water. Pass water through filtering base.

Table I

List of Sampling Locations

Frequency	Site	
Monthly	RWS-27	NOTE: Must collect for both dissolved and suspended portions
Quarterly	SW-3 SW-5 Above Falls RWS-25 RWS-26 RWS-27	

List of Analysis

Split	Parameters
A	pH, Specific Conductance, Bicarbonate, TSS (TSS on surface waters only)
B	Aluminum, Arsenic, Borium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Total Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Vanadium, Zinc
C	Ammonia, Nitrate, Nitrite
D	Uranium, Boron, Chloride, Fluoride, Sulfate, TDS
E	Cyanide
F	Polonium-210, Lead-210, Radium-226, Thorium-230, Radium-228, (Ra-228 on OCR groundwaters only).

Equipment & Reagents Required

1. Vacuum Pump
2. 1000 ml capacity side arm filtration flask
3. 0.45 micron filters
4. Filtration funnels
5. 500 ml graduated cylinder
6. Ultra pure concentrated nitric acid
7. Reagent grade concentrated nitric acid
8. Reagent grade concentrated sulfuric acid
9. Saturated sodium hydroxide solution
10. Ice
11. Deionized distilled water
12. Funnel
13. 4 ounce bottles
14. 250 ml bottles
15. 1 gal. cubitainers
16. Parent container
17. pH paper
18. pH meter
19. Specific Conductance meter
20. Ice chests
21. Cupric sulfate (required when RWS-27 is to be collected).
22. Phosphoric acid (required when RWS-27 is to be collected).

SURFACE WATER & GROUNDWATER SAMPLING SHEET

Location	Date	Time	A 250 ml unfiltered Cool 4°C	B 250 ml filtered HNO_3 (Ultra Pure) to pH<2	C 100 ml filtered H_2SO_4 to pH<2 and cold	D 500 ml filtered cold	E 100 ml filtered NaOH pH12, cold	F 1 gal. HNO_3 (Reagent) pH<2	G* Phenols Cool 4°C H_3PO pH<2 1 gm Cu SO_4 per liter	pH of water	Specific cond. of water	Depth

* Is only required for sample from RWS-27

Technician:

UNC MINING AND MILLING

SURFACE SOIL SAMPLING PROCEDURE

Frequency - Annual

The purpose of environmental sampling and analysis is to obtain numerical data which can describe a particular situation and which can be interpreted as a basis for possible action.

Procedure

1. Select an undisturbed site with minimal amount of vegetation.
2. Using a ruler measure a 12" x 12" square. Collect a 5-spot sample by taking a sample at each corner and the center of the square with cookie cutter.
3. Take spatula and slide under cutter to prevent sample from falling out and place sample in preweighed bag.
4. Label sample bag with site, date, type sample (i.e. soil) and time.
5. Submit samples to Environmental laboratory for analysis.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/20/81	1-2

List of Sampling Sites

NOTE: Refer to figure 12 in EMP-1 for all locations other than Springstead and Gallup #1.

Site	Description
A	NECR Trailer Park
B-1	Kerr McGee Sewage Treatment Plant at Admin. Bldg
C	East Side of Tailings - Below Well #203
D	Near Mesa, Southeast side of Tailings
E	Across from Shaft Construction headquarters
F	Half-way point on east/west road, north tailings
OCR-IX	OCR-IX Plant - southwest of grounds
Springstead	Springstead Trailer Park at Sewage Treatment Plant

UNC MINING AND MILLING

VEGETATION SAMPLING PROCEDURE

Frequency - Three times during grazing season

The purpose of this sampling is to evaluate possible deposition of radioactivity from facilities at UNC Mining and Milling.

Procedure

1. Clip off vegetation with grass shears near ground level. Note: The vegetation should be of the type normally consumed by domestic animals grazing in the area. The vegetation can be green or dry depending upon the season.

2. Collect the vegetation over a 10 square foot area in order to obtain a representative sample.

3. Collect a minimum of 4000 gm (≈9 pounds) net weight sample.

4. Place in a tared cloth bag and identify with site location, date, and time.

5. Reweigh the sample and cloth bag, calculate weight of sample and record weight on bag.

6. Submit to Environmental Lab for analysis.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/20/81	1-2

Table I

Sampling Sites

Frequency	Site	Number of bags
Every 4 months	Springstead	1
	OCR	1
	Site F	1
	½ mile downwind from Site F	1
	Site C	1
	½ mile downwind from Site C	1
Optional	A	1
Optional	B1	1

UNC MINING AND MILLING

SEDIMENT SAMPLING PROCEDURE

Frequency - Annually (SW-3 and SW-5)

The purpose of sediment samples is to monitor the amount of contamination in sediments by suspended solids in discharge water as absorbed by the sediment.

Procedure

1. Select a location along the bank or as close to the water as possible.
2. Mark off a 12" x 12" square.
3. Collect a sample at each corner and in the center by wedging cutters into it.
4. Take spatula and slide under cutter.
5. With the aid of spatula, to prevent sediment from falling out, remove cookie cutter and place sample in a preweighed bag.
6. Label sample bag with site, date, type sample and time. Reweigh bag and record weight of sample.
7. Submit samples to Environmental Lab for analysis.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/23/81	1

UNC MINING AND MILLING

DRINKING WATER SAMPLING

Frequency - Monthly for Coliform; at least annually for all others. The purpose of drinking water (potable water) sampling is to insure the quality of water meets the criteria for human health standards.

Procedure

1. With match or cigarette lighter sterilize the faucet. (Make sure it is not made of plastic).

2. Turn faucet on and allow water to run for five (5) minutes in order to flush water lines out.

3. Rinse sample containers thoroughly with water to be sampled.

4. Fill a 250 ml bottle three quarters full. (Note: Leave at least a one (1) inch air space).

5. Label bottle with site, date, time and initials.

6. Place bottle in ice and prepare for shipping to Core Laboratories for analysis.

7. No need to do the remaining sampling described in this procedure unless annual sampling is done or special request.

8. Transfer a minimum of 250 milliliters of unfiltered sample to a 500 ml bottle, cap and label with sample location, date, time, "A" and cool 4^{0}C. Place sample container in an ice chest and cool using ice.

9. Take a pH and specific conductance measurement of the water.

10. Start filtering water that will provide you with a total of 5 to 6 liters of filtered sample and initiate filtering water through a 0.45 micron filter. Filtering is best performed using a vacuum pump equipped with a filtration flask, trap and funnel. Filter sample inside field vehicle.

11. Transfer filtered sample to parent container for homogenizing. Container should be capable of holding 5 to 6 liters of filtered sample.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/22/81	1-4

12. Cap the parent container and shake vigorously for at least five (5) minutes.

13. From the filtered parent sample take 250 milliliters water and place in a 250 ml bottle. Add five (5) milliliters of concentrated ultra pure nitric acid and shake. Check pH of sample with pH paper to insure it is below pH2. Cap and label with sample location, date, time, "B", preservative added. Place sample container in an ice chest; this sample does not require being kept cold.

14. From filtered parent sample take 100 milliliters and transfer to a four ounce bottle. Cautiously, add two (2) milliliters concentrated sulfuric acid to sample, cap and shake. Check pH of sample with pH paper to insure it is less than 2. Label with location, date, time, "C" and preservative added. Place sample in ice chest and keep cooled to 4^0C.

15. From filtered parent sample take 500 milliliters and transfer to a 500 ml botle. Cap bottle and label with sampling, location, date, time "D" and cold 4^0C. Place sample in ice chest and keep cold to 4^0C.

16. From parent sample transfer enough sample to fill a one (1) gallon cubitainer. Add ten (10) milliliters concentrated reagent grade nitric acid, cap and shake. Check pH and insure that it is less than 2, if not, add more acid. Label with location, date, time, "E" and preservative. This sample is not required to be kept cold.

17. Rinse filtering equipment thoroughly with deionized or distilled water. Pass water through filtering base.

List of Analysis

Split	Parameters
A	pH, Conductance, Bicarbonate, Carbonate, Alkalinity, Color, Odor, Coliform, Turbidity
B	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Calcium, Hardness, Iron, Magnesium, Manganese, Potassium, Sodium
C	Nitrate
D	Fluoride, Chloride, Sulfate
E	Radium-226, Radium-228, Gross Alpha

Equipment and Reagents Required

1. Vacuum Pump
2. 1000 ml capacity side arm filtration flask
3. 0.45 micron filters
4. Filtration funnels
5. 500 ml graduated cylinder
6. Ultra pure concentrated nitric acid
7. Reagent grade concentrated nitric acid
8. Reagent grade concentrated sulfuric acid
9. Saturated sodium hydroxide solution
10. Ice
11. Deionized distilled water
12. Funnel
13. 4 ounce bottles
14. 250 ml bottles
15. 1 gal. cubitainers
16. Parent container
17. pH paper
18. pH meter
19. Specific conductance meter
20. Ice chests
21. Cupric sulfate
22. Phosphoric acid

SURFACE WATER & GROUNDWATER SAMPLING SHEET

Location	Date	Time	A 250 ml un- filtered Cool 4°C	B 250 ml filtered HNO_3(Ultra Pure) to pH<2	C 100 ml filtered H_2SO_4 to pH<2 and cold	D 500 ml filtered cold	E 100 ml filtered NaOH pH12, cold	F 1 gal. HNO_3(Re- agent) pH<2	G* Phenols Cool 4°C H_3PO pH<2 1 gm Cu SO_4 per liter	pH of water	Specific cond. of water	Depth

* Is only required for sample from RWS-27

Technician:

UNC MINING AND MILLING

DISCHARGE WATER SAMPLING

Frequency - See attached table

The purpose of this sample is to determine compliance of discharge waters with Consolidated Permit Regulations (NPDES).

Procedure

A. Grab samples. (Springstead Trailer Park Sewage Plant discharge).
   1. Take a one (1) liter plastic bottle and fill, using a clean cup.
   2. Do not aerate water as it is being transferred to sample container.
   3. Fill container completely and do not allow air bubbles to remain in container.
   4. Place in an ice chest and keep cold with ice.
   5. Submit to Core Laboratories so that it arrives within twenty-four (24) hours after collection.
   6. Request that Core test the sample for Fecal Coliform, Total Suspended Solids, pH, and BOD.
   7. Ship sample via Purolator packing in ice.

B. Composite Samples (OCR and NECR-IX). Twenty-four (24) hour composites.
   Note: OCR-IX composite is 24 hour composite .
   NECR-IX is two (2) consecutive twenty-four (24) hour composites.
   1. Rinse composite containers for OCR and NECR, with nitric acid followed with deionized or distilled water.
   2. Place appropriate container in the ISCO composite sampler and add ice to keep cold for twenty-four (24) hours. (Note: Bring cork down before closing).
   3. Install sampling head and submerge in water.
      a. Check to make sure system is set on mode switch to "flow".
      b. Suction line length switch is set at 6 2/3 'for NECR-IX and at 3 1/2' for OCR-IX.
      c. Volume selector at 390 for 3' head at NECR-IX and at 180 for 3' head at OCR-IX.
      d. Check dessicant cartridge, replace if pink indicated at 40%.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	12/30/81	1-5

e. Sample rate switch is set at 3 for NECR-IX and 6 for OCR-IX.
f. Time interval multiplier set as counter clockwise as possible.

4. Set pump switch to "fwd" until you see water being pumped, then set to "Rev" and clear. Set to "Auto". Note: If it will not operate replace dessicant, fuse and check cork at top of sample bottle.

5. Fill out form as per attachment A.

6. When sampling is complete, record date and time composite started and finished on container, location.

7. Record total gallons on daily log sheet.

8. Repeat steps 1 through 7 for second twenty-four (24) hour composite at NECR-IX.

9. Take a 250 ml aliquot of composite sample and preserve with sulfuric acid to pH less than 2 and send to Core Labs in Albuquerque for analysis via Purolator, for COD.

10. Submit samples to Environmental Lab for analysis.

Table 1

Sampling Frequencies and Type of Sampling

Frequency	Location	Type
Monthly	Springstead Trailer Park Sewage Plant	Grab
Weekly	OCR-IX at Wier	Composite (24hr.)
Weekly	NECR-IX at Wier	2 Composite (24hr.)

INITIAL SETTINGS

FLOW METER

DATE__________

TIME__________

TOTALIZER__________00 gallons

CHART RECORDER PEN POSITION________(0-100)

CHART SPEED__________iph

LEVEL UNITS ft. m LEVEL____actual____

FLOW RATE__________g/s

FULL SCALE FLOW RATE__________g/s

FLOW MODE__________

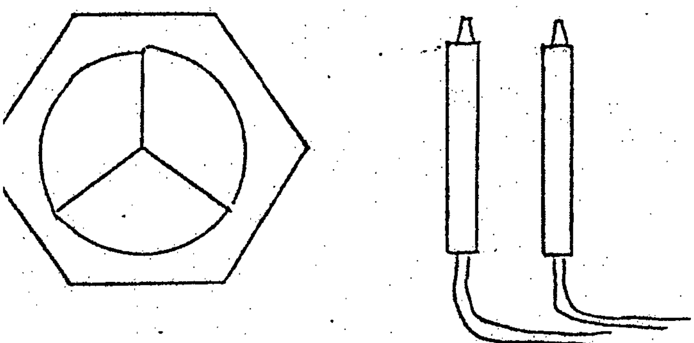
MODE NUMBER 1 2 3 4

SAMPLER INITIATION SIGNAL__________

SCALING CONSTANT__________

BUBBLE RATE__________(bubbles/15sec)

DESSICATORS (indicate blue areas)



SAMPLER

PUMP SWITCH rev fwd off auto

MODE time flow

TIME INTERVAL MULTIPLIER__________

SUCTION LINE LENGTH________TUBE I.D._____

SAMPLE RATE (flow multiplier)__________

VOLUME SELECTOR________HEAD FT._____

FINAL SETTINGS

FLOW METER

DATE__________

TIME__________

TOTALIZER__________00 gallons

CHART RECORDER PEN POSITION________(0-100)

CHART SPEED__________iph

LEVEL UNITS ft. m LEVEL____actual____

FLOW RATE__________g/s

FULL SCALE FLOW RATE__________g/s

FLOW MODE__________

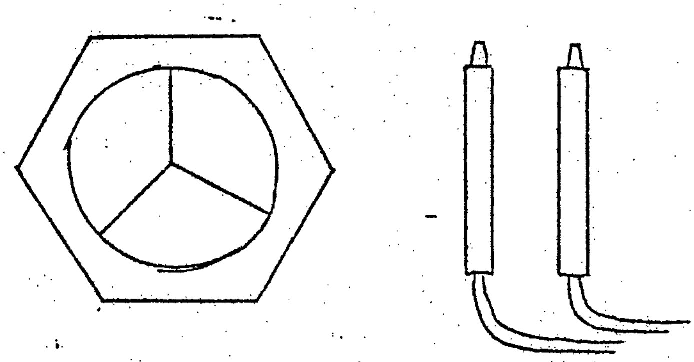
MODE NUMBER 1 2 3 4

SAMPLER INITIATION SIGNAL__________

SCALING CONSTANT__________

BUBBLE RATE__________(bubbles/15sec)

DESSICATORS (indicate blue areas)



SAMPLER

PUMP SWITCH rev fwd off auto

MODE time flow

TIME INTERVAL MULTIPLIER__________

SUCTION LINE LENGTH________TUBE I.D._____

SAMPLE RATE (flow multiplier)__________

VOLUME SELECTOR________HEAD FT._____

INCHES	DECIMAL FT	INCHES	DECIMAL FT
1	.083333	10	.833333
2	.166666	11	.916666
3	.250000	12	1.000000
4	.333333	13	1.083333
5	.416666	14	1.166666
6	.500000	15	1.250000
7	.583333	16	1.333333
8	.666666	17	1.416666
9	.750000	18	1.500000

SURFACE WATER & GROUNDWATER SAMPLING SHEET

Location	Date	Time	A 250 ml un-filtered Cool 4°C	B 250 ml filtered HNO_3(Ultra Pure) to pH<2	C 100 ml filtered H_2SO_4 to pH<2 and cold	D 500 ml filtered cold	E 100 ml filtered NaOH pH12, cold	F 1 gal. HNO_3(Re-agent) pH<2	G* Phenols Cool 4°C H_3PO pH<2 1 gm Cu SO_4 per liter	pH of water	Specific cond. of water	Depth

* Is only required for sample from RWS-27

Technician:

UNC MINING AND MILLING

X-RAY MACHINE LEAK TEST

Frequency - Biannual

The purpose of performing a leak test is to determine if the Promethium-147 source is leaking. Notify Senior Chemist at Production Lab.

Procedure

1. Attach a NU-CON SMEAR to a record folder.
2. Hold record folder, smear up, printed side down and rub surface to be smeared.
3. From front side of instrument reach in and smear bottom of source canister.
4. Record information requested on record folder and submit to Environmental Lab for counting.

REV:	Prepared By:	Date:	Approved By:	Date:	Page(s)
1			[signature]	10/30/81	1

ADDENDUM A

UNC CHURCH ROCK MILL

QUARTERLY EXPOSURE CALCULATIONS

NAME ______________________ SOCIAL SECURITY NO. ______________ YEAR ____________

Empl. # ________

MPC = 1 X 10^{-10} µCi/m

Month	Working Area	Working Hour/Mo.	Measured Concentration µCi/ml	Time Weighted Exposure in µCi X 10^{-10}/ml	Fraction of MPC for Month	Dose to Lung Rem/Qtr
January	Precip.					
	Yellowcake					
February	Precip.					
	Yellowcake					
March	Precip.					
	Yellowcake					
April	Precip.					
	Yellowcake					
May	Precip.					
	Yellowcake					
June	Precip.					
	Yellowcake					
July	Precip.					
	Yellowcake					
August	Precip.					
	Yellowcake					
September	Precip.					
	Yellowcake					
October	Precip.					
	Yellowcake					
November	Precip.					
	Yellowcake					
December	Precip.					
	Yellowcake					

Rem/Year:

Permissible Dose to Lung:

Rem/Quarter 3.75

Rem/Year 15.00

UNC CHURCH ROCK URANIUM MILL
DETERMINATIONS OF QUARTERLY OCCUPATIONAL EXPOSURES

1. On the "Monthly Exposure Record" enter the total number of hours spent by each employee in the yellowcake packaging and in the precipitation (precip.) areas of the Mill. This information is obtained from the individual employee time cards.

2. On the "Quarterly Exposure Calculations" for each employee record by month the total hours spent in yellowcake packaging and precipitation areas of the Mill.

   (a) Record the measured concentration of yellowcake in units of µCi/ml for each month.

   (b) Calculate and record the time weighted exposures in units of $\mu Ci \times 10^{-10}/ml$ by:

   $$\left(\frac{\text{hours worked per month}}{\text{168 hrs. per work month}}\right)\left(\begin{matrix}\text{measured}\\ \text{concentration}\end{matrix}\right) = \begin{matrix}\text{time weighted}\\ \text{exposure}\end{matrix}$$

   (c) Calculate and record the fraction of MPC for each month by:

   $$\left(\frac{\Sigma \text{ time weighted exposure for each area}}{\text{MPC}}\right) = \begin{matrix}\text{fraction of MPC}\\ \text{for month}\end{matrix}$$

   (d) Calculate and record the dose to the lung in Rem per quarter by:

   $$\left(1.25 \text{ Rem/mo.}\right)\left(\sum_{1}^{3} \begin{matrix}\text{fraction of MPC}\\ \text{for each month}\end{matrix}\right) = \text{Rem/Quarter}$$

ADDENDUM B

OPERATING PROCEDURES FOR LUCAS CHAMBER COUNTING EQUIPMENT SYSTEM

Brief Description of Counting System

The system consists of a Lucas chamber, a Lucas chamber counting detector, and associated electronics.

The detector consists of an ORTEC Model 276 preamplifier and an RCA Model 4523 photomultiplier tube enclosed in a light tight box.

One ORTEC 401M/402M minibin and power supply houses the following electronic modules:

1. One ORTEC Model 456 High Voltage Power Supply (HVPS)
2. One ORTEC Model 485 Linear Amplifier (LA)
3. One ORTEC Model 550 Single Channel Analyzer (SCA)
4. One ORTEC Model 775 Counter (C)
5. One ORTEC Model 719 Timer (T)

These modules may be arranged in any order in the minibin; however, the order listed above (from left to right in the bin) is probably most convenient. All of the modules except the HVPS obtain their power from the 401M/402M minibin. Items 2 through 5 are compatible with standard AEC Nuclear Instrument Modular (NIM) bins. The HVPS can operate extenally from the minibin if more NIM modules are added to the system. See the individual instruction manuals for more details.

Electrical and Cable Connections

Three cables are connected to the preamplifier in the detector box and exit through a hole in the back of the box. The grey wire is a standard power connector for NIM standard modules and connects to the back of the LA. The connection is secured by two wire locks. The high voltage cable (with exposed nylon sleeve) is also a NIM standard high voltage connector and connects to the back of the HVPS (either of two available connections). The third cable carries the signal from the preamplifier and connects to the input terminal of the amplifier (either the front or back connection).

ADDENDUM B
(Continued)

On the front panel, three short cables make connections between the following terminals:

Cable 1 - Between the "output" of the LA and the "input" of the SCA

Cable 2 - Between the "output" of the SCA and the "input" of the counter

Cable 3 - Between the "output" of the timer and the "gate" of the counter

The minibin and the HVPS connect to standard 3-prong, 117-volt AC power lines.

Nominal Instrument Settings for Lucas Chamber Counting

High Voltage Power Supply - 1150 volts DC
- 1000 volts on top dial
- 100 volts on middle dial
- 50 volts on Vernier (the vernier scale read 100 volts full scale)
- Set the two position polarity switch on the rear panel to "pos."

Linear Amplifier
- Course gain - 4
- Fine gain - 6.5
- Toggle switches set to "Pos" and "Unipolar"

Single Channel Analyzer
- Upper level discriminator 10.00 (dial fully clock-wise)
- Lower level discriminator 0.24
- Toggle switch "Normal" or "Integral"
- Toggle switch on rear pannel "INT"

Counter
- Toggle switch to "count"

Timer
- Settings are optional for counting
- The slide switch indicates the units of time (0.01 min or 0.1 sec)
- The two preset multiplier dials set the total interval of time to be counted, i.e., on 0.01 min., 2 and 100 would imply 0.01 x 2 x 100 or a 2 minute count

Final Draft 12/18/81/rs

ADDENDUM B
(Continued)

GENERAL OPERATING INSTRUCTIONS

1. Check all cable connections and instrument settings described in previous section.

2. Connect the instrument to the 117 AC power line.

3. Set the timer for a 10-minute count, turn on the minibin and then the power supply.

4. Press the start button on the timer. If a fast count rate is observed, check for a light leak in the detector chamber. A 10-minute count should give about 20 counts. **Note:** Do not have high voltage on with unnecessary light on photomultiplier tube.

5. Allow the photomultiplier tube to stabilize for a period of time, one hour or more is recommended.

6. Take a 10-minute count with no sample in the detector to obtain a "dark" count. Record this figure, it should be about 2 counts per minute.

7. With the timer running, take a Lucas chamber that is ready for counting and insert it into a sleeve of the detector chamber. With your other hand, reach in the second sleeve and take the "sock" off of the Lucas chamber. Wipe the quartz window with a Kleenex or Kim Wipe and place the Lucas chamber on top of the photomultiplier tube. All the while, "keep an eye" on the counter to check that a minimum of light reaches the PM tube (indicated by a high count rate).

8. Set the timer for the desired counting time (a minimum of 10 minutes for low activity samples). Press the "stop," "reset," and "start" buttons on the timer and scalar in that order.

9. Record the data on the Lucas Chamber data sheets. For low activity samples, you may want repeated counts.

10. Repeat Steps 7, 8, and 9 as necessary.

11. To turn the system off, the HVPS should be turned off first, then the minibin.

CARE OF LUCAS CHAMBERS

Storage: When not in use, the Lucas chambers should be flushed with nitrogen, helium, or some other nonradioactive gas and stored with the "socks" on in the case provided. The zinc sulfide phosphor is "excited"

ADDENDUM B
(Continued)

SHORT DISCUSSION OF RADON 226 (RADON) MEASUREMENT

When an atmosphere sample is collected through an 0.45 micron millipore filter (or equivalent), the metallic radioactive decay products including (radon daughters) will be collected on the millipore filter. Only the radon will pass the filter and be collected in the flask.

After a sufficient amount of atmosphere has been passed through the Lucas chamber, the chamber will have essentially the same concentration of radon as the atmosphere. Closing the opening to the Lucas chamber prevents radon from entering or leaving the chamber.

Since radon is radioactive, some of the radon will decay. Radon has a half-life of 3.824 days; therefore, the activity of the radon becomes less with time. There are, however, several decay products of radon which are also radioactive. The result of the process is that, for a period of time, the activity in the chamber increases rather than decreasing as one would tend to expect. This increase in activity is useful because it improves the sensitivity of the Lucas chamber.

The correction factors one must use as a function of time to correct the count data back to the sampling time decrease rapidly during the first 90 minutes. This rapid change will accentuate any errors in technique, timing, or even the random statistical errors. The chambers should not be counted during this time period if it can be avoided. The optimum time to count the chambers is between 190 and 230 minutes. The correction factor after 36 hours is about 1.30825 (you add about 30 percent of the counts).

Correction factors which differ significantly from 1.00 lead to larger error bounds in the data.

LUCAS CHAMBER DATA SHEET

Date : ________ ; Analyst : ____________ ; Location : ______________________

Comment : ____________ ____________ Sampler : ____________ ; Date : ________

Chambers are counted for ____________ minutes.

Site No	Chamber No	Sampling Time (24 hr clock)	Start Count Time (24 hr clock)	Elapsed Time (min)	Gross Counts (cpm)	Bkg Count Rate (cpm)	Net Count (cpm)	CF*	Adjusted Count (cpm)	Eff	Activity (pCi/l)

Elapsed Time = (Start Counting Time - Sampling Time) + ½ Counting Time

*CF is the correction factor taken from elapsed time and Table 1.

Eff is efficiency of the Lucas Chamber (or Chambers)

Net Count = Gross Ct — Bkg Ct

Adjusted Count = Net Count X CF

Activity = Adjusted Count/Eff.

Eff for Chamber #1 : 0.564 ; #2 : 0.577 ; #3 : 0.608
#4 : 0.598 ; #5 : 0.568 ; #6 : 0.628
#R2D1: 0.949; #R2D2: 0.821; #R2D3: 0.778
#R2D4: 0.969; #R2D5: 0.745; #R2D6: 0.927

ADDENDUM C

Bruce King
GOVERNOR

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271
Thomas E. Baca, M.P.H., Director

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

RADIATION PROTECTION BUREAU

May 8, 1980

Mr. Todd Miller
Manager of Environmental Operations
United Nuclear Corporation
Church Rock Operations
P. O. Drawer QQ
Gallup, NM 87301

Dear Todd:

We have received your letter of April 28, in which you reported the results of eight air samples taken during March and April, 1980.

Until receipt of this letter, most thorium-230 results to date were reported to be less than your lower limit of detection (LLD) of .01 pCi/m^3 (.1 x 10^{-13} µCi/ml). The summary of 23 samples presented in your April 1, 1980 letter to Gerald Stewart, New Mexico Environmental Improvement Division (NMEID), indicated that only five samples were above the LLD.

In your April 28 letter, however, five of the eight reported air samples were above the thorium-230 LLD. In addition, the March 14, sample at 0.1 pCi/m^3, is above the NMEID thorium-230 concentration limit of .08 pCi/m^3 for unrestricted areas, and a March 15 sample is just at that limit. These results, combined with your previously reported February 28 value of .09 pCi/m^3, may indicate that an upward trend is beginning to occur. In order to determine this, more intensive and sensitive air sampling is necessary.

I would like to comment on the thorium-230 levels your sampling has measured. Your reported data are higher than results reported by other groups in similar areas. For comparison, I am sending you copies of results obtained by the U. S. Environmental Protection Agency (EPA) for thorium-230 levels around the Jackpile Uranium Mine. They were obtained from the EPA report Ambient Airborne Radioactivity Measurements in the Vicinity of the Jackpile Open Pit Uranium Mine New Mexico (ORP/LV 79-2, January, 1979). Please note that background

Mr. Todd Miller
May 8, 1980
Page 2

values for thorium-230 are as low as 8.1×10^{-5} pCi/m^3 at Old Laguna. The highest value obtained for Th-230 (.014 pCi/m^3) collected from February 27 to March 26 at the Jackpile Housing, was a factor of seven less than the highest number you are reporting.

Such high Th-230 values must be further investigated by increased sampling to determine if concentration limits are being complied with. Additional sampling should include the following:

1. Monitoring of suspended material at three or more locations along the Rio Puerco. One of these locations should be in Gallup, and the other two at representative sites, such as the 16 K - 340 and 16 K - 336 locations now being used.

2. Sensitivity and lower limit of detection for measurement results should be in accordance with that required by Nuclear Regulatory Commission Regulatory Guide 4.14.

3. In choosing sampling sites, conditions such as topography and meteorology should be taken into account in order to obtain a representative sample.

4. Air sampling at Gallup should be continuous. Continuous sampling should be performed at the other sites whenever possible, and if not possible, should at least include the time period from 12:00 to 16:00 Mountain Daylight Savings Time for all days sampled.

5. Air concentrations of the following radionuclides should be monitored:

   natural uranium
   thorium-230
   radium-226
   lead-210
   polonium-210

6. The mass of collected material should be measured and the total suspended particulate (TSP) load calculated.

7. The following information should be reported for each sample to the NMEID:

   a. Sampling site locations shown on U. S. Geological Survey (7½ minute topographic) maps;

b. Date, time of day, running time, and location at which each sample was taken;

c. Measured air concentrations for natural uranium, thorium-230, radium-226, lead-210, polonium-210 and TSP. Results shall be reported as the measured value and its associated standard deviation. Radionuclide data shall be reported in units of µCi/ml, and TSP in units of $\mu g/m^3$.

d. Volume of air sampled, in cubic meters;

e. Specific activity of natural uranium, thorium-230, radium-226, lead-210, and polonium-210 in the collected TSP material, and the accompanying measurement standard deviations. These data shall be reported in units of pCi/gram;

f. Sample results should be obtained monthly at each location. Filters taken at a particular location may be composited to include periods no greater than one month. Results for a particular month should be reported to the NMEID by the end of the following month.

8. Air monitoring of clean-up crews for occupational exposures should continue at a frequency of at least one three-hour air sample per month.

9. Sampling along the Rio Puerco shall continue at this level until it has been determined by the NMEID that airborne radioactivity concentrations do not warrant further monitoring.

We are also concerned that the current dry condition of the south and north cells of your tailings pile may result in increased air concentrations of both radon-222 and airborne particulates. This should be investigated by field sampling.

Sampling around your facility should conform with the operational sampling program for mills described by the U. S. Nuclear Regulatory Commission in Regulatory Guide 4.14 and the Generic Environmental Impact Statement on Uranium Milling (NUREG-0511), table 10-3 with the following modifications:

1. Air particulate sampling should also include a measurement of the mass of collected material, and a calculation of the total suspended particulate load.

2. Surface and ground water sampling should include measurements of pH, conductivity, total suspended solids, total dissolved solids, and sulfate.

3. Data reporting should include the measurement value, the measurement standard deviation, sampling date, sampling duration, sampling site, and, in the case of air particulate samples, sample volume.

A copy of table 10-3 is enclosed for your convenience. The portions of this program with which UNC is not in compliance should be implemented immediately if possible.

This environmental radiation monitoring program is necessary to ensure that UNC's environmental sampling is adequate to determine that concentration limits given in Part 4 of the New Mexico Regulations for Governing the Health and Environmental Aspects of Radiation are being met. The program will apply only to the environmental radiological monitoring around your mill. Other UNC radiological and non-radiological monitoring responsibilities, such as for occupational radiation exposures or for exposures around your mine backfill operation, are unaffected by this program. Current monitoring activities for these unaffected areas should continue in accordance with your present sampling protocol.

UNC shall submit to the NMEID a written description of its environmental radiation monitoring programs by June 15, 1980. This report shall include a description of the types of samples being taken, sampling locations, sampling duration, sampling frequency, analysis frequency, and parameters analyzed for. Calibration schedules shall be submitted for equipment needing calibration. The quality assurance program for both sampling and analysis, including inter-laboratory comparisons, split and duplicate sampling, shall be described in detail.

Those areas of the sampling programs described in the enclosed documents with which UNC cannot immediately comply should be discussed and plans for achieving compliance shall be presented. All elements of this monitoring program shall be implemented by December 1, 1980.

UNC is currently developing an extensive groundwater monitoring program with the review of the EID's Water Pollution Control Bureau. We are aware that several requirements listed in the enclosed table may be satisfied by this program. If UNC feels that a particular requirement is already being complied with, it should so indicate in its June 15, 1980 report.

If you have any questions or comments, please do not hesitate to contact me at 827-5271.

Sincerely,

Thomas E. Buhl
Program Manager
Surveillance and Field
Operations

JUL 8 1980

ADDENDUM D

HEALTH & ENVIRONMENT department

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271
Thomas E. Baca, M.P.H., Director
RADIATION PROTECTION BUREAU

Bruce King
GOVERNOR

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

July 3, 1980

Mr. Thomas F. Bailey
Vice President
UNC Mining and Milling
P.O. Box 3951
Albuquerque, NM 87190

Dear Mr. Bailey:

This refers to the letters of June 18, 1980 and June 24, 1980 from Mr. H.J. Abbiss to Mr. Thomas E. Baca in which United Nuclear Corporation (UNC) objected to the Environmental Improvement Division's (EID) decision that UNC upgrade its present environmental radiation monitoring program both at its Churchrock mill and along the Rio Puerco.

Pursuant to section 4-200 of the New Mexico Radiation Protection Regulations, licensees are required to make or cause to be made surveys to establish compliance with regulations. Under section 4-160A, licensees must maintain radioactive material concentrations in releases to unrestricted areas below limits specified in Part 4, Appendix A, Table II. Under 4-100B licensees are additionally required to maintain releases of radioactive materials to unrestricted areas, as well as radiation exposures, to as low a level as is reasonably achievable (ALARA).

It should be noted that monitoring is required by the regulations not only when levels approach the concentration limits given in Appendix A of Part 4, but also to establish compliance with the ALARA concept. In addition, radiation measurements are required to be representative, accurate, and precise, so that valid comparisons with regulations can be made.

The present UNC monitoring program, which was outlined in Mr. Abbiss's June 18, 1980 letter, does not provide satisfactory data in several important areas. To take an example, radon-222 levels are reported to be measured by a grab sample taken quarterly. As you know, radon-222 concentrations show large diurnal variations. Daytime levels can

be several times lower than nighttime values. If all radon grab samples were taken during the day, average radon concentrations could be seriously underestimated. Measurements having this potential for systematic error are not satisfactory for determining compliance with New Mexico Radiation Protection Regulations, as required under Section 4-200.

UNC environmental monitoring for airborne particulates both around the mill and along the Rio Puerco also has a large potential for systematic error. As discussed in Doctor Thomas Buhl's May 8, 1980 letter to Mr. Todd Miller, comparison of UNC's results with other measurements in the area, such as the Environmental Protection Agency's study around the Jackpile Uranium Mine, suggests that representative samples have not been taken by UNC. This conclusion is further supported by EID air monitoring in Gallup.

In view of the current situation at the Churchrock mill, it is especially important that a more comprehensive sampling program be implemented. This is due to the UNC's interim operation using the central pond area and borrow pits, as well as the present condition of the north and south pond areas. The mill operating conditions have changed significantly since the mill was licensed, and increased emissions may have resulted.

So that the requirements of section 4-200 are being met, UNC shall comply with the following:

I. In order to adequately measure airborne radioactivity along the Rio Puerco, UNC shall implement an air sampling program by July 11, 1980 that shall contain, at a minimum, the following elements:

1. Monitoring of suspended material at three or more locations along the Rio Puerco. One of these locations shall be in Gallup, and the other two at representative sites, such as the 16 K - 340 and 16 K - 336 locations now being used.

2. Sensitivity and lower limit of detection (LLD) for measurement results shall be in accordance with that required by Nuclear Regulatory Commission Regulatory Guide 4.14 (Revision 1).

3. In choosing sampling sites, conditions such as topography, meteorology and proximity to the Rio Puerco shall be taken into account in order to obtain a representative sample. Final sampling site locations are subject to approval by the EID.

4. Air sampling at Gallup shall be continuous. Continuous sampling shall be performed at the other sites whenever possible, and, if not possible, shall at least include the time period from 12:00 to 16:00 Mountain Daylight Savings Time for all days sampled, with samples being taken at biweekly intervals.

ADDENDUM D

5. Air concentrations of the following radionuclides shall be monitored:

   natural uranium
   thorium-230
   radium-226
   lead-210
   polonium-210

6. The mass of collected material from air filters shall be measured and the total suspended particulate (TSP) load calculated.

7. The following information shall be reported for each sample to the NMEID:

   a. Sampling site locations, referenced on U.S. Geological Survey (7 1/2 minute topographic) maps;

   b. Date and starting time, running time, and location at which each sample was taken;

   c. Measured air concentrations for natural uranium, thorium-230, radium-226, lead-210, polonium-210 and TSP. Results shall be reported as the measured value, its associated standard deviation and LLD. Radionuclide data shall be reported in units of μCi/ml, and TSP in units of $\mu g/m^3$.

   d. Volume of air sampled, in cubic meters;

   e. Specific activity of natural uranium, thorium-230, radium-226, lead-210, and polonium-210 in the collected TSP material, and the accompanying measurement standard deviations. These data shall be reported in units of pCi/gram;

   f. Sample results shall be obtained monthly at each location. Filters taken at a particular location may be composited to include periods no greater than one month. Results for a particular month shall be reported to the NMEID no later than the end of the following month.

8. Sampling along the Rio Puerco shall continue at this level until it has been determined by the NMEID that airborne radioactivity concentrations do not warrant further monitoring.

II. UNC shall take water samples monthly from the Rio Puerco at its present monitoring location RWS-27. These samples shall be analyzed for total (dissolved plus suspended) concentrations of the following parameters:

   natural uranium
   thorium-230
   radium-226

ADDENDUM D

5. Air concentrations of the following radionuclides shall be monitored:

   natural uranium
   thorium-230
   radium-226
   lead-210
   polonium-210

6. The mass of collected material from air filters shall be measured and the total suspended particulate (TSP) load calculated.

7. The following information shall be reported for each sample to the NMEID:

   a. Sampling site locations, referenced on U.S. Geological Survey (7 1/2 minute topographic)maps;

   b. Date and starting time, running time, and location at which each sample was taken;

   c. Measured air concentrations for natural uranium, thorium-230, radium-226, lead-210, polonium-210 and TSP. Results shall be reported as the measured value, its associated standard deviation and LLD. Radionuclide data shall be reported in units of μCi/ml, and TSP in units of $\mu g/m^3$.

   d. Volume of air sampled, in cubic meters;

   e. Specific activity of natural uranium, thorium-230, radium-226, lead-210, and polonium-210 in the collected TSP material, and the accompanying measurement standard deviations. These data shall be reported in units of pCi/gram;

   f. Sample results shall be obtained monthly at each location. Filters taken at a particular location may be composited to include periods no greater than one month. Results for a particular month shall be reported to the NMEID no later than the end of the following month.

8. Sampling along the Rio Puerco shall continue at this level until it has been determined by the NMEID that airborne radioactivity concentrations do not warrant further monitoring.

II. UNC shall take water samples monthly from the Rio Puerco at its present monitoring location RWS-27. These samples shall be analyzed for total (dissolved plus suspended) concentrations of the following parameters:

   natural uranium
   thorium-230
   radium-226

ADDENDUM D

lead-210
polonium-210
sulfate

as well as pH, conductivity, and water temperature. Results shall be reported to the EID beginning August 1, 1980, and at 3 month intervals thereafter.

III. In addition to monitoring along the Rio Puerco, UNC shall upgrade its environmental monitoring around its Churchrock mill. UNC shall submit a written description of this environmental radiation monitoring program by August 8, 1980. For guidance in designing an adequate monitoring system, U.S. Nuclear Regulatory Commission Regulatory Guide 4.14 (Revision 1, April, 1980), and Doctor Buhl's May 8, 1980 letter, should be consulted. Upon approval of the monitoring program by the EID, UNC shall immediately implement as many of its elements as possible. All elements of the monitoring program shall be implemented by December 1, 1980.

UNC's offer to cooperate to make sites and access available to the EID for sampling purposes is appreciated. The EID is currently increasing its monitoring around the Churchrock mill, and may contact UNC in the future concerning its offer. UNC must realize, however, that as a licensee it bears a responsibility to conduct its own sampling program adequate to demonstrate that it is in compliance with New Mexico regulations. Sampling performed by the EID around the Churchrock mill does not relieve UNC of its responsibility.

Sincerely,

Thomas E. Baca
Director

TEB:TEB:ag

cc Bill Bennett
Ted Brough
Jerry Stewart
Henry May
Greg Eadie

ADDENDUM E

HEALTH & ENVIRONMENT department

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271
Thomas E. Baca, M.P.H., Director

Bruce King
GOVERNOR

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

O R D E R

Order of this Division dated 16th of July, 1979, as amended July 18, 1979, August 13, 1979, and October 23, 1979, relative to New Mexico Radioactive Material License No. NM-UNC-ML is further amended to include the following additional requirement and condition.

6. The licensee shall immediately comply with the recommendations and requirements for an adequate environmental monitoring program contained in letter dated July 3, 1980, Mr. Thomas E. Baca, NMEID, to Mr. Thomas F. Bailey, United Nuclear Corporation.

Thomas E. Baca
Director

Dated at Santa Fe, New Mexico this 3rd day of June, 1980.

OFFICIAL SEAL
SIGNATURE Cecilia Lopez
CECILIA LOPEZ
NOTARY PUBLIC - NEW MEXICO
NOTARY BOND FILED WITH SECRETARY OF STATE
My Commission Expires 10-20-82

APPENDIX H

APPENDIX H

ANALYTICAL PROCEDURES

TABLE OF CONTENTS

H-1

REFERENCES TO CURRENT ANALYTICAL METHODS

Method 1 - "Colorimetric Determination of Uranium in Aqueous Solutions," Annual Book of ASTM Standards, Part 31, p. 784 (1977).

Variations developed at ORNL and approved for UNC use by EPA-Region VI letter of 12 July 79 to John Abbiss from Adlene Harrison, Regional Administrator.

Method 2 - Percival, D. R. and D. B. Martin, "Sequential Determination of Ra-226, Ra-228, Ac-227, and Thorium Isotopes in Environmental and Process Samples," Anal. Chem., 46, p. 1742 (1974).

"Determination of Ra-226 and Th-230 in Mill Effluents," The 6th Annual Meeting on Bio-Assay and Analytical Chemistry, TID-7616, USAEC, 1960, p. 149.

Method 3 - "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, USEPA/ORD/EMSL, Cincinnati, OH (August, 1980).

Method 4 - Harley, J. H., ed., EML Procedures Manual, HASL-300, Environmental Measurements Lab, USDOE, New York, NY (1972).

Baratta, E. J., E. S. Ferri, and T. C. Reavey, "Analysis of Environmental Samples, Supplementary Chemical and Radiochemical Procedures," Northeastern Radiological Health Lab Report No. NERHL-65-4, Dept. HEW, Public Health Service, Winchester, MA (1965).

Method 5 - "Radiochemical Analytical Procedures for Analysis of Environmental Samples," EMSL-LV-0539-17, USDOE/EMSL/LV, p. 49 (March, 1979).

PARAMETER	METHOD	LOWEST LIMIT DETECTION
Gross Alpha	Method 3	1.0 pCi/L (procedure has always been used)
Gross Beta	Method 3	0.5 pCi/L (procedure has always been used)
Lead-210	Method 4	2.0 pCi/L (implemented 10/01/81)
Polonium-210	Method 5	0.1 pCi/L (implemented 10/01/81)
Radium-226	Method 3	0.5 pCi/L (implemented 10/01/81)
Radium-228	Method 2	2.0 pCi/L (implemented 10/01/81)
Thorium-230	Method 2	0.1 pCi/L (implemented 10/01/81)
Uranium	Method 1	0.1 mg/l (procedure has always been used)

GROSS ALPHA AND GROSS BETA RADIOACTIVITY IN DRINKING WATER

1. Scope and Application

1.1 This method covers the measurement of gross alpha and gross beta particle activities in drinking water. The method is a screening technique for monitoring drinking water supplies for alpha and beta particle activities according to the limits set forth under the Safe Drinking Water Act, PL 93-523, 40 FR 34324, and thereby determining the necessity for further analysis.

1.2 The method is applicable to the measurement of alpha emitters having energies above 3.9 megaelectronvolts (MeV) and beta emitters having maximum energies above 0.1 MeV.

1.3 The minimum limit of concentration to which this method is applicable depends on sample size, counting system characteristics, background, and counting time. The National Primary Interim Drinking Water Regulations (NIPDWR) require a gross beta detection limit of 4 pCi/l, an alpha detection limit of 1 pCi/l for compliance with Part 141.15(a) and a gross alpha detection limit of 3 pCi/l for compliance with Part 141.15(b).

1.4 Since, in this method for gross alpha and gross beta measurement, the radioactivity of the sample is not separated from the solids of the sample, the solids concentration is very much a limiting factor in the sensitivity of the method for any given water sample. Also, for samples with very low concentrations of radioactivity such as from drinking water sources, it is essential to analyze as large a sample aliquot as is needed to give reasonable counting times in meeting the required sensitivities (detection limits) indicated above. The Regulations define sensitivity in terms of detection limits Part 141.25(c) of the Regulations .

1.5 The largest sample aliquot that should be counted for gross alpha activity is that size aliquot which gives a solids density thickness of 5 mg/cm^2 in the counting planchet. For a 2-inch diameter counting planchet (20 cm^2), an aliquot containing 100 mg of dissolved solids would be the maximum aliquot size for that sample which should be evaporated and counted for gross alpha activity.

1.6 When the concentration of total dissolved solids (TDS) is known for a given water sample and the alpha background and the counting efficiency of a given counting system are known, the counting time that is needed to meet the required sensitivity (3 pCi/l) can be determined by equations given in Appendix C.

1.7 For the counting of gross beta activity in a water sample the TDS is not as limiting as for gross alpha activity because beta particles are not stopped in solids as easily as are alpha particles. Very often a single sample aliquot is evaporated and counted for both gross alpha and gross beta activity. In that case the sample aliquot size would be dictated by the solids limitations for alpha particles. For water samples that are to be counted for gross beta activity, equations in Appendix C can also be used to determine the necessary counting time to meet a sensitivity for gross beta activity (4 pCi/l required by NIPDWR).

1.8 Radionuclides that are volatile under the sample preparation conditions of this method will not be measured. In some areas of the country the nitrated water solids (sample evaporated with nitric acid present) will not remain at a constant weight after being dried at 105°C for two hours and then exposed to the atmosphere before and during counting. Other radioactivities may also be lost during the sample evaporation and drying at 105°C (such as some chemical forms of radioiodine). Those types of water samples need to be heated to a dull red heat for a few minutes to convert the salts to oxides. Sample weights are then usually sufficiently stable to give consistent counting rates and a correct counting efficiency can then be assigned. Some radioactivities, such as the cesium radioisotopes, may be lost when samples are heated to dull red color. Such losses are limitations of the test method.

1.9 This method provides a rapid screening measurement to indicate whether specific analyses are required. For drinking waters with an extremely high solids content (>500 ppm), method 900.1 is recommended.

2. Summary of Method

2.1 An aliquot of a preserved drinking water sample is evaporated to a small volume and transferred quantitatively to a tared 2-inch stainless steel counting planchet. The sample residue is dried to constant weight, reweighed to determine dry residue weight, then counted for alpha and/or beta radioactivity.

2.2 Counting efficiencies for both alpha and beta particle activities are selected according to the amount of sample solids from counting efficiency vs sample solids standard curves.

3. Sample Handling and Preservation

3.1 A representative sample must be collected from a free-flowing source of drinking water, and should be large enough so that adequate aliquots can be taken to obtain the required sensitivity.

3.2 It is recommended that samples be preserved at the time of collection by adding enough 1N HNO_3 to the sample to bring it to pH 2 (15 ml 1N HNO_3 per liter of sample is usually sufficient.) If samples are to be collected without preservation, they should be brought to the laboratory within 5 days, then preserved and held in the original container for a minimum of 16 hours before analysis or transfer of the sample.

3.3 The container choice should be plastic over glass to prevent loss due to breakage during transportation and handling.

4. Interferences

4.1 Moisture absorbed by the sample residue is an interference as it obstructs counting and self-absorption characteristics. If a sample is counted in an internal proportional counter, static charge on the sample residue can cause erratic counting, thereby preventing an accurate count.

4.2 Non-uniformity of the sample residue in counting planchet interferes with the accuracy and precision of the method.

4.3 Sample density on the planchet area should be not more than 5 mg/cm^2 for gross alpha and not more than 10 mg/cm^2 for gross beta.

4.4 When counting alpha and beta particle activity by a gas flow proportional counting system, counting at the alpha plateau discriminates against beta particle activity, whereas counting at the beta plateau is sensitive to alpha particle activity present in the sample. This latter effect should be determined and compensated for during the calibration of the specific instrument being used.

5. Apparatus - See Appendix D for details and specifications.

5.1 Gas-flow proportional counting system, or

5.2 Scintillation detector system

5.3 Stainless steel counting planchets

5.4 Electric hot plate

5.5 Drying oven

5.6 Drying lamp

5.7 Glass desiccator

5.8 Glassware

5.9 Analytical balance

6. Reagents

All chemicals should be of "reagent-grade" or equivalent whenever they are commercially available.

6.1 Distilled or deionized water having a resistance value between 0.5 and 2.0 megohms (2.0 to 0.5 micromhos)/cm at 25°C.

6.2 Nitric acid, 1N: Mix 6.2 ml 16N HNO_3 (conc.) with deionized or distilled water and dilute to 100 ml.

7. Calibrations

7.1 For absolute gross alpha and gross beta measurement, the detectors must be calibrated to obtain the ratio of count rate to disintegration rate. Americium-241 (used for alpha activity in the collaborative test of this method) has higher alpha particle energy (5.49 MeV) than those emitted by the naturally occurring uranium and radium-226 radionuclides but is close to the energy of the alpha particles emitted by naturally occurring thorium-228 and radium-224. Standards should be prepared in the geometry and weight ranges to be encountered in these gross analyses. It is, therefore, the prescribed radionuclide for gross alpha calibration. NBS or NBS-traceable americium-241 is available from Standard Reference Materials Catalog, NBS Special Publications 260, U.S. Department of Commerce (1976), and from Quality Assurance Branch, EMSL-LV, P.O. Box 15027, Las Vegas, Nevada 89114.

7.2 Strontium-90 and cesium-137 have both been used quite extensively as standards for gross beta activity. Standard solutions of each of these radionuclides are readily available. Cesium is volatile at elevated temperatures (above 450°C). Some water supplies have dissolved solids (salts) that, when converted to nitrate salts, are quite hygroscopic and need to be converted to oxides by heating to red heat to obtain sample aliquots that are weight-stable. Sample weight stability is essential to gross alpha and gross beta measurements to ensure the accuracy of the self-absorption counting efficiency factor to be used for the samples. Strontium-90 in equilibrium with its daughter yttrium-90 is the prescribed radionuclide for gross beta calibrations.

7.3 For each counting instrument to be used, the analyst should prepare separate alpha and beta particle self-absorption graphs showing water sample residue weight (mg) vs the efficiency factor

(dpm/cpm), using standard alpha and beta emitter solutions and tap water. For the alpha graph standard, alpha activity is added to varying size aliquots of tap water, such that the aliquot residue weight is varied between 0 and 100 mg (for a 2-inch counting planchet). A similar graph is prepared with standard beta activity and tap water aliquots, varying the residue weight between 0 and 300 mg (for a 2-inch planchet). If it is planned to use water sample aliquot volumes that always contain 100 mg of dried water solids, then only the efficiency factor for that residue weight needs to be established.

7.4 Tap water aliquots with added americium-241 or strontium-90 standard, should be acidified with a few ml 16N HNO_3, evaporated to a small volume in a beaker on a hot plate, transferred quantitatively in 5 ml portions or less to a tared counting planchet, evaporated to dryness, and finally dried at 105°C for 2 hours (or flamed to a red heat if dried solids appear to be noticeably hygroscopic). Weight-stable aliquot residues should then be alpha and/or beta counted until at least 10,000 total counts have been accumulated. A single set of reference standards prepared in this way can be used for each counting instrument for separate graph preparations and can be stored for reverification whenever needed.

8. Procedure

8.1 Transfer to a beaker an aliquot of a water sample of a volume size that contains no more than 100 mg (for alpha only or alpha and beta determination) or 200 mg (for beta only determination) of total water solids. Evaporate the aliquot to near dryness on a hot plate. If water samples are known or suspected to contain chloride salts, those chloride salts should be converted to nitrate salts before the sample residue is transferred to a stainless steel planchet (Chlorides will attack stainless steel and increase the sample solids and no correction can be made for those added solids). Chloride salts can be converted to nitrate salts by adding 5 ml portions of 16N HNO_3 to the sample residue and evaporating to near dryness. (Two treatments are usually sufficient.) Add 10 ml 1N HNO_3 to the beaker and swirl to dissolve the residue. Quantitatively transfer the aliquot concentrate in small portions (not more than 5 ml at a time) to a tared planchet, evaporating each portion to dryness.

8.2 Dry the sample residue in a drying oven at 105°C for at least 2 hours; cool in a desiccator; weigh; and count. Store the sample residue in a desiccator until ready for counting.

8.3 Some types of water dissolved solids, when converted to nitrate salts, are quite hygroscopic even after being dried at 105°C for two hours. When such hygroscopic salts are present with samples that are put into an automatic counting system, those samples gain weight while they are waiting to be counted and inaccurate counting

data result. When there is evidence of hygroscopic salts in sample counting planchets, it is recommended that they be flamed to a dull red heat with a Meeker burner for a few minutes to convert the nitrate salts to oxides before weighing and counting.

8.4 Count for alpha and beta activity at their respective voltage plateaus. If the sample is to be recounted for reverification, store it in a desiccator.

Note: As long as counting chambers are capable of handling the same size planchet, alpha and beta activity can be determined at their respective voltage plateaus in the designated counting instruments. Keep planchet in the desiccator until ready to count because vapors from moist residue can damage detector and window and can cause erratic measurements. Samples may be counted for beta activity immediately after drying; but alpha counting should be delayed at least 72 hours until equilibrium has occurred. If the gas-flow internal proportional counter does not discriminate for the higher energy alpha pulses at the beta plateau, the alpha activity must be subtracted from the beta plus alpha activity. This is particularly important for samples with high alpha activity.

9. Calculations

9.1 Calculate the alpha radioactivity by the following equation:

$$\text{Alpha (pCi/liter)} = \frac{A \times 1000}{2.22 \times C \times V}$$

where:

A = net alpha count rate (gross alpha count rate minus the background count rate)at the alpha voltage plateau,
C = alpha efficiency factor, read from graph of efficiency versus mg of water solids per cm^2 of planchet area, (cpm/dpm),
V = volume of sample aliquot, (ml),and
2.22 = conversion factor from dpm/pCi

9.2 Calculate the beta radioactivity by the following equations:

9.2.1 If there are no significant alpha counts when the sample is counted at the alpha voltage plateau, the beta activity can be determined from the following equation:

$$\text{Beta (pCi/liter)} = \frac{B \times 1000}{2.22 \times D \times V}$$

where:

B = net beta count rate (gross count rate minus the background count rate at the beta voltage plateau),
D = beta efficiency factor, read from the graph of efficiency versus mg of water solids per cm^2 of planchet area, (cpm/dpm),
V = volume of sample aliquot, (ml), and
2.22 = conversion factor from dpm/pCi

9.2.2 When counting beta radioactivity in the presence of alpha radioactivity by gas-flow proportional counting systems (at the beta plateau) alpha particles are also counted. Since alpha particles are more readily absorbed by increasing sample thickness than beta particles, the alpha/beta count ratios vary with increasing sample thickness. Therefore, it is necessary to prepare a calibration curve by counting standards containing americium-241 with increasing thickness of solids on the alpha plateau and then on the beta plateau, plotting the ratios of the two counts vs density thickness. The alpha amplification factor (E) from that curve is used to correct the amplified alpha count on the beta plateau. When significant alpha activity is indicated by the sample count at the alpha voltage plateau, the beta activity of the sample can be determined by counting the sample at the beta voltage plateau and calculating the activity from the following equation:

$$\text{Beta (pCi/liter)} = \frac{(B - AE) \times 1000}{2.22 \times D \times V}$$

where:
B = (as defined above)
D = (as defined above)
A = (as defined above)
E = alpha amplification factor, read from the graph of the ratio of alpha counted at the beta voltage/alpha counted at the alpha voltage vs sample density thickness, and
V = volume of sample aliquot, (ml), and
2.22 = conversion factor from dpm/pCi.

9.4 Errors associated with the results of the analysis should also be reported. (See Appendix B for error and statistical calculations).

10. Precision and Accuracy

10.1 In an interlaboratory collaborative test of the method, three sets of samples were analyzed by 18 laboratories for gross alpha and gross beta activity. The samples were prepared with dissolved water solids with known additions of americium-241 for gross alpha and cesium-137 for gross beta activity. Sample series A contained only americium-241 radioactivity,

series B contained only cesium-137 radioactivity, and series C contained both americium-241 and cesium-137 radioactivities. Participating laboratories were supplied with standard solutions of americium-241 and cesium-137 and blank solution of dissolved water solids for preparing sample self-absorption curves.

10.2 The gross alpha data from two laboratories was rejected for the statistical analysis because their scores in the ranked results of the laboratory averages were out of the acceptable range for 18 laboratories. The gross beta data from 3 laboratories were rejected for the statistical analysis for the same reason.

10.3 The coefficients of variation for the combined within-laboratory precision for gross alpha analysis of the 3 samples ranged from 7.4% to 12.2%. The coefficients of variation for the precision of the method between laboratories ranged from 11.5% to 14.6% for gross alpha analysis for the 3 samples.

10.4 The coefficients of variation for the combined within--laboratory precision for gross beta analysis for the 3 samples ranged from 3.5% to 5.2%. The coefficients of variation for the precision between laboratories for gross beta analysis for the 3 samples ranged from 3.5% to 7.5%. The coefficients of variation for the total error between laboratories based on a single analysis ranged from 5.9% to 8.3% for gross beta analysis of the 3 samples.

10.5 In the statistical test to detect method bias the calculated values for "t" were well below the specified critical value for "t" for both gross alpha and gross beta analysis, indicating no bias in the method. Also, a comparison of the known values to the grand average values shows a deviation of less than 10% for alpha activity for the 3 samples. The same comparison for beta activity shows a deviation of less than 2% for each of the 3 samples.

10.6 Whenever the same radioisotopes are present in standards and samples, acceptable accuracy of measurement of alpha and beta activities would be expected. Whenever different radioisotopes are present in standards and samples, especially when significantly different particle energies are involved, then any measurement of gross alpha and gross beta activity in the sample will only be an estimation of the true activities. Such an estimation can only serve to indicate the need for more specific analyses.

Bibliography

1. Standard Methods for the Examination of Water and Waste Water, 14th Ed., American Public Health Association, Washington, D.C. (1976).

2. 1979 Annual Book of ASTM Standards, Part 31, American Society for Testing and Materials, Philadelphia, Pa. (1979)

3. Friedlander, G., J.W. Kennedy, and J. Miller, Nuclear and Radiochemistry, John Wiley and Sons, Inc., New York, New York, 1964.

4. Youden, W.J., and E.H. Steiner, Statistical Manual of the Association of Official Analytical Chemists, 1975.

5. Dixon, W.J., and F.J. Massey, Jr., Introduction to Statistical Analysis, 3rd Edition, McGraw-Hill, 1969.

6. Harley, J.H., N.A. Hallden, and I.M. Fisenne, "Beta Scintillation Counting With Thin Plastic Phosphors," Nucleonics, 20:59, 1961.

7. Hallden, N.A., and J.H. Harley, "An Improved Alpha-Counting Technique," Analytical Chemistry, 32:1861, 1960.

ION-EXCHANGE SEPARATION

This procedure is for the determination of lead 210 and bismuth 210 in a dissolved ash. It has been applied to the determination of these nuclides in ashed samples of bone, tobacco, food, and other biological materials.

Principle of Method

Lead and bismuth carriers are added to the dissolved ash, and the solution is passed through an anion-exchange resin column. The lead and bismuth are adsorbed onto the resin. The lead is eluted first with dilute hydrochloric acid, and then bismuth is eluted with dilute sulfuric acid. The bismuth is precipitated as the oxychloride, which is counted for the beta activity of bismuth 210.

Lead is precipitated as the sulfide, dissolved in hydrochloric acid, and again adsorbed onto the anion resin. It is then eluted with dilute hydrochloric acid and precipitated as the chromate. The lead chromate is counted for beta activity to follow the decay of lead 210 to bismuth 210.

Reagents

acetic acid, CH_3COOH: glacial (17N)
ammonium hydroxide, NH_4OH: concentrated (15N)
anion-exchange resin: Dowex 1-X8 (Cl^- form, 50-100 mesh)
carrier solutions:
- Bi^{+3} as bismuth oxide, Bi_2O_3: 15 mg Bi^{+3} per ml
- Pb^{+2} as lead nitrate, $Pb(NO_3)_2$: 20 mg Pb^{+2} per ml

ethyl alcohol, C_2H_5OH: absolute (100%)
hydrochloric acid, HCl: concentrated (12N), 6N, 1.8N, 0.1N, 0.05N
hydrogen sulfide, H_2S: gas
potassium dichromate, $K_2Cr_2O_7$: 1N
sulfuric acid, H_2SO_4: 2N

Apparatus

anion-exchange system: a glass column, 10 mm in diameter and 30 cm in length, having a coarse fritted glass disk or glass-wool plug above the stopcock. Twenty ml of the Dowex 1-X8 resin are placed in the column and washed with 1.8N HCl prior to use.

desiccator

stainless steel suction-filtration apparatus (Tracerlab)

Procedure

1. Dissolve the weighed sample of ash in a minimum volume of 6N HCl. To the dissolved ash, add 1.0 ml each of bismuth and lead carrier solutions, and dilute to 400 ml.
   [Note: The solution should be 1.8N HCl after dilution.]
2. Pass the solution over the anion-exchange resin at a flow rate of approximately 2 milliliters per minute (ml/min). Collect the effluent in an 800-ml beaker.
3. Pass 125 ml of 0.05N HCl over the resin at 2 ml/min to elute the lead, and combine this solution with the effluent from Step 2. RECORD THE MIDPOINT OF THE ELUTION PERIOD AS THE BEGINNING OF BISMUTH 210 DECAY.
4. Pass 150 ml of 2N H_2SO_4 through the column to elute the bismuth. Collect the eluate in a 400-ml beaker.
   [Note: Process the column for re-use in Step 14 by passing 1.8N HCl through it at 2 ml/min until the pH of the effluent reaches 2.]
5. Using a pH meter, adjust the eluate to pH 5 by adding concentrated NH_4OH. Add 2 ml of 6N HCl, and dilute to 350 ml with distilled water. Digest the bismuth oxychloride precipitate on a hot plate for 30 minutes.
6. Place a 2.4-cm diameter glass fiber filter onto a stainless steel planchet, and weigh together. Place the filter in the filtration apparatus.
7. Filter the solution. Wash the precipitate with hot distilled water. Complete the wash with 10 ml of absolute ethyl alcohol.
8. Carefully place the filter back onto the stainless steel planchet, and dry in an oven at 110° C for 30 minutes. Cool in a desiccator, and reweigh the planchet and filter with the precipitate. Calculate the chemical yield of bismuth by dividing the weight of the precipitate by the weight of bismuth oxychloride [BiOCl] which should be obtained from 1 ml of carrier solution.

9. Transfer the filter to an appropriate counting dish or planchet, and count for the beta activity of bismuth 210 in a low-background beta counter.
10. Using a pH meter, add concentrated NH_4OH to the lead solution from Step 3 to bring the pH to 7. Then add 8 ml of concentrated HCl, and dilute to 1 liter.
[Note: The solution is now 0.1N HCl.]
11. Heat the solution on a hot plate, and slowly pass H_2S gas through the solution for several minutes to precipitate lead sulfide [PbS]. Filter the solution through a glass fiber filter, using a Buchner funnel. Wash the precipitate with distilled water.
12. Place a 100-ml beaker under the funnel, and dissolve the precipitate into the beaker by passing a minimum amount of warm 6N HCl through the filter. Evaporate the filtrate to dryness.
13. Dissolve the residue in 20 ml of 1.8N HCl, and filter the solution through Whatman No. 541 filter paper. Wash the filter paper and contents with 1.8N HCl; then discard the filter paper.
14. Pass the filtrate over the regenerated anion-exchange resin at a flow rate of approximately 2 ml/min. Wash the resin with 60 ml of 1.8N HCl, and discard the effluent and wash solutions.
15. Pass 150 ml of 0.05N HCl through the column to elute the lead, collecting the eluate in a 250-ml beaker. RECORD THE TIME AS THE BEGINNING OF BISMUTH 210 INGROWTH.
16. Add 1 ml of glacial acetic acid, and using a pH meter, adjust the pH to 5 with concentrated NH_4OH. Heat the solution to boiling, and add 1 ml of 1.0N potassium dichromate.
17. Place a 2.4-cm diameter glass fiber filter onto a stainless steel planchet, and weigh together. Place the filter into the filtration apparatus.
18. Filter the solution, and wash the precipitate with distilled water and finally with 10 ml of absolute ethyl alcohol.
19. Carefully place the filter back onto the stainless steel planchet, and dry in an oven at 110° C for 30 minutes.
20. Cool in a desiccator, and reweigh the planchet and paper with the precipitate. Calculate the chemical yield of lead by dividing the weight of the precipitate by the weight of lead dichromate [$PbCr_2O_7$] which should

be obtained from 1.0 ml of lead carrier solution.

21. Transfer the filter paper to an appropriate counting dish. Count in a low-background beta counter at 2- to 3-day intervals over a period of two weeks to follow the ingrowth of bismuth 210 from the lead 210. Interference from other bismuth isotopes can then be removed mathematically because of their different half-lives (^{210}Bi ~5 days; ^{214}Bi ~20 minutes).

Calculations

$$\text{bismuth 210 activity (pCi)} = \frac{A}{B \times C \times D}$$

where A = net count rate of bismuth 210 (cpm) [from Step 9]

B = counter efficiency for counting bismuth 210 as bismuth oxychloride mounted on a glass fiber filter (cpm/pCi)

C = recovery of bismuth carrier [Step 8]

D = correction factor $e^{-\lambda t}$ for bismuth 210 decay, where t is the time from midpoint of the elution period [Step 3] to the time of counting [Step 9]

$$\text{lead 210 activity (pCi)} = \frac{A}{B \times C \times D}$$

where A = net count rate of bismuth 210 (cpm) [from Step 21]

B = counter efficiency for counting bismuth 210 as bismuth-lead chromate mounted on a glass fiber filter (cpm/pCi)

C = chemical yield of lead

D = correction factor $1-e^{-\lambda t}$ for ingrowth of bismuth 210, where t is the time from the second elution of lead from the column [Step 15] to the time of counting

Reference

Baratta, E. J., E. S. Ferri, and T. C. Reavey. *Analysis of Environmental Samples, Supplementary Chemical and Radiochemical Procedures*. Northeastern Radiological Health Laboratory Report No. NERHL-65-4, U. S. Department of Health, Education and Welfare, Public Health Service, Winchester (1965)

RADIOCHEMICAL DETERMINATION OF LEAD-210*

Method used 9/81-Present

Principle

This method is based on the solvent extraction of a lead bromide complex into Aliquat-336. Lead-210 is isolated from most interferences. Its daughter bismuth-210 is separated from lead-210 and the beta activity is measured radiometrically after ingrowth.

Scope

The method is applicable to samples of bone, food, urine, feces, blood, air and water.

Special Apparatus

1. Atomic absorption spectrophotometer.
2. Aluminum foil - 7.2 mg/cm^2.
3. Rings and discs - See SPECIFICATION G-01.
4. Mylar film - See SPECIFICATION G-03.
5. Teflon filter holder - See SPECIFICATION G-09.
6. Combination magnetic stirrer and hot plate.

Special Reagents

1. Aliquat-336 (Methyltricapryl-ammonium chloride), General Mills Chemical Co. 30 volume percent in toluene and washed twice with an equal volume of 1.5M hydrobromic acid.
2. Hydrobromic acid 48%.
3. Hydrobromic acid 3.0M - 340 ml HBr 48%/liter of water.
4. Hydrobromic acid 1.5M - 170 ml HBr 48%/liter of water.
5. Hydrobromic acid 0.1M - 10 ml HBr 48%/liter of water.
6. Toluene

---

* Based on: Petrow, H.G. and A. Cover, "Direct Radiochemical Determination of Lead-210 in Bone", Anal. Chem. 37, 1659 (1965)

7. Standard lead solution - 1000 ppm.

8. Lead carrier : 20 mg Pb/ml - 32 g $Pb(NO_3)_2$/liter 1:19 HNO_3.

9. Bismuth carrier : 10 mg Bi/ml - 23.2 g $Bi(NO_3)_3 \cdot 5H_2O$/liter 1:19 HNO_3.

SAMPLE PREPARATION

Water

1. To daily collections of 20 liters of tap water, add 1 ml of lead carrier and 100 ml nitric acid and evaporate to about 100 ml.

2. Add 100 ml of nitric acid and transfer to a 400 ml beaker. Complete the dissolution of organic material and evaporate to dryness.

3. Add 100 ml of 3M hydrobromic acid, heat, cool, and proceed with DETERMINATION.

Urine

1. Transfer 2000 ml of urine to a 3000 ml beaker and add 1 ml of lead carrier.

2. Destroy most of the organic material by carefully heating with nitric acid. Hydrogen peroxide can be used to complete the oxidation of organic material.

3. Transfer the sample to a 400 ml beaker and evaporate to dryness.

4. Add 100 ml of 3.0M hydrobromic acid, heat, cool, and proceed with DETERMINATION.

Feces and Blood

1. Add 1 ml of lead carrier to the blood sample or to a 24 hour feces in a 1000 ml beaker.

2. Oxidize all organic material by carefully heating with nitric acid, and finally with hydrogen peroxide.

3. Transfer the sample to a 400 ml beaker and evaporate to dryness.

4. Add 100 ml of 3M hydrobromic acid, heat, cool and proceed with DETERMINATION.

Bone

1. Add 1 ml of lead carrier to 20 g of bone ash in a 400 ml beaker.

2. Dissolve the ash in 100 ml of 3M hydrobromic acid, heat, cool and proceed with DETERMINATION.

Air Filter

1. Add 1 ml of lead carrier to the air filter in a 600 ml beaker and destroy the filter with nitric acid and hydrogen peroxide.

2. Evaporate the sample to dryness, cool, and add 100 ml 3M hydrobromic acid. Heat the sample, cool, and proceed with DETERMINATION.

Food

Where possible, food samples such as whole milk, meat, seafood, fresh fruit, poultry, eggs, fresh vegetables, potatoes, baker products, canned fruit, and canned vegetables should be freeze-dried prior to dissolution with nitric acid. Fruit juices, macaroni, dry beans, flour and powdered milk can be prepared by directly dissolving in nitric acid and hydrogen peroxide in a large beaker with magnetic stirring on a combination magnetic stirrer and hot plate. In either case, add 1 ml of lead carrier immediately after the first nitric acid addition. The final sample volume can be transferred to a 400 ml beaker and evaporated. Add 100 ml 3M hydrobromic acid, heat, cool and proceed with DETERMINATION.

DETERMINATION

1. Transfer the 3M hydrobromic acid solution to a 250 ml separatory funnel containing 75 ml of Aliquat-336.

2. Shake for 30 seconds. Let separate and discard the aqueous phase.

3. Wash the organic phase three times with 50 ml portions of 0.1M hydrobromic acid and discard all washes.

4. Strip the lead from the organic phase by shaking twice for 30 seconds with 50 ml portions of HCl.

5. Combine the strip solutions in a 400 ml beaker and add 100 ml of HNO_3. Let sit overnight.

6. Wait for any reaction to subside and heat gently until the organic residue is destroyed. Reduce volume to 25 ml.

First Milking

1. Add 1 ml of bismuth carrier and transfer the sample to a 40 ml centrifuge tube.

2. Adjust pH of the sample to 8 with NH_4OH.

3. Heat the sample with stirring in a hot water bath.

4. Cool and centrifuge. Discard the supernate.

5. Dissolve the precipitate with 5 drops of HCl.

6. Add 40 ml water and heat with constant stirring.

7. Cool, centrifuge and reserve the supernate in a 250 ml beaker.

8. Repeat steps 5-7 twice more, combining the supernates. Discard the precipitate. (Record the time and date for ingrowth of bismuth-210)

9. Add 1 ml of bismuth carrier and 3-5 ml of HCl to the combined supernates. Reduce the volume to less than 100 ml.

10. Cool, transfer to a 100 ml volumetric flask and bring to volume.

11. Dilute 1 ml of sample to 10 ml in a 10 ml volumetric flask.

12. Determine the recovery of lead carrier by measuring the sample in the 10 ml volumetric flask on an atomic absorption spectrophotometer at 283 mu. (The calibration curve should have a working range of 0-50 ppm)

13. Allow 2-3 weeks for ingrowth of bismuth-210 into the main portion of the sample (step 10).

Second Milking

1. Transfer the solution from the 100 ml volumetric flask to a 250 ml beaker and evaporate to about 15 ml.

2. Transfer to a 40 ml centrifuge tube and adjust the pH to 8 with NH_4OH. Centrifuge and discard the supernate.

3. Dissolve the precipitate with 5 drops of HCl and bring volume of sample to 40 ml with water. (Record the time and date for decay of bismuth-210)

4. Heat with constant stirring in a hot water bath. Cool and centrifuge. Reserve the supernate for additional lead-210 analysis.

5. Dissolve the precipitate with 5 drops of HCl and dilute to 40 ml with water.

6. Heat in a hot water bath with constant stirring. Cool and centrifuge. Combine the supernate with that from step 4.

7. Dissolve the precipitate with 5 drops of HCl. Dilute with 40 ml of water.

8. Heat in a hot water bath with constant stirring. Cool, filter with suction on a weighed 2.8 cm #42 Whatman filter paper using a Teflon filter holder.

9. Wash the precipitate with water and alcohol and dry the paper and precipitate for 30 minutes at 110°C.

10. Cool and reweigh to determine weight of BiOCl precipitate.

11. Mount with plastic ring and disc, covering the sample with aluminum foil (7.2 mg/cm^2) and Mylar film.

12. Count with a low background beta counter. (Record the time and date for decay of bismuth-210)

13. Standardize the counter with a known amount of Pb-210 from which Bi-210 has been separated and prepared in the same way as the sample.

CALCULATION

The Pb-210 disintegration rate is calculated using the following formula:

$$\text{dpm of Pb-210} = \frac{R_s Y_1 Y_2 E}{GD}$$

where R_s = net counting rate of sample

Y_1 = recovery factor for lead carrier

Y_2 = recovery factor for bismuth carrier

E = counter efficiency factor

G = growth factor (growth of Bi-210 from first milking to final milking)

D = decay factor (decay of Bi-210 from final milking to time of counting)

LIMIT OF DETECTION

		1	2
Counter Efficiency	(%)	35	--
Counter Background	(cpm)	0.3	--
Yield	(%)	80	80
Blank	(cpm)		
LLD (400 min.)	(dpm)	0.5	0.4
LLD (1000 min.)	(dpm)	0.3	0.3

1 - Pb-210 separation, Bi-210 ingrowth, Bi-210 separation

2 - Bi-210 separation only

ANALYSIS OF POLONIUM-210 IN SOIL AND AIR FILTERS

(Current method)

1. Principle

1.1 Samples are decomposed by digestion with hydrofluoric acid and nitric acid in the presence of lead carrier and a polonium-208 tracer. Polonium is co-precipitated with lead sulfide from a dilute acid solution separating it from calcium, iron and other interferences. The sulfide precipitate is dissolved in dilute hydrochloric acid and polonium is spontaneously deposited on a nickel disk. Polonium-210 and the polonium-208 tracer are measured by alpha spectrometry.

2. Application

2.1 This method is appropriate for the analysis of up to 1 gram of soil or one 10-cm (4-inch) diameter glass-fiber air filter.

3. Range

3.1 This method is designed to detect environmental levels of activity approaching 0.02 picocurie per sample. To avoid possible cross-contamination and contamination of the alpha detectors, sample activities should be limited to 25 picocuries or less.

4. Interferences

4.1 Samples containing extremely high levels of polonium-210 will result in invalid analyses by interfering with the determination of the polonium-208 tracer recovery. Samples should be screened by gross alpha counting to determine the proper sample aliquot.

5. Lower limit of detection

5.1 The lower limit of detection* (LLD) is defined as the smallest concentration of radioactive material sampled that has a 95% probability of being validly detected.

$$LLD = \frac{3.29\ S_o}{2.22 \times E \times S}$$

* HASL Procedures Manual, J. H. Harley, editor, pages D-08-01/12, August 1977.

where 3.29 = $K_\alpha + K_\beta$

K_α = the value for the upper percentile of the standardized normal variate corresponding to the preselected risk for concluding falsely that activity is present (α) = 0.05

K_β = corresponding value for the predetermined degree of confidence for detecting the presence of activity ($1-\beta$) = 0.95

S_o = estimated standard error for the net sample activity

2.22 = dpm/pCi

E = fractional counting efficiency

S = sample size

5.2 The sensitivity for an analysis is proportional to the actinide yield, the counter efficiency, and the length of alpha count. The sensitivity for an analysis having a 100% yield and employing a 1000-minute count on a counter having a counting efficiency of 0.20 cpm/dpm is 440 counts/picocurie.

6. Precision and accuracy

7. Shipment and storage of samples and sample stability

7.1 Samples should be analyzed as soon as possible after collection to avoid appreciable decay or ingrowth of the relatively short-lived polonium-210 in the sample, depending on its state of equilibrium, with its parent lead-210.

8. Reagents

8.1 Ammonium hydroxide, concentrated (14N): Reagent grade.

8.2 Ammonium hydroxide, (1.4N): With stirring, add 100 ml concentrated ammonium hydroxide to 800 ml of distilled water. Dilute to 1000 ml.

8.3 Citric acid, (40% w/v): Dissolve 40 g of reagent grade citric acid in 100 ml of distilled water.

8.4 Ethyl alcohol, (95%): Reagent grade.

8.5 Hydrochloric acid, concentrated (12N): Reagent grade.

8.6 Hydrochloric acid, (0.5N): Add 42 ml of 12N reagent grade, hydrochloric acid to 900 ml of distilled water. Dilute to 1000 ml with distilled water.

8.7 Hydrofluoric acid, concentrated (48%): Reagent grade.

8.8 Hydroxylamine hydrochloride (50% w/v): Dissolve 100 g of reagent grade hydroxylamine hydrochloride in 100 ml of distilled water.

8.9 Lead carrier, (10 mg/ml): Dissolve 1 g of lead nitrate ($Pb(NO_3)_2$) in 100 ml 4N nitric acid.

8.10 Nitric acid, concentrated (16N): Reagent grade.

8.11 Polonium-208 tracer: 5 pCi/ml in 4N nitric acid.

8.12 Thioacetamide, (10% w/v): Dissolve 50 g of reagent grade thioacetamide in 500 ml of distilled water.

9. Apparatus

9.1 Alpha spectrometric analyzer: A counting system consisting of a multichannel analyzer, biasing electronics, a printer, a vacuum pump and silicon surface barrier detectors operated in vacuum chambers.

9.2 Caps: Black resin, Poly-Seal liner, 22-mm GCMI thread design.

9.3 Centrifuge tubes: 50-ml, disposable.

9.4 Centrifuge

9.5 Deposition cells with 1.91-cm (3/4-inch) polished nickel disks.

9.5.1 Cut a 1.43-cm (9/16-inch) hole in the bottom of the polyethylene vial with a sharp cork borer. Improve the seal by abrading the threaded end with wet #320 waterproof emery paper held against a flat surface. Finish with wet #600 emery paper.

9.5.2 Remove the polyethylene liner from a 22-mm Poly-Seal cap.

9.5.3 Cut a 1.91-cm (3/4-inch) disc from 0.079-cm neoprene sheeting with a cork borer or a die. Place the disc in the cap.

9.5.4 Cleaning

9.5.5 Completely immerse the body of the cell in dichromate-sulfuric acid cleaning solution for 2 to 3 hours. Rinse off the cleaning solution with water and immerse the cell in 4<u>N</u> nitric acid for at least one hour. Rinse and immerse in distilled water until ready to use.

9.5.6 The cleaning process renders the polyethylene hydrophilic, provided the cell is kept continuously wet after having been cleaned. The polyethylene parts of used cells can be rinsed and then cleaned by the directions given in 9.5.5, except that the immersion in dichromate sulfuric acid cleaning solution is limited to one hour. Clean the caps and neoprene washers by immersing for a few minutes in 4<u>N</u> nitric acid and then rinse with water.

9.5.7 Assembly

Connect one hole of a 2-hole #6 rubber stopper to an aspirator pump with a length of rubber tubing.

9.5.8 Rinse the polyethylene cell with distilled water but do not dry. Hold the nickel disc centered against the threaded end of the cell and place the rubber stopper against the other end of the cell. Apply suction by placing a finger over the open hole of the stopper. The vacuum will hold the planchet in a centered position while the cap assembly is screwed on. Fill the cell halfway with water and alternately apply and release the vacuum. The flexing will cause the planchet to seat more firmly against the cell.

9.5.9 Check to see that no stream of air bubbles rises through the water when vacuum is applied. If the vacuum is great enough, the water may boil, but the boiling is easily distinguished from air leakage.

9.5.10 Fill the assembled cell to the top with water to preserve the hydrophilic character of the cell until ready to add sample.

9.6 Neoprene sheet: 0.079-cm (1/32-inch) thickness.

9.7 pH meter.

9.8 Steam or hot water bath.

9.9 Stirrer.

9.10 Teflon beakers: 100-ml.

9.11 Vials: Polyethylene, 25-ml screw cap, Packard #6001075.

10. Procedure

10.1 Weigh and transfer 0.5 to 1.0 grams dried soil, or a 10-cm (4-inch) diameter air filter, into a 100-ml Teflon beaker. Keep filter as flat and close to bottom as possible. Add 1 ml polonium tracer and 1 ml lead carrier.

10.2 Add 10 ml concentrated nitric acid and 10 ml 48% hydrofluoric acid and place on hot plate. Evaporate to dryness without bringing to a boil. Repeat 3 more times.

10.3 Add 10 ml concentrated nitric acid and evaporate to dryness. Repeat 2 more times.

10.4 Add enough concentrated nitric acid and heat to dissolve salts. Add 10 ml water and filter through a Whatman #42 filter, using a disposable funnel into a disposable 50-ml centrifuge tube. Wash filter with 10 ml water followed by 10 ml 0.05N hydrochloric acid.

10.5 Evaporate the solution in the centrifuge tube to dryness in a steam bath. Redissolve with 1 ml concentrated hydrochloric acid. Add 10 ml water and adjust pH to 3.5-4.0 with 0.5N hydrochloric acid and/or 1.4N ammonium hydroxide.

10.6 Add 5 ml of 10% thioacetamide solution and digest for 1 to 2 hours on the steam bath. Cool. Centrifuge. Decant and discard the supernatant liquid.

10.7 Dissolve the precipitate with 1 ml concentrated hydrochloric acid. Repeat steps 10.5 and 10.6.

10.8 Dissolve the residue with 1 ml concentrated hydrochloric acid while heating on the steam bath. Add 5 ml water and filter through a Whatman #42 filter (using a disposable funnel) into a new 50-ml disposable centri-

fuge tube. Wash the filter with 1 ml water and 1 ml 0.5<u>N</u> hydrochloric acid.

10.9 Transfer to a deposition cell with a minimum of water and add 2 ml 40% citric acid solution and 2 ml hydroxamine hydrochloride. Add water until cell is 3/4 full. Place cell in a hot water bath at 80° C and stir for 1 to 1 1/2 hours to plate the polonium.

10.10 Remove the cell from the hot water bath and discard the solution.

10.11 Wash the deposition cell with distilled water and then with ethyl alcohol.

10.12 Heat the disc (in an aluminum planchet) on a hot plate (200° C to 250° C) for 20 minutes. Cool and count in an alpha spectrometer.

11. Calibration

11.1 Calibration of the polonium-208 tracer is performed by co-deposition with standardized polonium-210 solutions and by liquid scintillation counting.

12. Quality Control

13. Calculations

CALCULATION OF SAMPLE ACTIVITY (R)

13.1

$$\text{(R) isotope activity (pCi/unit)} = \frac{(A - A_1) \times F \times D}{(B - B_1) \times \text{(sample size)}}$$

CALCULATION OF THE TWO SIGMA ERROR (E)

13.2

$$(E) = 2R\sqrt{\frac{\frac{A}{T_s} + \frac{A_1}{T_B}}{(A - A_1)^2} + \frac{\frac{B}{T_s} + \frac{B_1}{T_B}}{(B - B_1)^2}}$$

where

- A = gross sample counts per minute which appear in the polonium-210 energy region
- A_1 = background counts per minute in the same alpha energy region (channels) as "A" above
- B = gross tracer counts per minute from the sample disc
- B_1 = background counts per minute in the same alpha energy region (channels) as "B" above
- F = tracer activity in picocuries added to the sample
- D = fractional decay of the tracer between the time of its standardization and the time of the sample count

T_S = sample counting time in minutes

T_B = background counting time in minutes

14. References

Figgins, P. E., Radiochemistry of Polonium. National Academy of Sciences--National Research Council. NAS-NS 3037. (1961)

Harley, J. H., HASL Procedures Manual. U.S. Atomic Energy Commission. HASL-300. (1972)

RADIUM-226 IN DRINKING WATER
RADON EMANATION TECHNIQUE

(Current method)

1. Scope and Application

1.1 This method covers the measurement of radium-226 in a drinking water sample and would be employed after the gross alpha or the gross radium alpha screening technique had indicated possible non-compliance with the alpha radioactivity limits set forth in the Safe Drinking Water Act, PL 93-523. 40 FR 34324.

1.2 This method is specific for radium-226, and is based on the emanation and scintillation counting of radon-222, a daughter product of radium-226.

1.3 The detection limit for this method assures measuring radium-226 concentrations as low as 0.1 pCi/l.

2. Summary of Method

2.1 The radium-226 in the drinking water sample is concentrated and separated by coprecipitation on barium sulfate. The precipitate is dissolved in EDTA reagent, placed in a sealed bubbler and stored for ingrowth of radon-222. After ingrowth, the gas is purged into a scintillation cell. When the short-lived radon-222 daughters are in equilibrium with the parent ($\sim$4h), the scintillation cell is counted for alpha activity.

2.2 The absolute measurement of radium-226 is effected by calibrating the scintillation cell system with a standard solution of this nuclide.

3. Sample Handling and Preservation (see Sec. 3, Method 900.0).

4. Interferences

4.1 There are no radioactive interferences in this method.

5. Apparatus - See Appendix D for details and specifications.

5.1 Scintillation cell system. (Figure 1.)

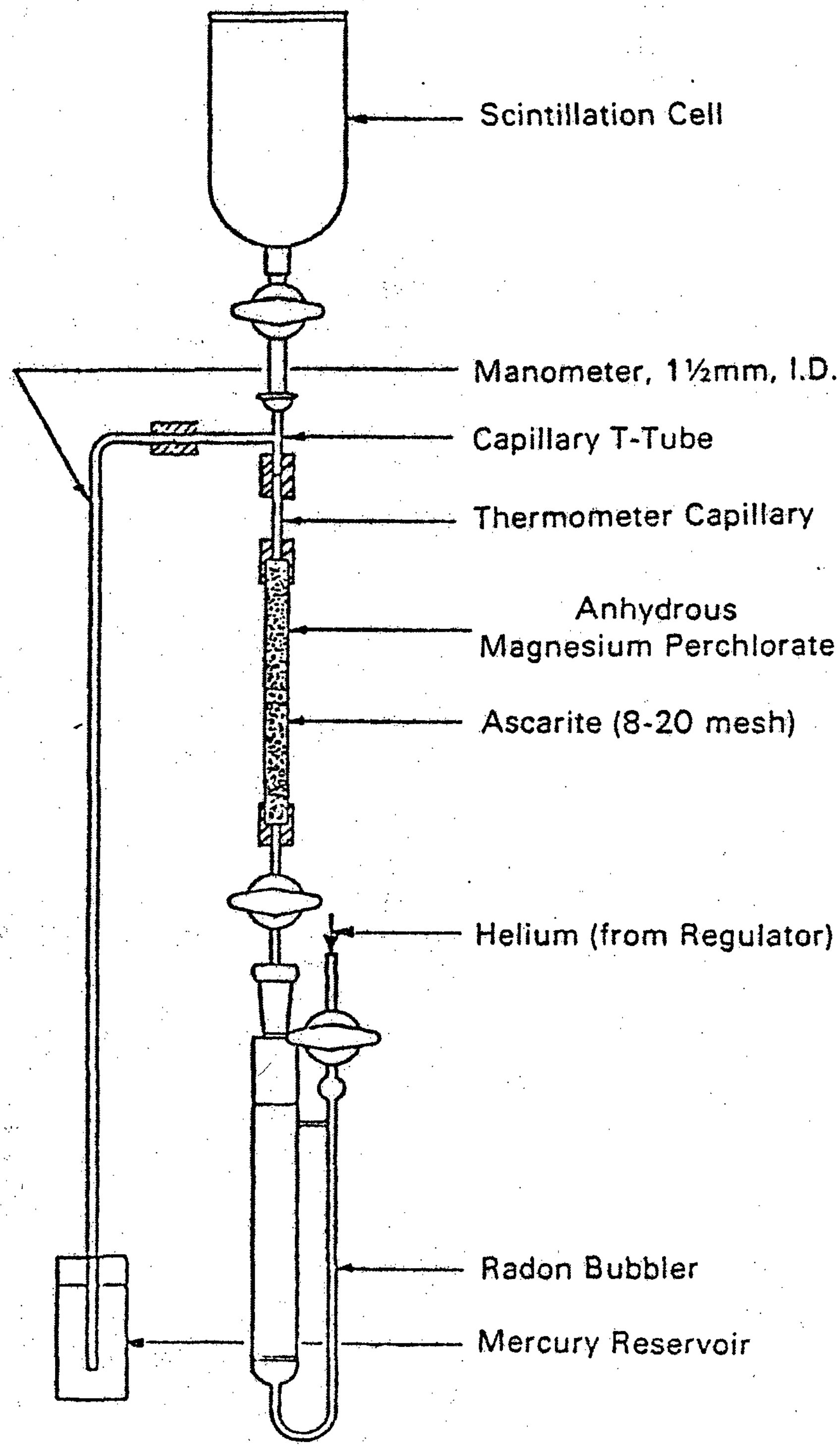


Figure 1. Radon emanation apparatus with scintillation cell

5.2 Radon emanation apparatus:

a) Radon bubbler - (Figure 2.)
b) Scintillation cell - (Figure 3.)

5.3 Electric hot plate

5.4 Analytical balance

5.5 Centrifuge

5.6 Glassware

6. Reagents

6.1 Distilled or deionized water.

6.2 Ammonium hydroxide, 15N: NH_4OH (conc.), sp. gr. 0.90, 56.6%.

6.3 Ascarite, drying reagent: 8-20 mesh.

6.4 Barium carrier, 16 mg/ml, standardized: (see Sec. 6, Method 903.0).

6.5 EDTA reagent, basic, (0.25M): Dissolve 20g NaOH in 750 ml water, heat and slowly add 93g disodium ethylenedinitriloacetate dihydrate, ($Na_2C_{10}H_{14}O_8N_2.2H_2O$) while stirring. After the salt is in solution, filter through coarse filter paper and dilute to 1 liter.

6.6 Helium, gas.

6.7 Hydrochloric acid, 12N: HCl (conc.), sp. gr. 1.19, 37.2%.

6.8 Magnesium perchlorate, $Mg(ClO_4)_2$: reagent grade.

6.9 Sodium hydroxide, 10N: Dissolve 40g NaOH in 50 ml water and dilute to 100 ml.

6.10 Standard radium-226 tracer solution: preferably purchased from National Bureau of Standards, Special Publication 260, 1978, SRM 4960. Prepare stock dilution equivalent to 50 pCi radium-226 per ml.

6.11 Sulfuric acid, 18N: Carefully mix 1 volume 36N H_2SO_4 (conc.) with 1 volume of water.

6.12 Sulfuric acid, 0.1N: Mix 1 volume 18N H_2SO_4 with 179 volumes of water.

7. Calibrations

7.1 The calibration constant of each scintillation cell must be

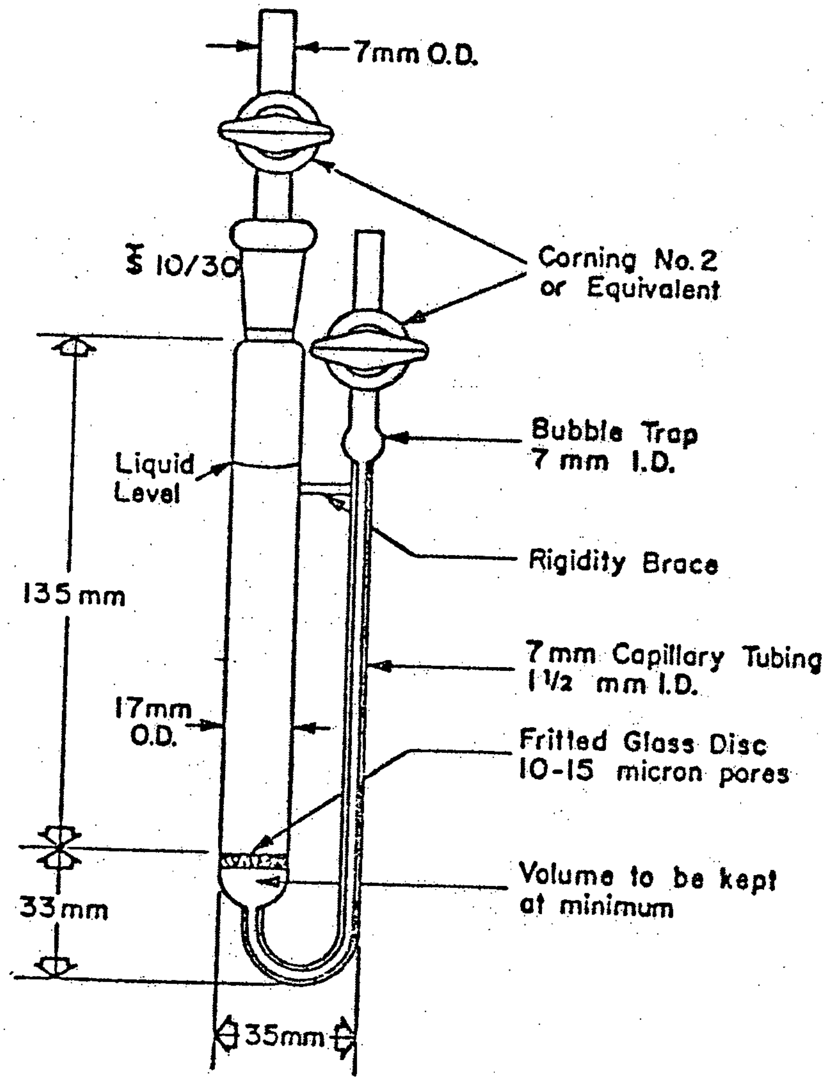


Figure 2. A typical radon bubbler

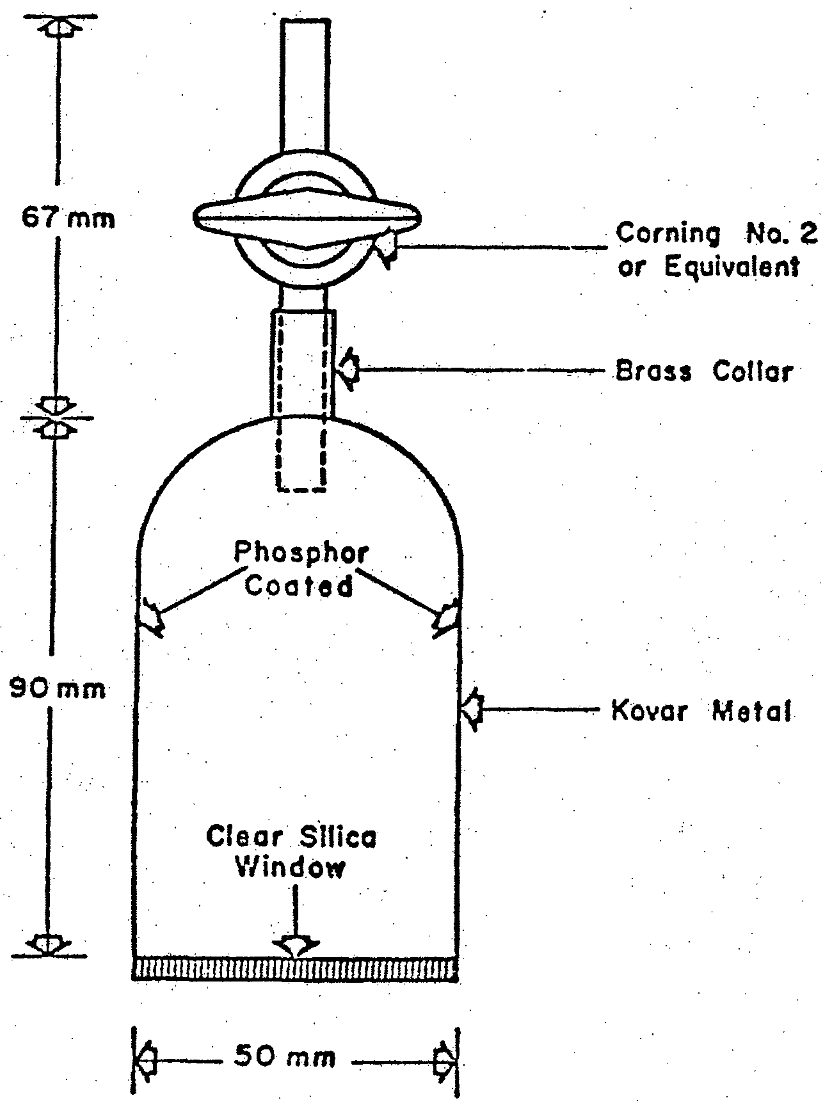


Figure 3. A typical scintillation cell for radon counting

determined using a standardized radium-226 solution with a labeled cell and a specific photon counter. This is determined as follows:

7.1.1 Place 50 pCi of the radium-226 standard solution in a bubbler (50 pCi of radium-226 will produce about 6 pCi radon-222 in 18 hours). Attach the bubbler to the radon assembly. (Fig. 1.)

7.1.2 With the scintillation cell disconnected, bubble helium gas through the solution for 20 minutes to remove all radon-222.

7.1.3 Close both stopcocks on the bubbler to establish zero time for ingrowth of radon-222.(Refer to 9.2) Set aside for approximately 18 hours.

7.1.4. Evacuate the scintillation cell and attach to the column and bubbler.

7.1.5. Proceed with steps 8.8 - 8.13, Radon Emanation Technique.

7.1.6. The calibration constant is determined from the radium-226 activity in the bubbler and the ingrowth time of radon-222.

7.2 The calibration constant includes the de-emanation efficiency of the system, the counting efficiency of the cell, and the alpha activity contributed by polonium-218 and polonium-214, which will be in equilibrium with radon-222 when the sample is counted 4 hours after the de-emanation. A 100-minute counting time will be sufficient for the standard and will eliminate the need to correct for decay of radon-222, which occurs during counting.

7.3 The bubbler used for the radium-226 standardization should not be used for sample analysis. It should be set aside to be retained for future calibrations. Each scintillation cell should be calibrated periodically with the radium-226 standard to ensure instrument quality control.

8. Procedure

8.1 To a 1000-ml drinking water sample, add 20 ml 12N HCl and 2.0 ml barium carrier and heat to boiling.

Note: If there is solid matter in the sample, do not filter before starting analysis. Follow procedure steps through 8.4, then filter solution into a clean centrifuge tube. Add 1 ml $(NH_4)_2SO_4$ (200 mg/ml) and stir thoroughly. Add glacial (17.4N) acetic acid (CH_3COOH) until barium sulfate precipitates, then add 2 ml excess. Digest in a hot water bath until precipitate settles. Centrifuge and discard supernate. Repeat step 8.4 and continue with radium analysis.

8.2 Cautiously and with vigorous stirring, add 20 ml 18N H_2SO_4. Digest 5 to 10 minutes and let precipitate settle overnight. Decant and discard supernate.

8.3 Slurry the precipitate and transfer to a centrifuge tube with a minimum amount of 0.1N H_2SO_4. Centrifuge and discard supernate. Wash twice with 0.1N H_2SO_4. Centrifuge and discard washes.

8.4 Add 20 ml basic EDTA reagent, heat in a water bath and stir well. Add a few drops 10N NaOH if the precipitate does not readily dissolve.

8.5 Transfer the solution to a radon bubbler (Fig. 2). Open both the upper and lower stopcocks and de-emanate the solution by slowly passing helium gas through the bubbler for about 20 minutes.

Note: The volume of these bubblers is usually greater than 20 ml allowing for at least a 1 cm air space between the bubbler and the stopper. In those instances where the solution volume exceeds the capacity of the bubbler, it will be necessary to continue the boiling in the water bath until the volume is reduced.

8.6 Close the two stopcocks, and record time. Store the solution for 4 to 8 days for ingrowth of radon-222 (Fig. 4).

8.7 At the end of the storage period, fill the upper half of an absorption tube with magnesium perchlorate and the lower half with ascarite.

Note: For minimizing corrections that would be required in subsequent calculations, the voids above the bubbler must be kept very small. Capillary tubing should be used whenever possible, and the drying tube volume with the ascarite and magnesium perchlorate must be kept to a minimum. A typical system consists of a drying tube 10 cm x 1.0 cm (I.D.), with each of the drying agents occupying 4 cm and being separated by small glass wool plugs. The column can be reused several times before the chemicals need to be replaced.

8.8 Attach the tube to the radon bubbler and then attach the evacuated scintillation cell (Fig. 3) to the tube. Open the stopcock on the cell and check the assembly for leaks. Gradually open the outlet stopcock on the bubbler, and when the stopcock is fully open and no further significant bubbling takes place, close the stopcock.

8.9 Adjust the helium gas pressure so that the gas flows at slightly above atmospheric pressure.

8.10 Connect the hose to the bubbler inlet and gradually open the inlet stopcock using the bubbling as a guide. When the stopcock can be

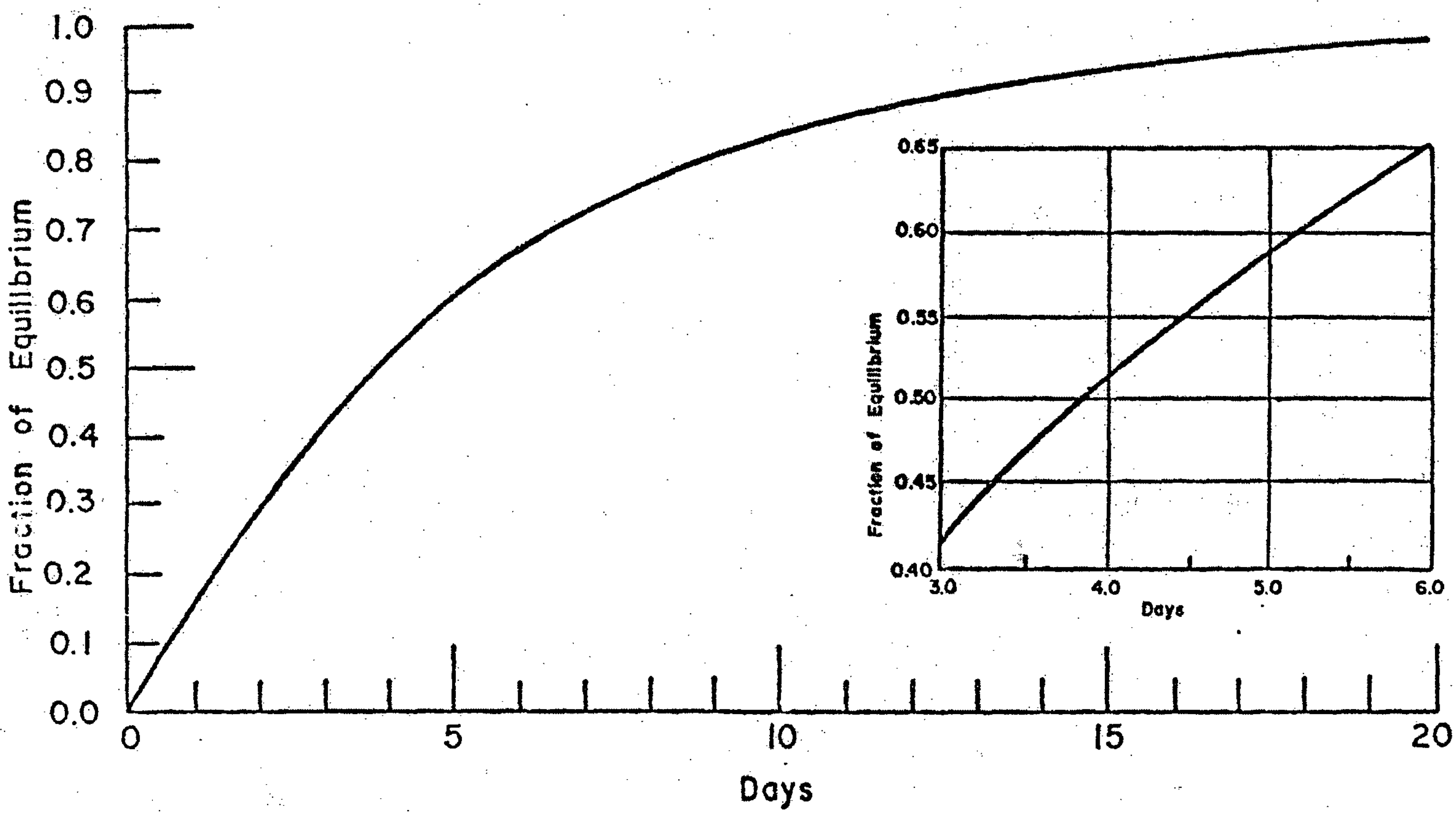


Figure 4. The growth of radon-222 from radium-226

fully opened without a significant amount of bubbling, the bubbler is essentially at atmospheric pressure again.

8.11 Open the outlet stopcock very slightly and allow bubbling to proceed at a rate, determined by experience, such that 15 to 20 minutes are required to complete de-emanation.

8.12 Toward the end of the de-emanation, when the vacuum is no longer effective, gradually increase the helium gas pressure. When the system is at atmospheric pressure, shut off the helium gas, disconnect the tubing from the bubbler inlet and close the inlet and outlet stopcocks of the cell and bubbler, and record time. This is the beginning of radon-222 decay and ingrowth of radon-222 daughters.

8.13 Store the scintillation cell for at least 4 hours to ensure equilibrium between radon and radon daughters. Count the alpha scintillations from the cell in a radon counter with a light-tight enclosure that protects the photomultiplier tube. Record the counting time to correct for the decay of radon-222.

<u>Note</u>: After each analysis, flush the cell three times by evacuation and filling with helium, and store filled with helium at atmospheric pressure. This procedure removes radon from the cell and prevents the build-up of radon daughter products. Before each analysis, the scintillation cell should be evacuated, filled with helium and counted to ascertain the cell background.

9. Calculations

9.1 Calculate the radium-226 concentration, D, in picocuries per liter as follows:

$$D = \frac{C}{2.22\ EV} \times \frac{1}{1-e^{-\lambda t_1}} \times \frac{1}{e^{-\lambda t_2}} \times \frac{t_3}{1-e^{-\lambda t_3}}.$$

where:

C = net count rate, cpm,
E = calibration constant for the de-emanation system and the scintillation cell in counts per minute/disintegrations per minute of radon-222, (see 9.2),
V = liters of sample used,
t_1 = the elapsed time in days between the first and second de-emanations (steps 8.6 and 8.12) and λ is the decay constant of radon-222 (0.181 d^{-1}),
t_2 = the time interval in hours between the second de-emanation and counting and λ is the decay constant of radon-222 (0.00755 hr^{-1}),

t_3 = the counting time in minutes and λ is the decay constant of radon-222 (1.26×10^{-4} min^{-1}), and
2.22 = conversion factor from dpm/pCi.

9.2 The calibration constant, E, is determined by the following equation:

$$E = \frac{C}{A\ (1-e^{-\lambda t_1})\ \ (e^{-\lambda t_2})}$$

where:

C = net count rate, cpm,
A = activity of radium-226 in the bubbler (dpm),
t_1 = ingrowth time of radon-222 in hours,
t_2 = decay time of radon-222 in hours occurring between de-emanation and counting, and
λ = decay constant of radon-222, (0.00755 $hour^{-1}$).

10. Precision and Accuracy

A number of laboratories which participate in the EPA, EMSL-Las Vegas intercomparison program for radium-226 in water used this method in their analyses of water samples received in that program for the period 4/78 through 12/78. Five intercomparison studies for radium-226 in water were conducted during that period. Two of the five studies were "Performance Studies" in which the sample contained other radionuclides. In the other three studies the samples contained only radium-226, radium-228 and their decay products. The radium-226 concentrations in the test samples for the five studies ranged from 3.7 to 9.2 pCi/l, all low level, which should relate well to drinking water supplies. Data from those five studies were used for this precision and accuracy evaluation of the method.

10.1 The number of laboratories that participated in the five studies (labs that were called and indicated that they used this method) ranged from 12 to 17 laboratories per study. The results from one laboratory in one study was rejected as an "outlier" as determined by the T test (ASTM Standards, Part 31, page 15, 1978). All laboratories reported triplicate analyses for each study (one test sample per study). The total number of analyses for the five studies was 207 of which 174 were acceptable results (within 3 sigma of the known value, 1 sigma being 15% of the known value). This calculates to be 84% acceptability of results as determined by this method.

10.2 A statistical evaluation of the data from the five studies was made according to the methods of Youden(4) and Steiner(5). The coefficient of variation for within-laboratory error ranged from 6.4% to 19% with an average of 10.2% for the five studies. The coefficient of variation for systematic error between laboratories ranged from 14% to 18% with an average of 16.2% for the five studies. The coefficient of variation for the total error between laboratories based on a single analysis ranged from 16% to 26% with

an average of 19.4% for the five studies. A comparison of the grand average values with the known values in a test for systematic error in a method gave a value for one of the studies higher than the critical value, indicating a bias (low) for the method. However, values for the other four studies were well below the critical values, indicating no bias for the method.

Bibliography

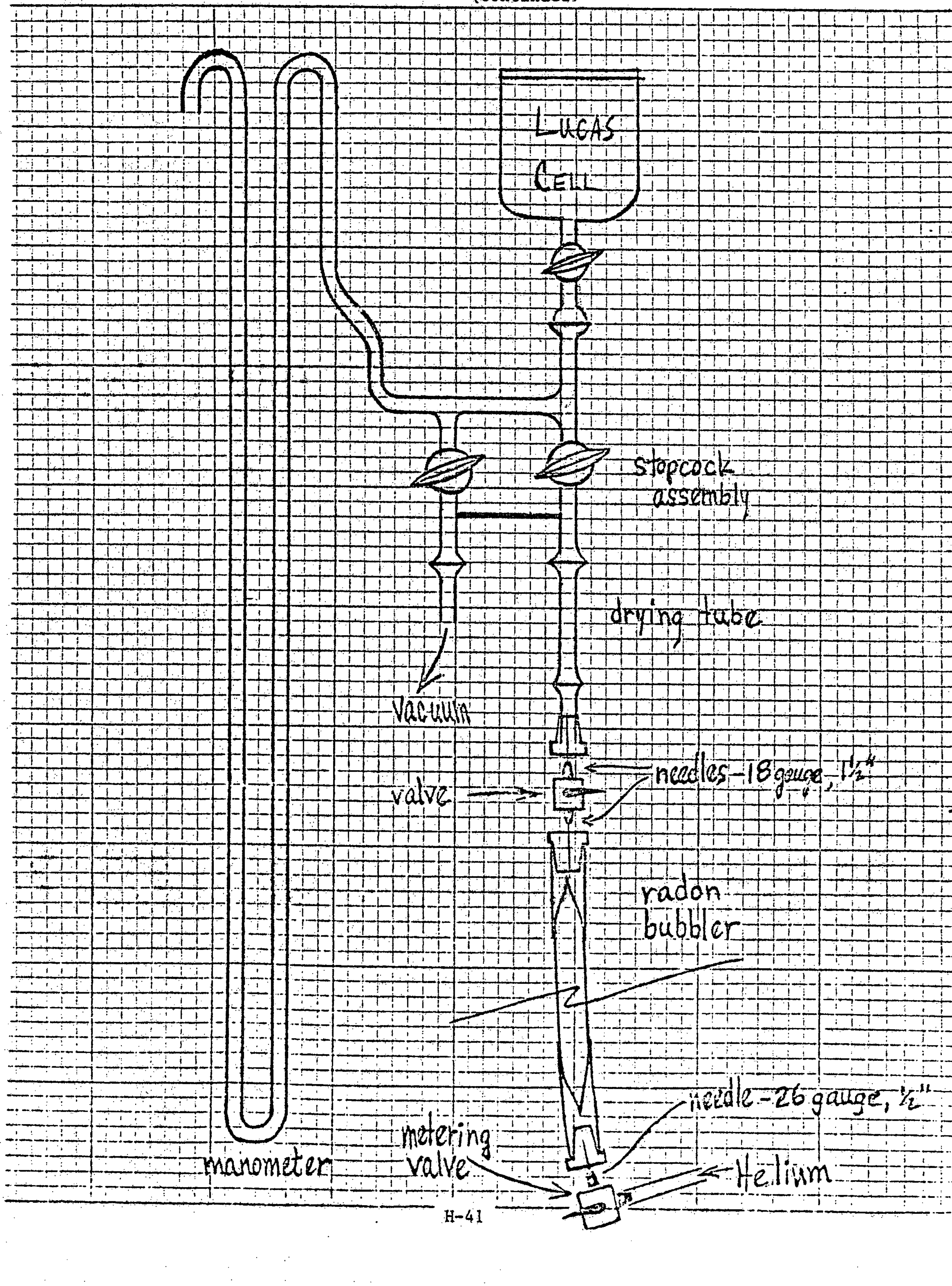
1. Blanchard, R. L. Uranium Decay Series Disequilibrium in Age Determination of Marine Calcium Carbonates. Doctoral Thesis, Washington University, St. Louis, Mo. (June 1963).

2. Ferri, E., P. J. Magno, and L. R. Setter. Radionuclide Analysis of Large Numbers of Food and Water Samples. U. S. Department of Health, Education, and Welfare, Public Health Service Publication No. 999-RH-17 (1965).

3. Rushing, D. E. The Analysis of Effluents and Environmental Samples from Uranium Mills and of Biological Samples for Uranium, Radium and Polonium. SM/41-44, Symposium on Radiological Health and Safety, Vienna, Austria (August 1963).

4. Youden, W. J. "Statistical Techniques for Collaborative Tests." Statistical Manual of the AOAC Association of Official Analytical Chemists, Washington, D.C. 1975.

5. Steiner, E. H. "Planning and Analysis of Results of Collaborative Tests." Statistical Manual of the AOAC, Association of Official Analytical Chemists, Washington, D.C. 1975.


LUCAS CELL
stopcock assembly
drying tube
vacuum
needles-18 gauge, 1½"
valve
radon bubbler
needle-26 gauge, ½"
metering valve
Helium
manometer

Radium-228, Thorium-230 Methods

Ref: Percival, D.R and D.B Martin, 1974 "Sequential Determination of Radium-226, Radium-228, Actinium-227, and Thorium Isotopes in Environmental and Process Waste Samples." Analytical Chemistry Vol. 46, pp. 1742-1749.

URANIUM

(Method used 7/77-present)

ANALYTICAL PROCEDURE

The analytical procedure used is well adapted for the assay of trace amounts of uranium in ore leach. Information was obtained from the Oak Ridge National Laboratory. It is based on a TOPO solvent extraction (TOPO- Trioctylphosphine Oxide) and a sensitive yellow coloration from DBM (DBM = 1,3-Diphenyl-1,3-propanedione). The DBM has about five times more sensitivity than the standard thiocyanate method for uranium.

Variations may be made in the following procedure, but it was used as stated.

A. A 100ml sample is taken of the ore leach in order to get a sufficient quantity of uranium. There was so much iron in the Anaconda leach that it seemed to be better to use 50ml for some dilution.

B. One ml of 1 M Hydroxylamine sulfate is added to reduce ferric iron. Sulfate is used rather than chloride because some metal chloride complexes are formed that may extract to some degree.

C. One ml of 1 M fluoride salt is added to complex Mo, Zr, Ti, etc. Uranium is weakly complexed in comparison.

D. Fifteen ml of concentrated HNO_3 is added to act as salting agent.

E. Five ml of TOPO, in cyclohexane, is the solvent extractant. This is shaken in a separatory funnel and allowed to settle. The aqueous stream is drained away. One ml of the solvent phase is pipetted out for a sample into a 10ml flask.

F. One ml of 50/50 pyridine/EtOH is next added.

G. Two ml of the coloration agent, DBM, is next added. The DBM is made up 10 g/l in ethyl alcohol (EtOH- 190 proof or better).

H. The solution is then diluted to 10ml, shaken, then read on a colorimeter at 405 nm, against a blank prepared the same way. Once the 1ml of TOPO extractant is removed, care should be taken that no water is added thereafter.

For very low levels of uranium, 2ml of TOPO is taken instead of one. The method is good for a few tenths of 1 ppm uranium in the presence of a mass of bulk salts.

COLORIMETRIC DETERMINATION OF URANIUM IN WATER SAMPLES

Uranyl ion can be separated from contaminants by solvent extraction using Trioctylphosphine oxide in cyclohexane. A yellow color complex of uranium (VI) dibenzoylmethane forms instanteously by introducing an aliquot of the extract into a pyridine-ethanol solution of dibenzoylmethane and ethanol. This complex has a maximum absorbance at 405 nm The color reaction confirms to Beer's Law, and has a sensitivity of 0.01 ppm uranium.

REAGENTS

1 M Hydroxylamine sulfate	Dissolve 164.14g of Hydroxylamine sulfate in 1 L DI water
1 M Potassium fluoride	Dissolve 58.10g of potassium fluoride in 1 L DI water
0.05 M Trioctylphosphine oxide in cyclohexane	Dissolve 19.3g of Trioctylphosphine oxide in 1 L cyclohexane
50% Pyridine in Ethanol	Mix 1 volume pyridine with 1 volume ethanol
1% Mixed color reagent	Dissolve 10g of Dibenzoylmethane in 1 L absolute ethanol

PROCEDURE

1. Place 100ml of sample into a 125ml separatory funnel
2. Prepare a blank, and sufficient standards in the same manner.
3. Add 2ml of conc. HNO_3
4. Add 1ml of Hydroxylamine sulfate to reduce ferric ion
5. Add 1ml of KF to complex Mo, Zr, Ti, etc.
6. Add 5.0ml of TOPO reagent
7. Stopper the funnel, and shake gently, relieve internal pressure and shake vigorously for 2 minutes
8. Allow the sample and organic phase to separate (about 5 min)
9. With a dry pipet introduce 2.0ml of the upper organic layer into a dry 10ml volumetric flask, excluding any droplets of aqueous phase which may be clinging to the walls of the sep funnel.
10. Add about 1ml of 50% pyridine in ethanol to the sample

11. Add 2.0ml of mixed color reagent
12. Make up to the mark with 50% pyridine/ethanol
13. Mix the sample thoroughly, and allow to stand for at least 5 minutes for color development
14. Set the colorimeter to zero absorbance with the blank at 405 nm
15. Read the absorbance of the sample and the standards

CALCULATION

$$\text{ppm } U_3O_8 = \frac{\text{Standard concentration(ppm) x Sample absorbance}}{\text{Standard absorbance}}$$

REFERENCE

"Colorimetric Determination of Uranium in Aqueous Solutions," Annual Book of ASTM Standards, Part 31, p.784(1977).

RADIUM-228 IN DRINKING WATER
SEQUENTIAL METHOD RADIUM-228/RADIUM-226
METHOD USED 6/77 TO 1/81

Principle of Method

The Ra-228 and Ra-226 in the drinking water sample are concentrated and separated by coprecipitation with barium and lead as sulfates and purified by EDTA-chelation. After 36-hour ingrowth of Ac-228 from Ra-228, the Ac-228 is carried on yttrium oxalate, purified, and beta counted. The Ra-226 in the supernatant is either precipitated as the sulfate, purified and alpha counted, or is transferred to a radon bubbler and determined by emanation (Ra-226 analysis is Item H-10).

Procedure Time

Two samples in 12 hours.

Reagents

Acetic acid, $HC_2H_3O_2$: 17.4N (glacial)
Acetone, $(CH_3)_2CO$: anhydrous
Ammonium hydroxide, NH_4OH: 15N (conc.)
Ammonium oxalate, $(NH_4)_2C_2O_4.H_2O$: 5%
Ammonium sulfate, $(NH_4)_2SO_4$: 200 mg/ml
Ammonium sulfide, $(NH_4)_2S$: 2%
Barium carrier: 16 mg/ml
Citric acid, $C_6H_8O_7.H_2O$: 1 M
EDTA reagent: 0.25 M
Ethanol, C_2H_5OH: 95%
Indicator, methyl orange: 0.1%
Lead carrier: 15 mg/ml, 1.5 mg/ml
Nitric acid, HNO_3: 16 N, 6 N, 1N
Sodium hydroxide, NaOH: 18 N, 10 N
Strontium-yttrium mixed carrier: 0.9 mg/ml Sr^{+2}-0.9 mg/ml Y^{+3}
Sulfuric acid, H_2SO_4: 18 N
Yttrium carrier: 18 mg/ml

Procedure

1. For each liter of drinking water, add 5 ml 1 M $C_6H_8O_7 \cdot H_2O$ (citric acid) and 10 drops methyl orange indicator. The solution should be red. (Note: If the solution is yellow, add concentrated nitric acid until the red color is obtained.)
2. Add 10 ml lead carrier (15 mg/ml), 2.0 ml barium carrier (16 mg/ml), and 1 ml yttrium carrier (18 mg/ml); stir well. Heat to incipient boiling and maintain at this temperature for about 30 minutes.
3. Add 15 N NH_4OH (ammonium hydroxide) until a definite yellow color is obtained, then add a few drops excess. Precipitate lead and barium sulfates by adding 4 ml 18 N sulfuric acid until the red color appears, then add 0.25 ml excess. Add 15 ml ammonium sulfate (200 mg/ml) for each liter of sample. Stir frequently and keep at a temperature of about 90°C for 30 minutes.
4. Remove the sample from the hotplate and allow it to settle for at least 2 hours, then siphon or decant most of the supernatant liquid and discard.
5. Transfer the ppt to a 50-ml centrifuge tube. Centrifuge and discard the supernatant liquid.
6. Wash the ppt TWICE with 10 ml conc. HNO_3 using centrifugation wash techniques.
7. Add 25 ml EDTA reagent, heat in a (hot) water bath, and stir well. Add a few drops 10 N NaOH if the precipitate does not readily dissolve.
8. Add 1 ml strontium-yttrium mixed carrier and stir thoroughly. Add a few drops 10 N NaOH if any precipitate forms.
9. Add 1 ml $(NH_4)_2SO_4$ (200 mg/ml) and stir thoroughly. Add 17.4 N $HC_2H_3O_2$ until barium sulfate precipitates, then add 2 ml excess. Digest in a (hot) water bath until precipitate settles. Centrifuge and discard supernatant.
10. Add 20 ml EDTA reagent, heat in a (hot) water bath, and stir until precipitate dissolves. Repeat Steps 9 and 10. (Note: Record time of last barium sulfate precipitation; this is the beginning of the Ac-228 ingrowth time.)

11. Dissolve the precipitate in 20 ml EDTA reagent as before, then add 1.0 ml yttrium carrier (18 mg/ml) and 2 ml lead carrier (1.5 mg/ml). If any precipitate forms, dissolve by adding a few drops 10 N NaOH. Cap the polypropylene tube and age at least 36 hours.
12. Add 0.3 ml (8 drops) $(NH_4)_2S$ (ammonium sulfide) and stir well. Add 10 drops 10 N NaOH with vigorous stirring until lead sulfide precipitates, then add 10 drops excess. Stir intermittently for about 10 minutes. Centrifuge and decant supernatant into a clean tube. Wash precipitate with small amount H_2O. Centrifuge and add wash water to supernatant.
13. Place the centrifuge tube in a (hot) water bath and slowly add 10 ml 10 N sodium hydroxide to the supernatant liquid. While stirring, add 1-2 drops yttrium carrier until yttrium hydroxide precipitates (5 to 8 minutes). (Note the time of the precipitation.) Centrifuge as soon as the yttrium hydroxide has largely settled. Save supernatant for Ra-226.
14. Wash the ppt thoroughly with 5 ml of distilled water. Add 10 drops 10 N NaOH; centrifuge and discard the wash solution.
15. Transfer the ppt to a 2-inch counting planchet using a small amount of water while drying under an IR lamp.
16. Count the sample for at least 30 minutes in an alpha proportional counter.

DETERMINATION OF DISSOLVED Ra-226 IN WATER

(Method used 7/77-1/81)

1975 EPA Standard Methods, p. 661

METHOD:

The Radium in water sample is co-precipitated with mixed Barium and Lead Carrier as the Sulfate. The Barium Sulfate precipitate is purified by Nitric Acid washes and is reprecipitation from EDTA-NH_4OH solution by treatment with Acetic Acid. The $BaSO_4$ precipitate containing Ra-226 is counted for alpha activity.

APPARATUS:

1. Gas Flow Proportional Counter
2. Centrifuge and Centrifuge Tubes
3. Infrared Heating Lamp
4. Stainless-steel planchet

REAGENTS:

1. 1 M Citric Acid
   Dissolve 21.0 grams of Citric Acid in water and dilute to 100 ml.
2. 1 N Lead Nitrate
   Dissolve 16.56 grams of lead nitrate in water and dilute to 100 ml.
3. 0.1 N Barium Nitrate
   Dissolve 1.31 grams of barium nitrate in water and dilute to 100ml.
4. 0.1% Methyl Orange Indicator
   0.1 grams of methyl orange in 100ml of water
5. 0.25 M EDTA
   Dissolve 1 grams of NaOH in about 380 ml. of water, heat and slowly add 47 grams of EDTA-disodium salt while stirring. After the salt is in solution, filter through filter paper and dilute to 500 ml.
6. 1 + 1 Sulfuric Acid
   Cautiously add, with stirring, 250 ml of concentrated H_2SO_4 to 200ml of water and dilute to 500 ml.
7. 6N Ammonia hydroxide
   Add 200 ml of concentrated NH_4OH to 200 ml of water and dilute to 500 ml.

DETERMINATION OF DISSOLVED Ra-226 IN WATER

PROCEDURE:

1. Shake the water sample bottle to mix its contents.
2. Filter 1 liter of water sample through a 0.45 u membrane filter and transfer to a 2000-ml beaker.
3. While stirring, add 5 ml of 1 M Citric Acid.
4. Make the solution alkaline with conc. NH_4OH (about 2.5 ml).
5. Add 2 ml of 1N lead carrier.
6. Add 1 ml of o.1N barium carrier and cover the beaker with a watch glass.
7. Heat the solution to boiling; while stirring, add 10 drops of 1% methyl orange indicator.
8. Add sufficient 1:1 H_2SO_4 until a permanent pink color is attained, then add 0.5 ml in excess. (Total about 4 ml).
9. Stir for 30 minutes at medium heat, remove the stirring bar, and let the mixed $BaSO_4$ precipitate settle for 2-3 hours, or overnight.
10. Decant and discard supernatant.
11. Transfer the precipitate to a 50-ml centrifuge tube with a minimum amount of water. Centrifuge and discard the supernatant.
12. Wash the precipitate twice with two portions of 10-ml conc. HNO_3 using a glass rod to break up the precipitate. Discard wash. If precipitate contains any color, repeat and wash with conc. HNO_3 until a white precipitate is obtained.
13. Dissolve the precipitate in 10 ml of water and 10 ml of 0.25 M EDTA, and 3 ml of 6 N NH_4OH, using a glass rod to break up the precipitate.
14. Heat in a water bath until clear (about 10 minutes).
15. Add 2.5 ml of glacial acetic acid dropwise to reprecipitate the $BaSO_4$, and digest for 30 minutes.
16. Centrifuge and discard supernatant.
17. Wash the precipitate with 10 ml of water, centrifuge and discard wash.
18. Slurry the precipitate with minimum of water and transfer to a clean stainless-steel planchet. Dry under infrared-lamps.
19. Cool, count each sample for 20 minutes in the gas flow proportional counter.

STANDARD SOLUTIONS:

Ra-226 Standard Stock Solution - 59.16 dpm/ml
Quantitatively transfer the standard (5.916×10^4dpm) to a 1 liter volumetric flask containing 60 ml of concentrate nitric acid and 800 ml or distilled water. Dilute to the mark with water and mix well.

Ra-226 Standard Solution (1) - 23.66 dpm/ml
Pipet 100.0 ml of the stock solution into a 250-ml volumetric flask containing 15ml of concentrate nitric acid and 200 ml of distilled water, dilute to the mark with water and mix well.

Ra-226 Standard Solution (2) - 11.83 dpm/ml
Pipet 50.0 ml of standard solution (1) to a 100ml volumetric flask containing 10 ml of concentrate nitric acid and 30 ml of distilled water and mix well.

CALCULATION:

Calculate the concentration, D, of the Ra-226 activity in picocuries per liter as follows:

$$D = \frac{C}{2.22 \times E.V.R.}$$

ER = Combined Chemical yield and counter efficiency for Alpha Counting.

V = Volume of sample used in liters.

C = Net count rate, cpm

2.22 = Conversion factor from disintegrations per minute to picocuries.

NOTES:

1. Distilled or deionized water should be used to prepare all reagents requiring water as the solvent.
2. The acetic acid added in step 15 gives a pH of about 4.5 and is sufficient to destroy the Ba-EDTA, but not the pH-EDTA Complex.
3. Drying should be rapid but not to vigorous to minimize loss of Ra-222.

(Continued)

NOTES:

4. Two standards, one reagent blank and six samples are considered as a full batch.

5. Blanks and Standards should always consist of 1L regardless of amts.used for samples.

REFERENCES:

1. Measurement of total Radium and Radium - 226 in Environmental waters, EPA-600/4-76-012, March,1976

2. Goldin, A.S. "Determination of Dissolved Radium". Analytical Chemistry, Vol. 33, p. 406. (1961).

3. Standard Methods for the Examination of Water and Wastewater, 14th ed.,American Public Health Association, Washington,D.C., p.661, (1976).

4. Annual Book of ASTM Standards, Part 31, p 772 (1977).

THORIUM-230 PROCEDURE

Method used 7/77 to 1/81

1. Pipet 200 ml of sample to a tall 300 ml beaker, and add 1 ml of the concentrated nitric acid, 2 drops of the 0.2% m-cresol purple, 5 drops of 20% mercaptoacetic acid, and 5 ml of aluminum nitrate $Al(NO_3)_3$ in 0.2 M HNO_3.
2. Adjust the pH of the solution to (1.6) light orange color with a pH meter by adding concentrated ammonium hydroxide dropwise.
3. Transfer the sample to a 250 ml seperatory funnel.
4. Add 15 ml of 0.5 M TTA in benzene and extract for 15 minutes.
5. Allow the phases to seperate and draw off the aqueous lower layer into another 250 ml seperatory funnel.
6. Add a second 15 ml portion of 0.5 M TTA in benzene and extract again for 15 minutes.
7. Allow the phases to seperate and discard the aqueous lower layer. Combine the organic layers and wash for 2 minutes with 10 ml of 0.2 M HNO_3. Discard the acid bottom wash.
8. Back extract the thorium for 5 minutes with two 10 ml portions of 9 N HCl.
9. Combine the bottom pink acid layers and discard the organic top yellow.
10. Add 10 ml of a 20% alamine in chloroform solution to the 9 N HCl and extract for 2 minutes. (Release pressure). Discard the yellow bottom organic layer. (If large quanitities of iron are present in the HCl top solution as indicated by a strong yellow color. Repeat the alamine extraction until no further reduction in the color of the acid phase is noted.)
11. Following the final alamine extraction, add 10 ml of chloroform and extract for one minute to remove any organic materials from the top acid wash. Discard the bottom chloroform. If the chloroform wash is colored, repeat extraction with a second 10 ml portion of chloroform.
12. Draw off the acid layer into a 150 ml beaker containing 5 ml of concentrated HNO_3 and evaporate to dryness on the hot plate.
13. Wash down the sides of the beaker with 5 ml of concentrated HNO_3 and again evaporate to dryness. Take up the residue in 3 ml of concentrated HNO_3 and reduce the volume to about 1 ml by evaporation on the hot plate.
14. Transfer the solution quantitatively to a tared stainless steel planchet using both concentrated HNO_3 and 0.2 M HNO_3 as a wash. Evaporate the solution to dryness under an infrared lamp and burn off the final organic on hot plates for a few minutes. Alpha count the planchet for 20 minutes.

RADIOMETRIC DETERMINATION OF THORIUM-230

he determination of thorium-230 in environmental samples is based on he separation of the total thorium content and its radioactive decay roducts by extraction with thenoyltrifluoroacetone in benzene. The table chelate formed is readily extracted by benzene. The extraction epends to a large extent on the acidity of the solution, its completion t pH>1, but drops sharply in more acid solutions.

. REAGENTS:

1. 20% Mercaptoacetic acid- 20 ml thioglycolic acid diluted to 100 ml with distilled water.
2. 2 M Al(NO3)3 in 0.2 M HNO3 - dissolve 750 g of Al(NO3)3.9H_2O in 800 ml of distilled water, add 13 ml of concentrated nitric acid dilute to the mark in 1-liter volumetric flask.
3. 1N NaAc, 1N HAc Buffer solution - dissolve 136 g of sodium acetate in 800 ml of distilled water, add 57 ml glacial acetic acid, dilute to the mark in 1-liter volumtric flask.
4. 0.5 M TTA in benzene - dissolve 100 g of thenoyltrifluoroacetone in benzene, dilute to 1-liter in a volumtric flask.
5. 0.2 M Nitric acid - 13 ml of concentrated nitric acid dilute to 1 liter with distilled water.
6. 9 N Hydrochloric acid - 775 ml concentrated hydrochloric acid, dilute to 1 liter with distilled water.
7. 20% Alamine in chloroform - 200 ml of alamine 336, dilute to 1 liter with chloroform.

B. SAMPLE PREPARATION:

a. Liquids

Make 2% in nitric acid and mix thoroughly. Let stand for 30 minutes and measure 200-ml aliquots for thorium analysis.

b. Sludge, Soil and Ores, Leaching Method

Dry at 110°C, pulverize and mix thoroughly. Weigh exactly 1.00 grams of sample in a 250-ml teflon-rimmed beaker with a small amount of distilled water. Add 10 ml of concentrated nitric acid, 15 ml of 72% perchloric acid. Swril gently and cover with a watch glass, evaporate to fumes and boil for 15 minutes. Allow the mixture to cool, carefully add distilled water down the sides of the beaker to avoid splitting. Wash down the watch glass and the sides of the beaker and dilute to about 60 ml, add 10 ml of concentrated nitric acid. Swirl the solution to get all solids suspended before setting on the hot plate, hot leach for 5 minutes after the solution starts to boil. Cool, filter the samples through a whatman #2 filter paper into a 100-ml graduated cylinder. Dilute to the mark with distilled water and mix well.

c. Sludge, Soil and Ores, Total Decomposition Method

Weigh exactly 1.00 grams of the dry powder in a 100-ml platinum dish and add 6 grams of anhydrous potassium fluoride sprinkled uniformly over the dry residue. Heat over a blast burner until a clear fusion is obtained. Cool the melt for 1 minute then add 7 ml of concentrate sulfuric acid dropwise (Use a buret) for the first 2 ml. Again heat over a burner until a pyrosulfate fusion is obtained. Cool, the melt is dissolved is 500 ml water and analyzed for thorium-230.

PROCEDURE FOR URANIUM ANALYSIS ON URINE SAMPLES

(In-house method used 1977-1978)

The procedure consists of an acid digestion of 50 ml urine sample with nitric and perchloric acids. Followed by a well adapted colorimutric analytical procedure for trace amount of uranium. The procedure is based on a TOPO (Trioctylphosphine oxide) solvent extraction, and a sensitive yellow coloration with DBM, (1,3-(1,3-Diphenyl- Propanedione).

PROCEDURE

1. Pipet 50 ml sample into 250 ml beaker, digest with 20 ml HNO_3, and 10 ml $HClO_4$ to 10 ml vol.
2. Wash down digested sample beaker, and add 5 ml HNO_3, and bring to boil.
3. Cool sample and filter into 125 ml seperating funnel dilute to 50 ml.
4. Add 1 ml Hydroxylamine sulfate to reduce iron.
5. Add 1 ml fluoride to complex Mo, Zr, etc.
6. Add 5 ml TOPO
7. Shake to extract uranium into TOPO for 1 minute.
8. Pipet 2 ml TOPO phase into 10 ml vol flask
9. Add 1 or 2 ml of 50-50 pyridine
10. Add 2 ml DBM color developer
11. Dilute to 10 ml with 50-50 pyridine and shake
12. Run a blank and a 10 PPM std starting at #3 (A urine sample of some office personal maybe used as a blank control.
13. Read on colorimeter at 405 MU

CALCULATION

$$\frac{\text{10 PPM std}}{\text{Std Abs-Blank Abs x aliquot taken}} = \text{Factor}$$

$$\frac{\text{Factor x (sample Abs-Blank Abs}}{\text{Aliquot of sample taken}} = \text{PPM Uranium in sample}$$

REAGENTS

1. Nitric acid
2. Pechloric acid
3. 1 M Hydroxylamine sulfate
4. 1 M Fluoride salt
5. 1 M Trioctylphosphine in cyclohexane
6. 50-50 phridine in ethyl alcohol
7. 10 g/l 1,3 Diphenyl-1,3-Propanedione in 190 Proff ethyl alcohol

APPENDIX

APPENDIX I

MONITORING EQUIPMENT MANUFACTURERS' SPECIFICATIONS SHEETS

RAS-1 Regulated Air Sampler - Eberline - Low Volume Mill Air

RAS-2 Regulated Air Sampler - Eberline - Low Volume Continuous Environmental Air

Model 43-5 Alpha Scintillator and Model 2 Geiger Counter - Ludlum

Model 19 Microrem (gamma) meter - Ludlum

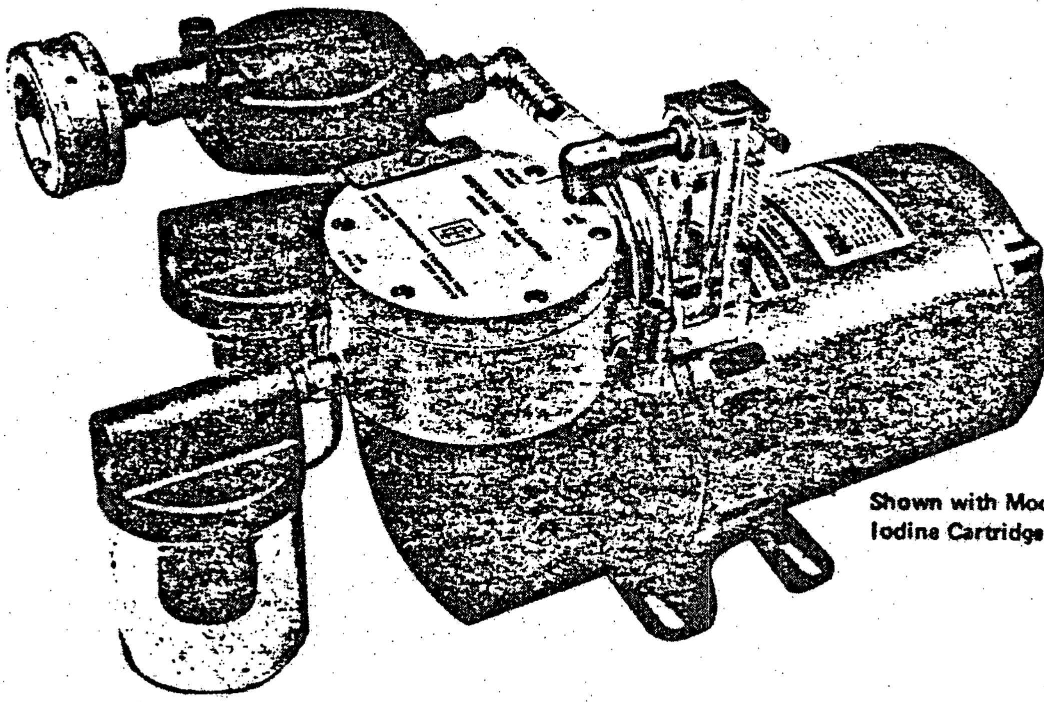
Model 811 Instant Working Level Meter - MDA Scientific

Tracketch Radon and Alpha Particle Detector - Terra-dex

Eberline TLD Service

Staplex High Volume Air Sampler

Regulated Air Sampler
Model RAS-1



Shown with Model ICH-1
Iodine Cartridge Holder

AIR SAMPLING FOR PREOPERATIONAL AND OPERATIONAL PROGRAMS AROUND NUCLEAR FACILITIES

IN-PLANT SAMPLING OF AIRBORNE PARTICULATE AND ^{131}I

47mm FILTER HOLDER/SAMPLE HEAD

FLOWMETER

REGULATED AIR FLOW

OIL-LESS PUMP

THERMAL MOTOR PROTECTION

OPTIONAL IODINE CARTRIDGE HOLDER

eberline

RAS-1

Regulated Air Sampler, Model RAS-1

GENERAL DESCRIPTION

The Model RAS-1 consists of an oil-less vacuum pump with regulated flow rate for use where a nearly constant air flow is desirable. The regulator holds a constant pressure drop across an in-line orifice by varying a bypass valve into the pump. This system allows the pump to work at a minimum head drop at all times so it runs cooler. This extends its lifetime. The sample holder uses standard 47 mm filters.

The relatively small size and light weight of the unit make it easily portable. The oil-less pump requires no lubrication. Vanes are carbon-graphite, self-sealing and self-adjusting to maintain like-new efficiency during long life. The air sampler may be operated continuously for years with minimum maintenance.

It should be noted that when pressure varies, the flow through an orifice, with a constant pressure drop, varies approximately as the square root of the ratio of the absolute pressure. Thus, if paper loading causes a pressure drop to one-half of the original, the flow, referred to atmosphere, will decrease to 0.7 of the original. The orifice is adjustable, allowing flow rate adjustment from near zero up to the pump maximum capacity.

The RAS-1 is supplied with 100 glass fiber filters, 47 mm dia., and with a technical manual.

Accessories: The Model ICH-1 Cartridge Holder holds the Eberline IC-1 Iodine Cartridge which is 1 inch thick x 2-1/2 inch dia. The IC-1 contains approximately 60 cm^3 of TEDA impregnated carbon. The impregnation provides for efficient collection in humid air at temperatures below 200°C of organic iodides and elemental iodine. Additional information on collection efficiency for penetrative forms of radioiodine is available upon request. A weatherproof housing (WPH-1) is also available.

SPECIFICATIONS

Pump Type: Oil-less, carbon vane.

Maximum Capacity: 4 cubic feet per minute (cfm) at 0 pressure drop.

Ultimate Vacuum: 26 inches Hg at sea level.

Typical Operating Flow Rates: Shaded region of figure below.

Sample Size: 47 mm.

Flowmeter: 0 – 100 liters per minute (0 – 3-1/2 cfm).

Filter: Outlet and bypass filter/muffler furnished.

Power: 115 V, 60 Hz at 5 A.

Thermal Protector: Furnished in motor.

Size: 17-1/2 inches long x 7 inches wide x 10 inches high (44.5 x 17.8 x 25.4 cm).

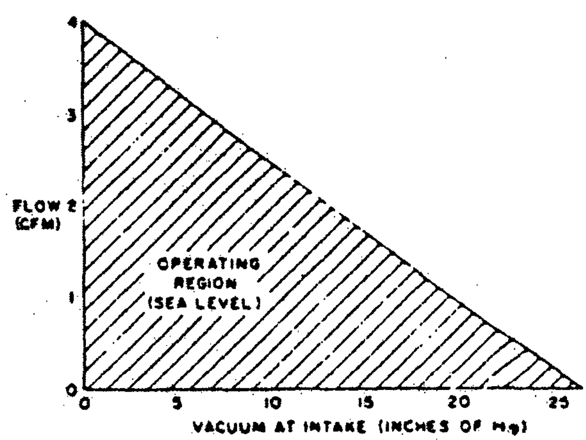
Weight: 30 pounds (13.6 kg).

ACCESSORIES

Model ICH-1 Iodine Cartridge Holder (supplied with 10 each IC-1).

Model IC-1 Iodine Cartridge (packaged 10 per box).

Model WPH-1 Weatherproof Housing.

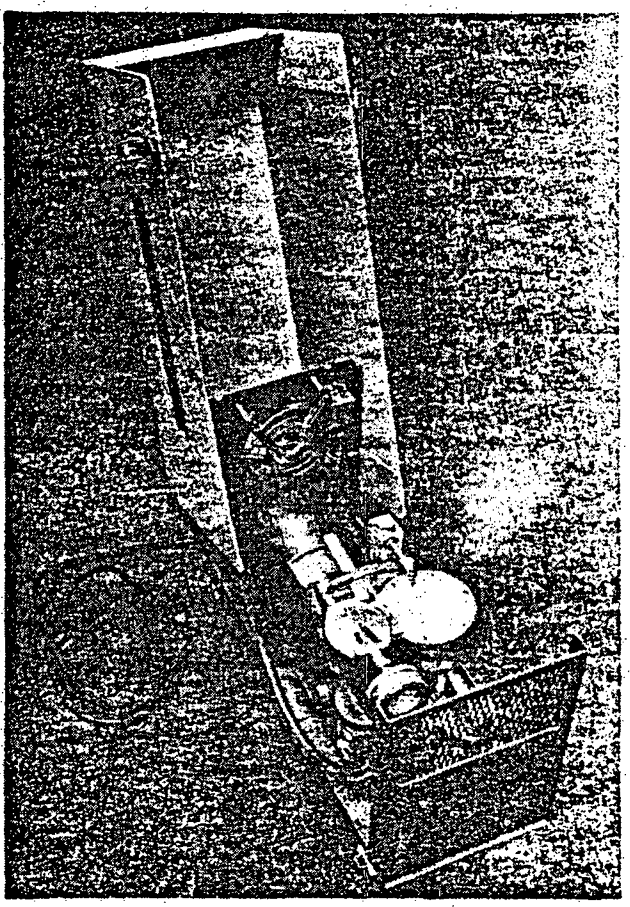


TYPICAL OPERATING FLOW RATES

eberline P.O. Box 2108, Santa Fe, New Mexico 87501 (505) 471-3232 TWX: 910-985-0678

February 1978

Regulated Air Sampler
Model RAS-2



AIR SAMPLING FOR ENVIRONMENTAL MONITORING AROUND NUCLEAR FACILITIES
WEATHERPROOF FOR USE OUT-OF-DOORS
SAMPLING OF AIRBORNE PARTICULATE AND ^{131}I
47mm FILTER HOLDER/SAMPLE HEAD
REGULATED AIR FLOW AND FLOWMETER
OIL-LESS PUMP
THERMAL MOTOR PROTECTION
OPTIONAL IODINE CARTRIDGE HOLDER

eberline

RAS-2

REGULATED AIR SAMPLER, MODEL RAS-2

GENERAL DESCRIPTION

The Model RAS-2 consists of an oil-less vacuum pump with regulated flow rate for use where a nearly constant air flow is desirable. The regulator holds a constant pressure drop across an in-line orifice by varying a bypass valve into the pump. This system allows the pump to work at a minimum head drop at all times so it runs cooler. This extends its lifetime. The oil-less pump requires no lubrication. Vanes are carbon-graphite, self-sealing and self-adjusting to maintain like-new efficiency during long life. The pump is mounted in a weatherproof enclosure (WPH-1) for use out-of-doors. The pump itself provides enough heat to prevent freeze-up in the winter and a fan provides adequate cooling in the summer. The air sampler may be operated continuously for years with minimum maintenance.

It should be noted that when pressure varies, the flow through an orifice, with a constant pressure drop, varies approximately as the square root of the ratio of the absolute pressure. Thus, if paper loading causes a pressure drop to one-half of the original, the flow, referred to atmosphere, will decrease to 0.7 of the original. The orifice is adjustable, allowing flow rate adjustment from near zero up to the pump maximum capacity.

The RAS-2 is supplied with 100 glass fiber filters, 47 mm diameter, and with a technical manual.

Accessories: The Model ICH-1 Cartridge Holder holds the Eberline IC-1 Iodine Cartridge which is 1 inch thick x 2 1/2 inch diameter. The IC-1 contains approximately 60 cm^3 of TEDA impregnated carbon. The impregnation provides for efficient collection in humid air at temperatures below 200°C of organic iodides and elemental iodine. Additional information on collection efficiency for penetrative forms of radioiodine is available upon request.

SPECIFICATIONS

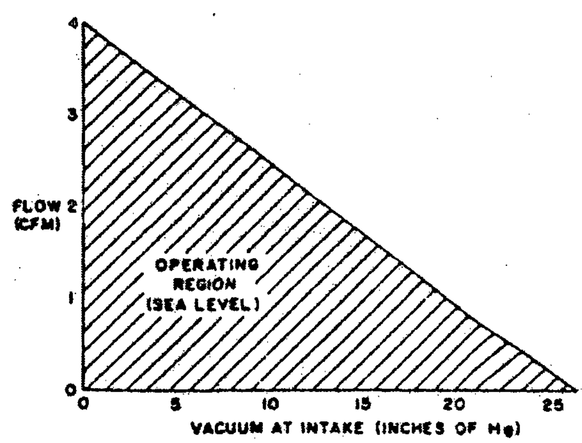
Pump Type: Oil-less, carbon vane.
Maximum Capacity: 4 cubic feet per minute (cfm) at 0 pressure drop.
Ultimate Vacuum: 26 inches Hg at sea level.
Typical Operating Flow Rates: Shaded region of figure below.
Sample Size: 47 mm.
Flowmeter: 0 – 100 liters per minute (0 – 3-1/2 cfm).
Filter: Outlet and bypass filter/muffler furnished.
Power: 115 V, 60 Hz at 5 A.
Thermal Protector: Furnished in motor.
Size: 23 inches long x 9 1/4 inches wide x 13 inches high (58 x 23.5 x 33 cm).
Weight: 60 pounds (27 kg).

ACCESSORIES

Model ICH-1 Iodine Cartridge Holder (supplied with 10 each IC-1).

Model IC-1 Iodine Cartridge (packaged 10 per box).

Pole Mounting Bracket.



TYPICAL OPERATING FLOW RATES

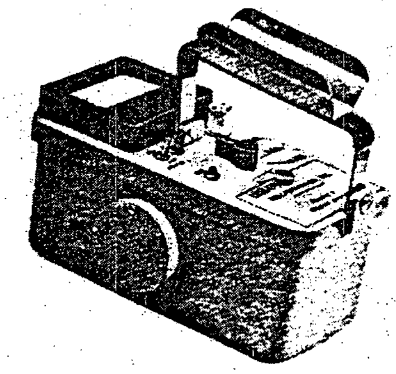
eberline P.O. Box 2108, Santa Fe, New Mexico 87501 (505) 471-3232 TWX: 910-985-0678

September 1978

Ludlum Geiger Counters

THE MODEL 2

A brand new counter, designed in the Seventies for use in the Seventies. Two 'D" cell flashlight batteries will operate this unit—INCLUDING THE SPEAKER —for 300 hours. Rugged is the word, even the meter is housed in a cast aluminum ›ezel. A new transistorized regulated high voltage makes this a truly outstanding ;eiger counter. The audio system is standard on this 0 to 50 MR/Hr meter. Any GM ›robe offered by Ludlum will work on this unit as well as many of the scintillators ;ince an adjustable high voltage is provided.

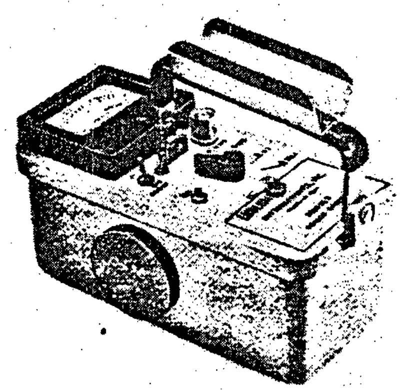


MODEL 2

HIGHLIGHTS: • 300 Hours from two standard "D" size batteries, replaceable rom the front panel • Individual range calibration potentiometers • Ruggedized neter • Fully transistorized • Temperature compensated • Electronically regu- ated power supply • Easily serviced fold-out circuit boards • Taut band meter › Corrosion resistant • All components derated to insure long life • Liberal one year warranty.

SPECIFICATIONS:

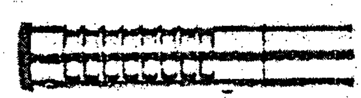
Range: Three linear ranges from 0-50 MR/Hr. Meter scale presentation 0-5 MR/Hr (CPM upon request) with multiples of X.1, X1, and X10.
Response: Toggle switch selection for 3 or 11 seconds.
Sensitivity: 40 millivolts.
Reset: Push button switch for meter reset.
High Voltage: 900 volts for Geiger probe. Externally adjustable from 400 to 1500 volts.
Audio: A built-in Unimorph speaker system with On-Off switch.
Connector: Series "C".
Linearty: Plus or minus 5% of full scale.
Calibration Stability: Less than 15% variance to battery end point.
Meter: 50 Micro-amp, 2½" diameter, taut-band suspension.
Size: 3.4" X 3.5" X 7.0" (H X W X L exclusive of handle).
Weight: 3.5 pounds less detectors.



MODEL 3

THE MODEL 3

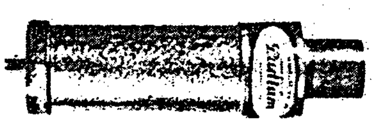
This unit incorporates all of the deluxe features found in the Model 2 plus an additional range The four scale unit allows operation from 0 to 200 MR/Hr. Four scales of 0-2 MR/Hr with multiples of X.1, X1, X10, and X100. (0-5K CPM or 0-50 CPS upon request)



MODEL 44-6
Thin Wall GM

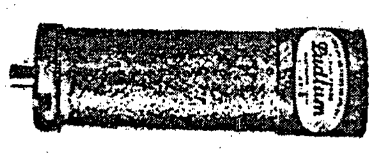
MODEL 44-9
Pancake GM

DETECTOR SPECIFICATIONS AND ORDER INFORMATION ON REVERSE SIDE.

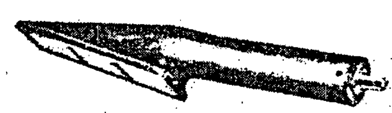


MODEL 44-2
Scintillator 1"x1" NaI (Tl)

MODEL 42-4
10" Sphere Neutron Scintillator



MODEL 43-2
Small Area Alpha Scintillator



MODEL 43-5
Alpha Scintillator

LUDLUM MEASUREMENTS, INC. • 501 Oak • Sweetwater, Texas 79556
Telephone (915) 235-5494

MODEL 44-7 End Window GM

Detector: LND 7232
Window: 1.5 to 2 mg/cm^2 mica
Window Diameter: 1.25"
Wall: .125" stainless steel
Dimension: 1.375" X 5¼" long
Weight: ½ pound
Replaceable GM tube

MODEL 44-9 Pancake GM

Detector: LND 7311/8767
Window: 1.5 to 2 mg/cm^2 mica
Window Diameter: 1.75"
Mounting: Aluminum holder, handle and window protector
Dimensions: 2¾" wide, 11" long 1.050" dia. Handle.
Weight: ¾ pound

MODEL 44-6 Thin Wall GM

Detector: LND 725
Wall Thickness: 30 mg/cm^2 Stainless Steel
Rotary Beta Shield: 1000 mg/cm^2 Stainless Steel
Dimensions: 1-3/16" × 6-1/2"
Efficiency for Radium 226: 1700 CPM per MR/Hr.
Weight: 12 ozs.

MODEL 43-5 Alpha Scintillator

Multiplier Tube: RCA 6199
Scintillator: ZnS (Ag)
Window: 1 mg/cm^2 aluminized mylar
Counting Area: 50 cm^2 active area
Dimensions: Outside window 7¾" X 2¼" Length including handle 15"
Weight: 2 pounds

MODEL 43-2 Alpha Scintillator (small)

Multiplier Tube: RCA-6199
Scintillator: 1mg/cm^2 aluminized mylar
Window: 1 mg/cm^2 aluminized mylar
Counting Area: 1½" diameter (11.6 cm^2)
Dimensions: 6½"× 2"
Weight: 14 ozs.

MODEL 42-4 Neutron Detector

The Model 42-4 is a portable neutron detector.* This instrument provides the monitor of a unknown neutron spectrum with instrumentation allowing direct interpretation with speed and accuracy. Achieving a spectral response closely approximating the dose curve for neutron energies from thermal to 7 MEV, the detector retains capability through 12 MEV and exhibits high sensitivity, good gamma rejection and excellent stability.

Sensitivity: Thermal neutrons . . . 1 millirem/HR—74 CPM 1 MEV neutrons . . . 1 millirem/HR—58 CPM.
Gamma Rejection: 1500 MR/HR.
Detector: 4mm x 4mm Li^6I (EU) Harshaw Scintillation crystal coupled to RCA 931A photomultiplier tube by optical quality acrylic light pipe.
Moderator: 10" diameter high density polyethylene sphere fitted with stainless steel handle and polyethylene feet.
Weight: 18 pounds.
Dimensions: Maximum height, 12 inches. Maximum length, 12 linches. Maximum width, 10 inches.

*Reference: 1. Los Alamos Scientific Laboratory Report No. LA-2717 "A Neutron Monitoring Instrument Having a Response Approximately Proportional To The Dose Rate From Thermal to 7.0 MEV" by D. E. Hankins, August, 1962. 2. Bramblett, Ewing and Bonner, "A New Type of Neutron Spectrometer," Nuclear Instruments and Methods, Sept. 1, 1960.

MODEL 44-2 High Energy Gamma Scintillator

Detector: 1" X 1" NaI (Tl)
Multiplier Tube: RCA 6199
Dimensions: 7½" X 2"
Weight: 14 ozs.

MODEL 44-3 Low Energy Gamma Scintillator

Specifications same as model 44-2 except
Detector: 1mm ×1" NaI (Tl)
Ideal for I 125

The Model 2 or 3 is supplied with a 39" cable, two "D" cell batteries, and an instruction manual. Choose a detector and add the price of the counting unit with the price of the detector for the cost of a complete unit. You may order a variety of detectors with your new counting unit if you wish. Orders may be placed, either by telephone or mail, with your area Ludlum representative or direct with the factory. Firm quotations will be given upon request. The FOB point is Sweetwater, Texas.

Ludlum **MODEL 19 MICRO R METER**

GENERAL DESCRIPTION

The Ludlum Model 19 Micro R Meter utilizes an internally mounted 1" x 1" NaI(T1) scintillator to offer an optimum performance in counting low level gamma radiation. Designed to be moisture and dust resistant, the unit also features a push button lighted meter. Five ranges are provided with 0-25 Mircro R/Hr as the most sensitive, and, 0-5000 Micro R/Hr on the highest range.

Designed to provide the monitor with the electronic capability generally associated with fixed laboratory devices, the Model 19 incorporates design features such as • Non overloading linear amplifier • Wide pulse amplitude discrimination range • Negative feedback stabilization • Temperature compensation • Regulated power supply • Elimination of marginal circuits, component selection and critical adjustments • solid state electronics.

All controls, including a calibration potentiometer for each range, are located on the front panel. Two "D" cell batteries are located in an isolated compartment, and are easily changed from the front panel. The meter is housed in a rugged, two piece aluminum bezel with an "O"ring seal.

SPECIFICATIONS

LINEARITY: Plus or minus 5% of full scale.

INPUT IMPEDANCE: 0.1 Megohm.

HIGH VOLTAGE: Variable from 400 to 1500 volts DC electronically regulated to within ±.1%.

CALIBRATION STABILITY: Less than 15% variance to battery end point.

BATTERY: Exceeds 100 hours when using standard flashlight "D" cells. RM-42R Mercury cells or Nickel-Cadmium cells are directly interchangeable.

METER RESPONSE: Variable with front panel toggle switch. Fast response 3 seconds and slow response of 11 seconds. Others on request.

AUDIO OUTPUT: Unit is furnished with built-in Unimorph speaker, on-off switch provided on front panel.

BATTERY COMPLEMENT: Two standard size "D" cell batteries, secured with screws and a gasket for dust and moisture proofing.

COUNTING RANGES: Two scale (and two color) meter face presenting 0-50 Micro R/Hr in black with full scale range positions for 5000, 500, and 50; and, in red, 0-25 Micro R/Hr with range selections of 250 and 25.

METER: 50 micro-amp, 2 1/2" diameter.

DETECTOR: An RCA 6199 coupled to a 1" x 1" NaI(T1) mounted inside the instrument housing.

FINISH: Instrument housing is of drawn and cast aluminum fabrication with brown epoxy paint and silk screened nomenclature. Switches are rubber booted.

SIZE: 6.4 x 3.5 x 7.0 inches (H x W x L exclusive of handle).

WEIGHT: 4.5 lbs.

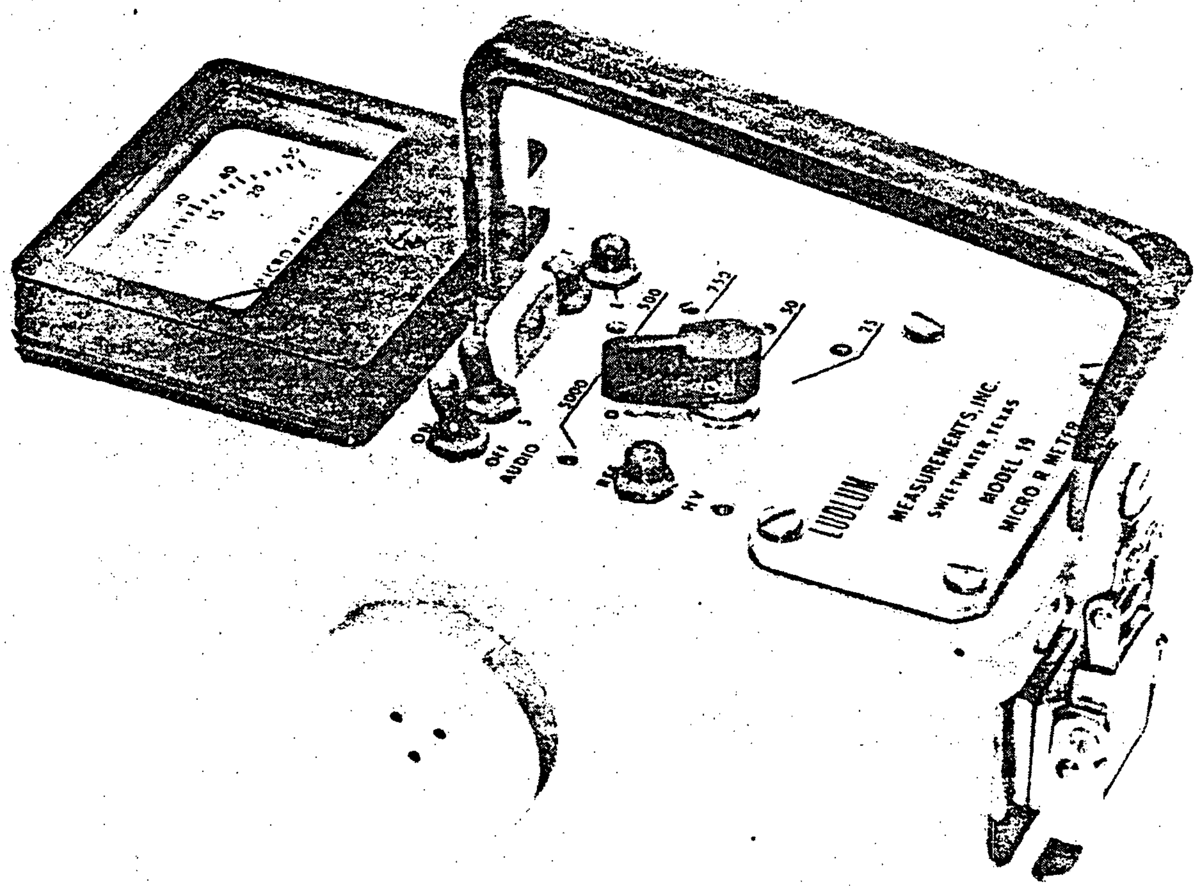
Model 19 Micro R Meter complete with batteries, speaker, and Instructional Manual.

LUDLUM MEASUREMENTS, INC. • 501 Oak Street • Sweetwater, Texas 79556
Telephone (915) 235-5494 P.O. Box 248

3-1-80

Ludlum MODEL 19 MICRO R METER

RUGGEDIZED,
WATER RESISTENT,
LIGHTED METER,
"D" CELL BATTERIES,
BUILT IN SPEAKER



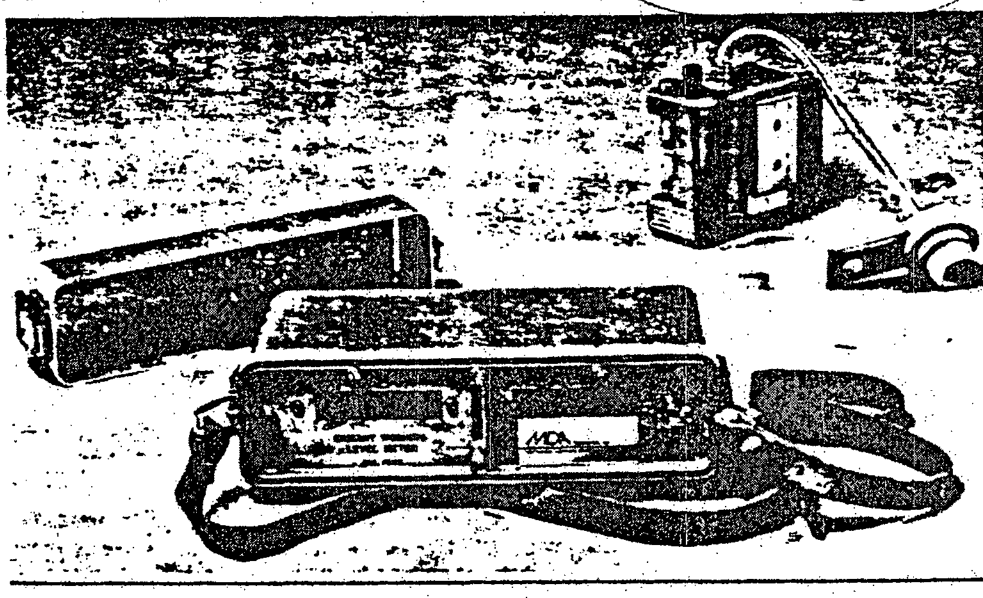
MDA
SCIENTIFIC, INC. ENVIRONMENTAL DIVISION•PERSONAL & AREA MONITORING SYSTEMS

Model 811 Instant Working Level Meter*

Quick, on-the-spot measurement of radiation hazard from radon daughters

Data Provided in 3½ minutes
- Working Level Determination
- Indication of Gamma Background
- Approximate 'Age of Air' and Concentration of Radon Gas from Nomograph

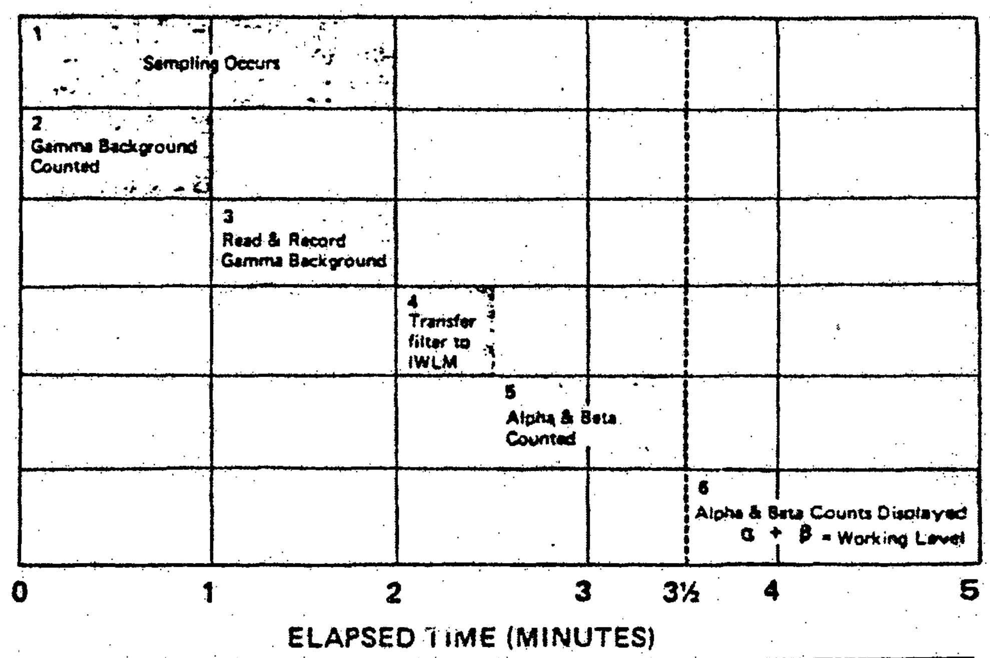
- Direct Reading Digital Display
- Data Equivalent in Accuracy to Kusnetz Method**
- Compact, Rugged Design



The Model 811 Instant Working Level Meter measures the radiation hazard associated with radon decay products in 3½ minutes. This allows immediate corrective action to be initiated, thus preventing prolonged employee exposure to high working levels and shutdown of work areas. Early discovery, and remedial action taken before excessive concentrations develop, decreases both lost time and operating costs.

Prior to the development of the Model 811 Instant Working Level Meter, the Kusnetz measurement technique was considered the most convenient method to use underground. However, it requires a 40-90 minute elapsed time from sampling until final readings are available. It is this delay and its inherent limitations and inconveniences which inspired the design of the Model 811.

6 EASY STEPS TO WORKING LEVEL



REFERENCES:

Miller, R.W., Denenberg, B., Moore, G., "A New Monitoring Technique for Airborne Radon Daughters", prepared for presentation at the Health Physics Society Ninth Midyear Topical Symposium, February 9-12, 1976.

Miller, R.W., Cleveland, J., Kump, D., "An Instant Working Level Meter" prepared for presentation at the American Industrial Hygiene Conference, May, 1976.

Manufactured under exclusive license from Kerr-McGee Nuclear Corporation

**Pat. Pending

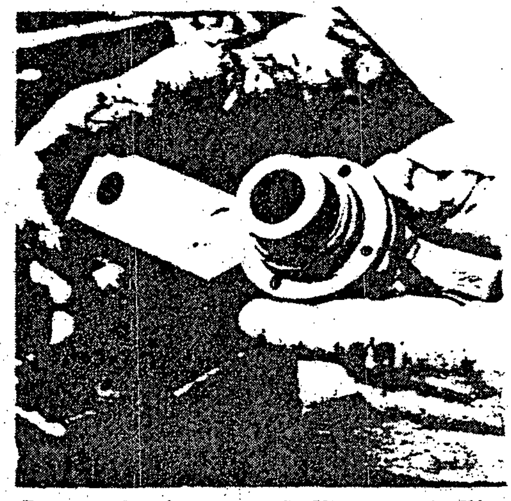
PRINCIPLE OF OPERATION

The Model 811 Instant Working Level Meter* is based upon a recent observation of the natural radon family found in mine atmospheres. It was found that the sum of alpha and beta activity for different ages or different mixtures of radon daughters stays nearly constant for a given working level. It is upon this principle that the Model 811 is based, with the sum of alpha and beta activity readouts equal to working level.

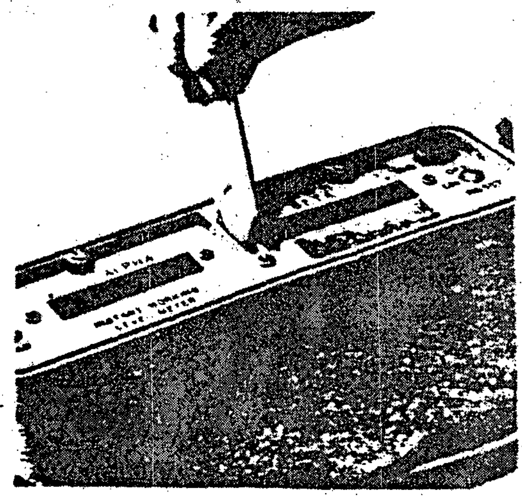
The Model 811 measures and electronically scales both alpha and beta activity, providing a direct digital readout of working level in a total elapsed time of 3½ minutes from the initiation of sampling. As in the Kusnetz method, an external sampling pump is used, together with a specially designed holder, to collect samples of the mine atmosphere on a fiberglass filter. After collection of a 5 liter sample, the filter and holder are removed from the sampling head and inserted into the filter well on the Instant Working Level Meter for evaluation.

During the initial sampling time a gamma background count is also made. It is displayed and can be recorded to provide useful exposure information. In addition to working level and gamma background data, the approximate 'Age of Air' and the activity (in picocuries/liter) of the radon gas that produced the sampled daughters can be determined by using a nomograph supplied with the instrument. Measurement results are equal in accuracy to those acheived with the Kusnetz method.**

Calibration is easily accomplished in the field by using separate alpha and beta emitting sources of known activity conveniently mounted in a specially designed fixture. Adjustments, when necessary, are made by means of internally mounted binary-coded-decimal rocker switches.



Removal of exposed filter and filte holder from sampling head.



Insertion of exposed filter into readout slot of Model 811 Instant Working Level Meter.

*Pat. Pendin

**Meter is gamma sensitive on beta-counting side. Thus, a special tungster shield may be required, in place of the one routinely supplied, where large high grade deposits are mined, i.e., ≥ 0.70% U_3O_8 equivalent.

ORDERING INFORMATION

Specify Model No. 811 Instant Working Level Meter.

Accessories:

- Battery Charger - Cat. No. 811-BC-1
- Filters - Box of 500 - Cat. No. 811-5
- Filter Holders - Cat. No. 811-F
- Filter Holder Container - Cat. No 811-FB
- Calibration Stds. α - Cat. No. 811-A; β - Cat. No. 811-B
- Sampling Pump, MSA No. 2 or equivalent - Cat. No. 811-P-1
- MSA Battery Charger or Equivalent - Cat. No. 811-P-BC

SPECIFICATIONS

Size: 10"W x 8"H x 2¾"D
Weight: 11 lbs.
Power Supply: Rechargeable Nickel Cadmium Batteries, included
Case: Heavy duty deep drawn aluminum, water-proof design with shoulder strap. Removable protective cover.
Sampling Rate: 2½ l/min for 2 minutes, using external pump — see accessories
Data Output:
1. Working Level — direct readout
2. Approximate gamma background — direct readout
3. Approximate 'Age of Air' and concentration of radon gas in picocuries/liter — from nomograph

Accuracy: Comparable to Kusnetz method for working level determinations**

MDA SCIENTIFIC, INC.
808 BUSSE HIGHWAY
PARK RIDGE, ILLINOIS 60068
(312) 696-4250 TELEX: 28-3469

TRACKETCH® for Environmental Monitoring
TERRADEX
JANUARY 1980

Services and Prices

SERVICES SUPPLIED BY TERRADEX CORPORATION*

Terradex Corporation supplies TRACK ETCH® detectors in various configurations and with instructions for measuring radon and total alpha activity. We process the detectors and prepare a report of the results. The only effort required of the client is to place the detectors in the area to be monitored and return them to Terradex.

The complete services provided by us include:

1. Consultation at Terradex to plan the TRACK ETCH program
2. Prenumbered TRACK ETCH detectors in appropriate configurations ready for field use
3. Detailed handling instructions
4. Forms for recording pertinent data
5. Processing and reading of the detectors
6. Computer analysis and tabulation of the data
7. Detailed statistical evaluation of the data
8. Storage of the detectors for future reference
9. Summary report of the results

TRACK ETCH detectors are shipped with proper protection so that they do not record alpha radiation before they are ready to be used. The detectors will not record other types of radiation.

When the detectors are returned from the field, we process and read them. The resulting data are computer analyzed, tabulated, and ranked, after conversion to average radon concentration values. A statistical evaluation of the data will be made if, in our opinion, the number of samples is adequate. A Terradex letter report summarizes the data.

After processing and reading the detectors, we store them for future reference. They can be reread at any time to verify the original results or to increase sensitivity by reading a larger area of detector.

You are welcome to free consultation at the Terradex offices to plan the field work. Free consultation at Terradex is also available to help interpret the results. You can also request field consultation at the consulting rates shown below.

CONFIGURATION TYPES

TRACK ETCH detectors are supplied in several configurations, depending on the measurements desired and the environment being monitored. All configurations have been calibrated at typical indoor radon/radon-daughter ratios in the radon chambers at the U.S. Department of Energy's Environmental Measurements Laboratory. Results are reported in pCi/l or BQ/m³ of radon based on these calibrations. Results can also be reported in Working Level (WL) if the Working Level ratio is known or assumed.

TYPE B — Detectors of this type are mounted bare on 2½-inch (6-cm) square cards, punched for easy hanging on walls or from ceilings. The back of the card has spaces for filling in dates and other comments for computer processing. In this simple configuration, which is well adapted for monitoring in buildings protected from the weather, the detector measures the total ambient alpha particle activity from both radon and radon daughters.

TYPE F — The detector is mounted inside the bottom of a light plastic cup, about 3.75 inches (9.5 cm) high and 2.9 inches (7.3 cm) at the widest diameter. A special filter, supplied with the cup and installed over the mouth of the cup by the client, prevents entry of radon daughters and dust. Type F detectors measure radon only, uncomplicated by radon daughter variability. Cups can be mounted on walls or ceilings with pressure sensitive tape. Detectors of this type are recommended for outdoor monitoring when they are contained in protective canisters. They are also suitable for indoor monitoring where a radon-only measurement is required.

TYPE M — Same as Type F, except that the mouth of the cup is covered with a Thoron Filter membrane that excludes thoron (Rn-220) but permits access of radon (Rn-222). It is less sensitive than the Type F but can be used in special situations with a high thoron concentration. It also excludes radon daughters and dust.

TYPE C — Same as Types F and M, except that the cup is left open and no filters or membranes are installed. It is intended primarily for soil gas radon measurements, but it can be used for indoor or outdoor atmospheric measurements in some instances.

PLACEMENT BY CUSTOMER

The client is responsible for placing the detectors in the area being monitored and for recording the time of placement and removal. Little or no equipment is needed for this work. If radon maps (optional) of the data are needed, the client provides sample location grid maps that are used as base maps for computer plotting.

SENSITIVITY RANGE

TRACK ETCH detectors have an extremely wide range of radon exposure sensitivity. They can measure not only the low radon levels in ambient outdoor air but also the very high levels that might be present in some uranium mine atmospheres. Sensitivity to low radon exposures can be increased simply by examining an increased detector area, at an additional price. This is an important advantage of the TRACK ETCH system where initial measurements are made in atmospheres of unknown radon concentration.

PRICE SCHEDULE

The price for TRACK ETCH services depends on the number of detectors ordered and the sensitivity levels desired. With a minimum order of 50 detectors the prices are as follows:

Sensitivity Level ((pCi/l)-months)	(WLM*)	Service Price (U.S. $ per Detector)
4.0	0.085	15
1.0	0.021	30
0.2	0.0042	60

Please request quotes for programs requiring more than 5000 detectors per year.

*Assuming a Working Level ratio of 0.5

In most environments with excessive radon levels, the lowest-price reading, 4.0 (pCi/l)-months, will provide adequate counting statistics. After reporting, if it is found that this sensitivity level is inadequate for precise readout, more area of the detector can be read to increase the sensitivity level. The increased price to read greater areas is reflected in this table.

OPTIONAL SERVICES SUPPLIED BY TERRADEX CORPORATION

Terradex can prepare TRACK ETCH radon contour maps of the results where area surveys are conducted. Prices for these maps will be quoted on request. A minimum of 100 sample points usually would be needed to provide adequate data for mapping.

Field consultation services on the radon monitoring program are available at a charge of $300 per day plus travel and living costs. Our consultants can help plan the program and instruct field personnel in the most effective way to use the detectors, record the field data, and interpret the results. This service can be particularly useful when applying the TRACK ETCH techniques to new or unusual situations.

Terradex has available protective canisters for use with the TRACK ETCH cups when they are installed outdoors or in harsh indoor environments. These canisters are available for lease or sale, depending on the client's needs.

Canister lease	$10.00 per month
Canister price	$50.00

LIMITATIONS OF DATA

We keep all data and other sensitive information strictly confidential and will not release it to other parties without specific permission from the client. We do not accept responsibility for subsequent action taken by the client or its consultants as a result of TRACK ETCH programs.

DELIVERY SCHEDULE

Shipment of detectors can be made within two days after receipt of an order at Terradex in Walnut Creek, California. You can place orders by telephone, but you should confirm by letter or Telex.

After the detectors are returned, the results are usually ready within five working days. Summary information can be transmitted by telephone or Telex if requested. Completed tabulated data are airmailed in ten working days or less.

ORDERING INFORMATION

Place orders for TRACK ETCH services through:

Terradex Corporation
460 N. Wiget Lane
Walnut Creek, CA 94598
Phone: (415) 938-2545
Telex: 337-793

The process of radon detection using track registration material is covered by U.S. and foreign patents: USA 3,665,194 and 3,303,085; Australia 424,388; Canada 911622; S. Africa 68/3983; Sweden 336688; other patents issued and pending. Thoron Filters are covered by U.S. patent 4,064,436; other patents pending.

TERRADEX

Printed in U.S.A.

RADIATION DOSIMETRY

TLD SERVICE

FOR PERSONNEL & ENVIRONMENTAL MONITORING

Thermoluminescence dosimetry (TLD) has emerged in recent years as a clearly acceptable alternative to film badges. This technique is based on the ability of certain materials to absorb and store radiation energy, releasing the stored energy in the form of light when the material is heated. Many of the disadvantages of film badges are eliminated by TLD. Lithium fluoride is the most popular TLD material for the following reasons:

1. The rad response of this material is similar to that of soft tissue, eliminating the need for a complex set of filters.

2. The useful range for gamma (γ) and x-ray is 1 mR to 1000 R, the entire range of interest in radiation protection. The response is linear with exposure over this range eliminating the need for calibration curves.

3. The material is commercially available in small solid dosimeters, especially useful in this application.

4. With proper annealing and reading, badge exchange frequency can be quarterly for personnel who are unlikely to exceed the quarterly occupational dose limits.

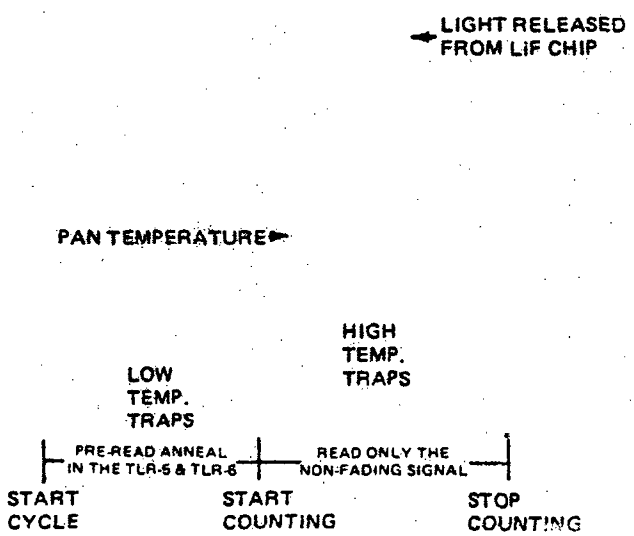
5. Angular dependence is almost completely eliminated with the Eberline badge design.

6. Effects of light, heat, humidity and time on the response are not significant with the Eberline method of dosimeter annealing and readout.

After a decade of providing film badge service (1960 to 1970) and another decade of TLD service (1967 to 1977), Eberline is convinced that TLD offers the best available technique for personnel dosimetry.

The Eberline two-step method of readout completely eliminates fading of response for use periods up to one year.

TLR-5 AND TLR-6 READOUT CYCLE FOR LiF



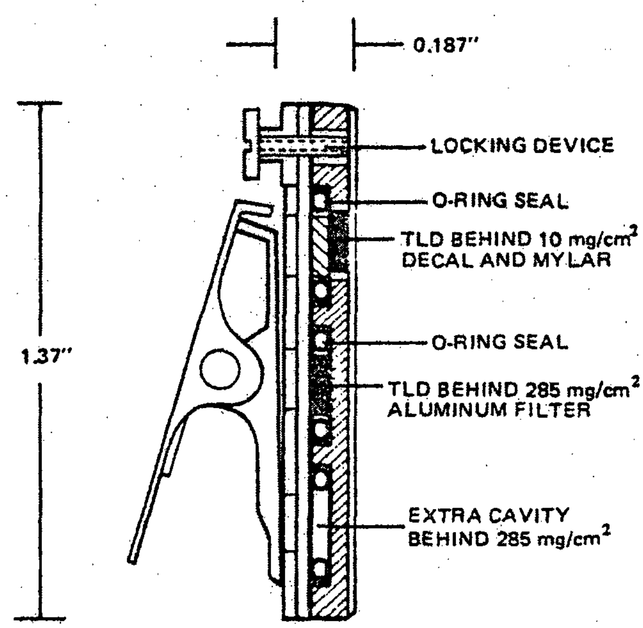
A variety of TLD holders is available, including the following:

Personnel Badge

Eberline provides a TLD badge with shielding to measure both the "shallow" and "deep" dose equivalents from beta, gamma, neutron and x-ray radiation.

Wrist and Ankle Badge

Identical to the personnel badge, except that the clip is replaced with an elastic band. This badge design is also suitable for attaching to a photo identification badge.



Ring Badge

A single TLD chip supplied in a small, black polyethylene bag, which is 10 mg/cm^2 thick, mounted on an elastic finger band. This badge is used to measure extremity dose from beta (β), γ or x-ray.

Environmental Badge

Each badge consists of five LiF chips selected for uniform response, in a plastic holder. The plastic provides adequate protection from weather for this badge to be used out-of-doors

Neutron Dosimetry

Eberline provides a neutron service based on the technique of Geiger and Doles (Proceedings of the Ninth Midyear Topical Symposium of the Health Physics Society, pages 845-849, February 1976). This technique is used to: (1) identify standard LiF dosimeters that have been exposed to neutrons, (2) calculate neutron and γ components of a mixed irradiation, and (3) estimate the dose from neutrons in situations where the spectrum of neutrons remains relatively constant. This method is based on the fact that natural lithium fluoride responds differently to neutrons than to γ, β or x-rays, with more of the stored energy attributable to neutrons being released at a higher temperature (325°C). The neutron response is dependent on the ratio of thermal neutrons to intermediate or fast neutrons. In a facility where this ratio is relatively constant, the technique may be used to estimate neutron dose. In a facility where the ratio is highly variable, the technique may be used to identify persons who should routinely use one of the other methods of neutron dosimetry. When requested by the customer, badges for neutron readout are issued with a red decal. Badges that are not identified in advance as neutron badges can still be read out for neutrons if they are so marked at the time of return to Eberline. The neutron component is reported in counts, with the customer converting counts to mrem based on calibration under typical conditions of neutron moderation at that facility. This calibration is done with a neutron rem-counter and Eberline TLD badges mounted on a one-gallon jug of water. The customer applies the mrem/count conversion factor that was determined for his facility. This neutron dose is then added to the dose record maintained by Eberline for that individual. The doses (penetrating and skin) from x-ray, γ and β also are reported by Eberline for each badge.

Frequency of exchange: When personnel seldom approach the 1250 mrem quarterly dose limit, a quarterly exchange is adequate. If the limit could be exceeded, monthly exchange is recommended. Environmental badges should be exchanged quarterly.

Exchange procedure: So simple – Eberline will ship a complete new TLD badge prior to each exchange date and customer returns the used badge for reading and reporting. Shipping container and return shipping labels are provided with each shipment of badges.

QUALITY ASSURANCE PROGRAM

Eberline TLD service meets performance requirements of standards developed by the Health Physics Society and the American National Standards Institute and Regulatory Guides of the Nuclear Regulatory Commission. Additional assurance is gained through audits conducted internally and by Eberline customers, and through an extensive and continuing dosimetry performance testing program.

One element of the Eberline program consists of a group of reference dosimeters, closely selected for uniform response, used to indicate the consistency in the annealing and reading process. Another is the weekly readout of in-house quality control badges, exposed by the QA Manager. Since they are representative of the current supply provided to customers, the results obtained from these badges indicate the consistency and accuracy of the total dosimetry program.

Badges representative of the current supply, and routinely processed in the same manner as those shipped to customers, are sent monthly to an independent agency for additional performance testing. Sources used include ^{226}Ra, ^{137}Cs and ^{60}Co γ radiation; x-rays of various energies down to 15 keV; β from ^{90}SrY; and neutrons from ^{252}Cf. Results of this testing are consistent with the Health Physics Society Standards Committee proposed standard "Criteria for Testing Personnel Dosimetry Performance". When this standard has been fully implemented, Eberline will supply to each customer evidence that the Eberline service meets these performance criteria for each type service provided to that customer.

REPORTING

The Eberline TLD report has been approved for use in lieu of NRC Form 5. A special form is provided to record information on start-up, additions and deletions.

Routine reports are normally mailed within one or two working days after receipt of badges and always within five working days. Emergency reports, if required, are made by telephone the same day the badges are received. Additional reports supplied at year-end as required by NRC include a statistical listing of number of persons in various dose ranges and a dose summary, listing the quarterly dose to each person.

eberline P.O. Box 2108, Santa Fe, New Mexico 87501 (505) 471-3232 TWX: 910-985-0678

EXPLANATION OF CURRENT TLD OCCUPATIONAL REPORT

Each green and white stripe contains two lines of information for each badge issued. The first three columns include data necessary for individual identification.

Columns four and five are used to specify the particular type of service and frequency of exchange, as well as the dates the badges are issued and returned. Column six is used to further identify work location and type of work performed. The second line of column six is used to record the neutron reading obtained by one of several techniques. Upon request, Eberline will assist with selection of a suitable technique and suggest calibration procedures.

Total TLD net counts, the reading of the dosimeter behind the 10 mg/cm² plastic decal, is reported in column seven. Also reported in this column are the penetrating net counts, the reading of the dosimeter behind the 285 mg/cm² aluminum absorber. Both readings are reported minus the reading of the control badge and corrected for the response factor of the dosimeter so that one count corresponds to one mR of exposure from ^{137}Cs gamma radiation.

The dose reported as "gamma" in column eight is the penetrating dose equivalent and is due primarily to gamma and x-rays. The whole body dose for types of service T and N is the sum of the top line from columns eight and ten.

The dose reported as "beta" in column nine is the total TLD net counts less the penetrating net counts. The skin dose reported in the second line of this column is the sum of the top lines of columns eight, nine and ten. This represents the total dose equivalent taken to be the dose to the skin for type service T and N.

Column ten reports the neutron reading corrected by the customer using a calibration factor for that source of neutron. The extremity (service codes H, J or K) dose recorded in the second line is the sum of the top line of columns eight, nine and ten.

Columns 11, 12 and 13 are the accumulated calendar quarter and year dose values in mrem for the whole body, skin and extremity. The corresponding limits, based on 10CFR20, section 20.101a are 1.25 rem whole body, 7.5 rem skin and 18.75 rem extremity for the quarter. The whole body dose limit for a calendar year is 5 rem. These limits are reported in the top line of columns 14 and 15.

The second line of column 14 reports the actual lifetime accumulated occupation dose, provided dose history information has been supplied to Eberline. The second line of column 15 gives the lifetime permissible whole body dose based on the formula 5(N-18), where N is the age of the person.

The current TLD Occupational Radiation Exposure Report used by Eberline has been approved for use in lieu of NRC form 5.

eberline

01-30-76

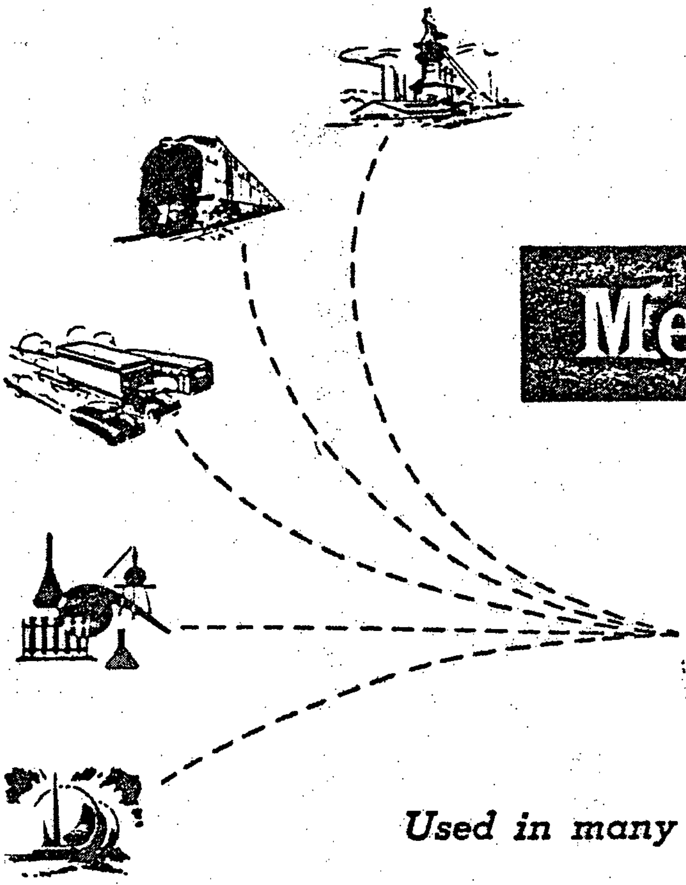
0001	Davis	RJ	253-36-4053		T	01-05-76	HC	E	370	310	60		310	370		1.25	5.00
0011			07-13-23	52	B	01-23-76			312	310	370		310	370		2.05	170
0002	Jones	JT	272-28-4435		N	01-05-76	HC		111	110	0	20	130	130		1.25	5.00
0011			08-22-32	43	B	01-23-76		21	109	130	130		130	130		1.10	125
0003	Smith	FL	561-64-7877		T	01-05-76	HL	A								1.25	5.00
0011			11-11-31	44	B	01-23-67										0.15	130
0004	Smith	FL	561-64-7787		H	01-05-76	HL		0	280					290		
0011			11-11-31	44	S	01-23-76			234			230			[illegible]		
0005	Burrage	MK	299-26-0303		J	01-05-76	BA	C									
0011			03-18-39	36	B	01-23-76											

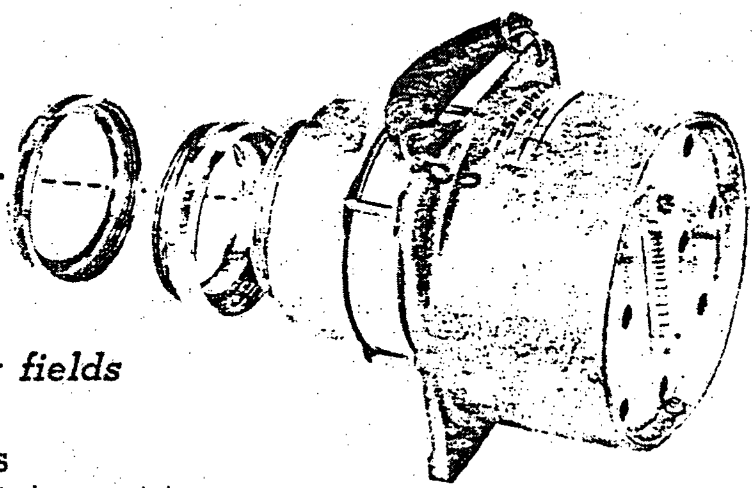
Nuclide Corporation
Richard J. Davis
P.O. Box 318
Oak Brook, Illinois 60521

Accurate . . . to 1/100th of a Micron!

FOR INDOOR
OR OUTDOOR USE
in

Measuring Air Pollutio





Used in many fields

RADIOACTIVE PARTICLES
Hundreds used in government atomic energy tests and by industries developing and manufacturing nuclear equipment and installations.

SMOKE AND SMOG
Government Health Agencies, including Municipal Air Pollution Control Departments and Insurance Companies check air pollutant factors with Staplex Hi-Volume Air Sampler. Insuring public safety.

ATMOSPHERIC CONDITIONS
Weather services, Armed Forces research units and others identify and measure particulate matter with Staplex Hi-Volume Air Samplers.

MINE AIR HAZARDS
For Mine Inspections, including Mine Safety and Health Programs.

FACTORY HEALTH HAZARDS
For alerting personnel where noxious particulate bodies and dusts are a source of hazard. For problems of industrial hygiene and occupational hazards.

Staplex
TRADE MARK
HI-VOLUME
AIR SAMPLER

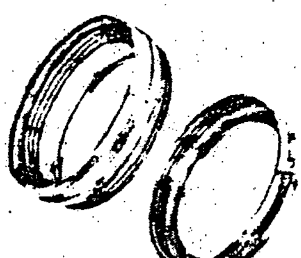
RESEARCH AND TESTING
Universities, National Laboratories, testing stations, Civilian Defense Agencies — use this Staplex Hi-Volume Air Sampler to be constantly on the alert for Safety Standards.

LITERALLY INHALES
an entire area with unparalleled speed and accuracy . . . designed for indoor or outdoor use . . . indispensable for series or unit tests . . . a necessity for detection and in maintaining optimum health standards anywhere that air pollution hazards are present.

COMPACT . . . PORTABLE
HI-VOLUME AIR SAMPLER

This unit was developed in the laboratories of the New York office of the United States Atomic Energy Commission and manufactured in large quantities for them by The Staplex Company. Through permission from this Commission Agency, The Staplex Company now makes available these High Volume Air Sampler Units for general use. The prime purpose of these units is for accurately sampling large volumes of air for particulate matter by means of a filter paper. The sampler has been used successfully to sample air containing particles as small as one hundredth of a micron in diameter. The unit employs a turbine type blower. The standard unit permits the use of a filter paper approximately 4" in diameter, with larger sizes available as described on page 4.

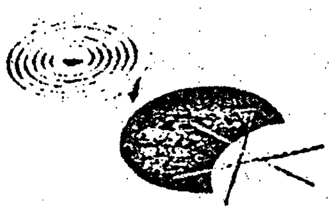
Approximately 50 filter type papers have been tested in this sampling unit. The only hard surface paper which has been tested that will permit passage of sufficient air to keep the pump motor cool is the TFA #41 which may be operated for approximately one hour without significantly over-heating. The highest flow rate has been obtained with TFA Type "S", a pleated respirator paper filter which will pass 70 c.f.m.



FILTER HOLDER — The filter holder is machined from aluminum in two pieces. The holder has been made to accommodate both the pleated and the flat filter papers. When using the flat filter paper, a removable cross-grid is inserted behind the paper to prevent its rupture in service.

It is considered important that all filter paper holders be interchangeable to permit the operator to carry several loaded filter holders during an air sampling run. The standard unit is equipped with one filter holder set, accommodating 4" diameter filters. Additional filter holders can be supplied. This makes it, when required, unnecessary for the operator to handle the paper when in the field and reduces contamination by a substantial amount. Special filter holders are available for 6" x 9" and 8" x 10" filter papers. Other sizes can be obtained by order.

FILTER PAPERS — The following type filter papers are recommended for use with this unit:



Type Filter	Flow Rate CFM	Advantages
TFA #41	18 approx.	Ashless. Easily countable for Alpha particles. Good efficiency for industrial dusts and for particulate matter size 10 microns and under to 1/100 micron.
TFA #2133	36 approx.	Moderate flow rate. Moderate resistance build-up. Countable for Beta Radiation.
TFA type "S" Pleated	70 approx.	High Flow rate. Physically strong. Low resistance buildup. For particulate matter size 10 microns and over.

FAN HOUSING ASSEMBLY

The housing assembly is cast aluminum, using a minimum of metal so that the weight can be kept down. The unit weighs but 10 lbs. and is portable.

The rate of flow is measured by means of an indirect, variable orifice meter. This indicates the pressure drop across an orifice in the housing and is calibrated against a standard orifice on the intake.

PUMP AND MOTOR

The air mover is a high speed, heavy duty pump and motor, .49 HP; 15,600 RPM, the pressure volume characteristic of which is shown. The unit is designed for 24 hour sampling. A number of these have been operated by the United States Energy Commission from two to three months continuously in the field without a break, with the pleated filter changed every seventy-two hours.

APPLICATION

May be used for indoor or outdoor sampling. For mobile or fixed position operation, either horizontal or vertical. Motor can work satisfactorily in conditions and atmospheres up to 105°C or 220°F.

Model TFIA—110 V. A.C. or D.C.

Model TFIA2—220 V. A.C. or D.C.

Model TFIA-4—24 V. D.C.

Exclusively manufactured and sold by THE STAPLEX COMPANY, AIR SAMPLER DIVISION

APPENDIX
J

APPENDIX J
CHURCH ROCK URANIUM RADIATION SAFETY PROGRAM

TABLE OF CONTENTS

APPENDIX J

J.1 CHURCH ROCK URANIUM RADIATION SAFETY ORIENTATION OUTLINE*

Differences between radioactive materials and radiation.

Radioactive materials present in the mill:

- o Uranium decay chain

Radiation present in the mill:

- o Different types of radiation

Radiological hazards in the mill:

- o Routes of entry into the human body

Contamination control:

- o Spills
- o Clothing and showers
- o Respirators

Rules for radiation protection.

License, signs, and posters.

Monitoring in the mill; in the environment.

Bioassay, film badges.

Exposure limits:

- o As low as reasonably achievable (ALARA)
- o Women in radiation zones

Environmental Protection.

____________________________ ______________________
Last Name, First Name Social Security Number

I have received the radiation orientation outlined above.

____

*(Document location - Employee's personnel file, RSO Office)

J.2 RULES FOR RADIATION PROTECTION

1. If you've been issued a dosimeter, wear it all the time you are at work.

2. Don't smoke, eat or drink inside processing buildings or the laboratory.

3. Wash your hands when leaving processing areas and before eating or smoking.

4. If you have a cut or open sore, have it bandaged before working in or around process areas.

5. Read and follow the radiation protection requirements in the "Standard Operating Procedure" for the job you are doing.

6. Wear a respirator whenever required by the "Standard Operating Procedure" and when instructed to by the foreman in charge.

7. Work safely; report unusual conditions and defective equipment to your supervisor.

J.3 RADIOLOGICAL WORK PROCEDURES

Ore handling areas of the mill:

- The area is to be kept as dust free as possible at all times.
- Cleaning operations should be done wet where possible.

If an area cannot be wetted, respiratory protection is required when a brush or broom is used. Compressed air may NOT be used in ore dust cleanup.

Yellowcake handling areas of the mill:

- The area is to be kept as dust free as possible.
- Protective clothing must be worn for yellowcake packaging operations.
- Protective clothing is to be stored separately from personal clothing.
- Protective clothing may be worn by the same individual several times without laundering provided there is no yellowcake contamination visible on the clothing.
- Protective clothing with visible yellowcake contamination must be exchanged for clean protective clothing. Contaminated protective clothing must be put in designated bins for laundering.
- A shower is required after working in the yellowcake barreling area and before dressing in personal clothing if yellowcake contamination is observed on protective clothing.
- Repository protection is to be worn where posted, whenever directed by the foreman, and for all operations where yellowcake dust is present.
- A water hose is to be used for cleanup of yellowcake dust. Never use compressed air.

J.4. RADIATION SAFETY TRAINING PROGRAM

I. Principles

A. Define and explain radiation and contamination:

1. Radiation -- the emanation of nuclear particles or high energy electromagnetic photons from a source, which may be radioactive, or a device such as a reactor or accelerator.

2. Contamination -- small dust-like particles of radioactive material in areas where there is no control over their spread and where one might unknowingly become exposed to radiation. There are two types: fixed and loose. Loose is easily removed. Fixed adheres to the object and must be removed by means other than simple washing.

3. Types in the Mill:
   a. YC in drums (radiation source)
   b. YC loose on the floor or in the air (contamination)
   c. Densitometers (radiation source)
   d. ore (possibly both)

B. Types of radiation:

1. See D below

C. Interaction:

1. Ionization -- Principal means of interaction
   a. Charged particles -- removal of electrons or addition of electrons (ion pairs).
   b. Ionizing radiation

2. Specific Ionization
   a. Number of ion pairs formed per unit path length in a given material.
   b. Increases with charge if the mass is the same.
   c. Increases with mass if the charge is the same.
   d. Higher mass lower velocities.
      Example: 4 amu S.I. 50K to 100K ip/cm air
      .00055 amu S.I. 30 to 300 ip/cm air

D. Specific types of radiation and their interaction:

1. Particles
   a. He nuclei
      1. Due to instability of radioactive nuclei.

f. Morphological damage.
g. Mutations in cells which are in the process of reproduction.
h. Rate of cell division retarded or inhibited.
i. Abnormal cell division, i.e., cancer.

B. Radiation Units
1. RAD vs REM
 a. RAD-Radiation Absorbed Dose — Any type of radiation which liberates 100 ergs of energy per gram of material in which it is absorbed.
 b. REM — That amount of radiation that produces the same amount of biological damage as one RAD.
  1. REM = RAD X Quality Factor (QF)
   a. Quality Factor is the ratio which makes rads and rems equal.
   Example: β, x-ray and λ QF = 1
   α QF = 20
2. Dose
 a. Dose = Dose Rate X Time
  1. Dose Rate — Energy absorbed per unit time.
  2. Dose — Total energy absorbed.

C. Effects:

1. Blood cells most susceptible — lymphocyte
2. Granulocytes
3. Bone cells
4. Nerve cells
5. Brain cells
6. Muscle cells

D. Exposure:

1. Chronic vs Acute
 a. Chronic -- continuous exposure over a long period of time.
 b. Acute -- large does over a very short period.

E. Somatic vs Genetic effects:

1. Somatic — high dose
 a. Continuous chronic exposure to hands of beta, at a few REM per week, dry and brittle, red skin. Skin cancer.
 b. Large doses to eye -- cataracts.
 c. Leukemia
 d. Epilation — 100 REM or more short period of time.

2. Specific energy characteristics of specific isotope. Very small energy range.

Example: $^{238}_{92}U \rightarrow ^{4}_{2}He + ^{234}_{90}Th$

b. Heavy element — Au, U, Pu, Ra
c. the lower the energy, the lower the half-life
-- <u>define half life</u>.
d. Interaction
   1. Ionization
   2. Short range — but indicative of a high energy of absorption or high degree of ionization possible high degree of tissue damage — internal hazard.
   3. Moves in a very straight line due to the mass.
      a. All stop about the same distance.
      b. Discovered by using a cloud chamber.

2. Beta
   a. Composed of electrons
      1. Range of energies
      2. Highest energy indicative of specific isotope.
   b. Neutron breaks down to a Proton, electron and an additional form of energy released, neutrino.

      Example $^{1}_{0}n \rightarrow ^{1}_{1}H + ^{0}_{-1}e + ^{0}_{0}$

   c. Interaction
      1. Ionization and transfer of energy to the outer electron field.
      2. Stoppage dependent on initial energy and density of electrons in the medium.
      3. Zig-zag path.

3. Gamma
   a. Electromagnetic
   b. Not continuous, consists of short bursts or packets of electromagnetic energy known as photons. Each burst is a result of a specific alteration or change in a nucleus.
   c. Excited state to ground state.
   d. Number and energy of photons characteristic of the excited state of the given nucleus.

      Example: $^{60}CO \xrightarrow[5.26\ yrs]{} ^{60}Ni + \quad_{1.17\ mev} + \quad_{1.32\ mev}$

   e. Interaction
      1. 3-types-Photelectric effect, compton effect, pair production.
      2. Photoelectric effect

e. Life span reduction 1 to 1-1/2 percent for every 100 REM total dose over entire life.

2. Genetic
   a. Background -- 0.5% of all mutations (5 per 1,000).

F. ALARA Philosophy:

1. Maintain levels so that exposure to indivduals is kept as low as feasibly can be achieved using today's technology. Cost Prohibitive.

G. Background Radiation (Range 100-200 mrem/yr):

1.	Cosmic Rays	35 mrem/yr
2.	Local external sources	40 mrem/yr
3.	Internal sources	25 mrem/yr
		100 mrem/yr

1. Cosmic Rays
   a. Outer space -- energetic particles
2. Local external sources
   a. K-40, U, Th, and their daughters
   b. wood structure approximately 50 mrem/yr
      concrete " 70 mrem/yr
      brick " as much as 100 mrem/yr
3. Internal Sources
   a. K-40 predominant
4. Average chest X-ray
   a. 45 mrem/yr
5. Other sources
   a. Luminous dial — 2 mrem/hr -- radium dial
   b. Dental X-ray — 0.4 -- 10 REM
   c. Fluoroscopy — 15 REM/minute
   d. X-ray shoe fitting — 10 REM
6. Gallup Background -- 189 mrem/yr

III. RADIATION DETECTION

A. Instrumentation:

1. Train in the use of instruments on hand
2. Theory of operation

B. Dosimetry

IV. Radiological Control

A. Principal of control:

1. Time, distance and shielding

B. Work Area Rules:

1. If you've been issued a dosimeter wear it, properly, at all times when you're at work, or directed to do so.
2. Don't smoke, eat or drink inside processing buildings or labs with the exception of the control rooms and offices, if they are kept clean.
3. Wash your hands.
4. Cut or open sore; have it bandaged, report it to your supervisor.
5. Read and follow the radiation protection requirements in the Standard Operating Procedure (SOP) for the job you are doing.
6. Wear repirator whenever required by the SOP and when instructed to by the foreman in charge. Cloth is not satisfactory for most jobs.
7. Work safely; report any unusual or unsafe conditions.
8. Keep area dust free as possible, wash down often, and never sweep.
9. Always wear coveralls or other protective clothing.
10. Shower at the end of the day.

C. Respiratory Protection:

1. Filters YC out of the air plus other isotopes that may be present.
2. Demonstrate proper use.

D. Monitoring Program:

1. Air samples
2. TLD's
3. Radiation Surveys,
4. Visual Inspections

V. Exposure Control

A. Limits:

1. External Whole Body -------------------- 5 REM/yr
1.25 REM/qtr
(REM) Lifetime— 5(N-18) N=Age in years
2. Hands -------------------------------- 75 REM/yr
3. Skin -------------------------------- 30 REM/yr
4. Lungs -------------------------------- 15 REM/yr

B. ALARA:

1. Cleanliness, job planning, common sense

C. Notification and posting:

1. Fence and entrance posted
2. Informed by guard
3. Sources identified with warning labels.

D. Record Keeping:

1. Exposure determined from time cards; important that they are filled out correctly.
2. Exposure from TLD's - very low, usually zero or background.

E. Bioassay:

1. Urine Samples -- all personnel in YC processing and ore areas.
2. Frequency -- conducted semi-annually, could be changed.

VI. Importance of Radiological Control

A. Consequence of violations:

1. Loss of license -- most serious
2. Removal from job -- most serious to individual
3. Unwarranted exposure, needlessly -- most serious of all.

B. Job Planning:

1. Shortens job, lowers exposure.

C. Waste disposal:

1. Cleanliness -- keeps contamination down.

D. Decontamination:

1. Simple washing.

VII. ENVIRONMENTAL MONITORING

A. Water Samples:

1. Ground water wells
2. Surface water

B. Air Samples:

1. Perimeter

C. Radon Samples:

   1. Perimeter

D. Treated mine water:

   1. U removal and Ra removal -- result water release better than when removed from underground. Safe for all to drink.

APPENDIX K

APPENDIX K

MILL PHYSICAL SECURITY AND RELATED YELLOWCAKE HANDLING

inspecting the yellowcake packaging and storage areas to ensure the security of the facilities, i.e., that all fence gates and doors are secure. The Yellowcake Packager is not authorized to permit anyone to enter the area; access to the room must be authorized by mill production supervision.

There are four (4) keys to Door 167. Two (2) keys are kept in the General Manager's key cabinet, the third is kept by the Mill Foreman or in his absence, the Operations Superintendent. The fourth key is kept by the radiation officer so that he can enter and take his radiological samples per his schedule. During plant shutdown, the Mill Foreman's key is kept locked in the Operations Superintendent's desk. The change room adjacent to the yellowcake packaging room is for the exclusive use of the Yellowcake Packager.

The delivery of empty drums to the packaging facility is arranged through the Mill Foreman or the Surface Labor Foreman. The contacted foreman unlocks the fence gate and supervises the unloading, thus maintaining the security of the storage area. The fence gate is relocked at the completion of the unloading. Empty drums drums are not to be stacked within six (6) feet of the fence on either side in order to prevent a security breach of the fence.

There are three (3) keys to the yellowcake storage fence gate. Two (2) keys are kept in the General Manager's key cabinet and the other is kept by the Mill Foreman or in his absence, the Operations Superintendent. During plant shutdown, this key is locked in the Operations Superintendent's desk.

K2.2 Yellowcake Sampling

The Yellowcake Packager removes a sample scoop (30-40 grams) of yellowcake from each filled drum and places it in a sample vial. The sample vials are coded to identify the drum source by lot and

drum number. At the end of the shift, the following procedure is followed.

1. The Yellowcake Packager brings a list with numbers, and weights, as well as a sample for each drum packaged on that shift.

2. This list goes to the Operations Superintendent. He checks and records production, and brings the list to the Analytical Chemist. The Analytical Chemist makes a copy and gives the original to the Chief Mill Accountant.

3. The samples from each drum are brought to the yellowcake lab which is kept locked except when analyses are being run. The Operations Superintendent, Chief Chemist, Chief Metallurgist, Analytical and Control Chemists are the only personnel with a key to the yellowcake lab.

4. A ten (10) drum composite is made daily if possible. Once the composite is assayed, the individual drum samples are returned to the yellowcake packaging building by lab personnel. The operator dumps out the bottles into present production on the same day the samples are returned to him/her.

5. All other yellowcake samples are kept in the yellowcake lab storage until analyses are exchanged with the buyer and assay agreement is reached. The samples are then also taken and emptied into the present production.

K2.3 <u>Shipment Loading</u>

The following procedure describes the physical loading of a trailer van for shipment and the dispatch process from the security perspective.

I. Chief Mill Accountant provides a loading manifest (Figure K-2) to the Surface Labor Foreman which gives the necessary information to prepare the shipment. The information includes:

A. Consignee and Consignee Lot Number.

B. Shippers Lot Number.

C. Tare Weight of each drum by Drum Number.

D. Net Weight of each drum by Drum Number.

E. Gross Weight of Shipment.

F. Total number of drums to be shipped.

II. Preparation of the shipment begins with the Surface Labor Foreman assigning two or three men to a loading team with one individual designated as team leader and equipment operator who is responsible for the following procedures:

A. Locate, check out, and move barrel loader to yellowcake shipping area.

B. Unlocks gates, starts other team members stenciling and marking required shipping information on drums.

C. Checks out tractor, hooks up and inspects commercial van for major discrepancies which could present a hazardous condition for material in transit.

D. Moves trailer to yellowcake shipping area and parks at loading gate.

E. Inspects stenciling progress, checks all drums for leakage, re-tightens all drum L.D. clamps, strikes top of drum to observe leakage or "Puffing" of materials.

F. Re-inspects interior of van for holes, nails in floor or sides, sweeps, or cleans interior of van as required.

G. Prepares for loading by installing forward bulkheads, banking straps and/or such other bracing as necessary.

III. The Environmental Coordinator or Environmental Technician conducts a radiation survey of the empty trailer.

IV. Loading of yellowcake shipment begins after the team leader is satisfied that all preparatory steps have been completed:

A. Barrel loader operator available.

B. Hand truck operator in van.

C. Final ground inspection - ensures loading by numerical sequence.

D. Floor checker in van - re-checks drum number, marks off shipping manifest, assists with drum placement.

NOTE: See attached loading diagram in Figure K-3.

E. Drums are loaded to prevent drum lid overlap due to variation in types and sizes of drums.

F. Drums are loaded in such a manner, that lid clamping bolts are placed in the dead space area between drums.

G. Because of total weight of each drum, normal loads contain thirty-eight (38) to fifty (50) drums per shipment which creates special loading and blocking problems as this leaves dead space near the middle of the van.

H. Upon completion and re-check count of drums loaded, team leader completes final blocking, bulkheads, and safety banding before releasing other team members for re-assignment.

I. Team leader moves van from parking area, removes loader from yellowcake area, oversees tool and material clean-up, secures gates, and finally moves van to holding area to await commercial truck.

J. Team leader notifies Surface Labor Foreman or Leadman, who completes final count, security of loading area and security of load prior to shipment.

K. Surface Labor Foreman notifies the Chief Mill Accountant of expected completion time of loading. The Accounting Department arranges for prompt delivery of carrier pick-up tractor.

L. The loaded van receives radiation survey by the Environmental Coordinator or Environmental Technician.

M. In the event that loaded trailer cannot be dispatched until following day, it is parked within the fenced mill area until the common carrier driver arrives.

N. Upon final count and load inspection, the Surface Labor Foreman or Leadman attaches a drum list to one of the drums, closes van doors, applies a temporary lock and seal to van doors, and notifies the Chief Mill Accountant that yellowcake is ready for shipment.

O. The Environmental Coordinator or Environmental Technician and the Surface Labor Foreman complete the inspection blanks on the shipping manifest.

V. The common carrier driver, upon arrival, reports to the Chief Mill Accountant and the following procedure is activated:

A. The Driver is given a document package consisting of Bill of Lading, packing list, emergency instructions, and a numbered seal.

B. The Surface Labor Foreman or Leadman is informed so he can remove the temporary lock and seal.

C. The Driver inspects loaded shipment by counting drums against packing list, and inspects bulkheading.

D. The Driver accepts shipment by sealing van door with numbered seal, records seal number on Bill of Lading, and signs the Bill of Lading.

E. The Driver and shipment are escorted to Highway 566 by Surface Labor Foreman or Leadman. If the shipment is taken out after normal work hours, the loaded van is escorted by the roving security patrol.

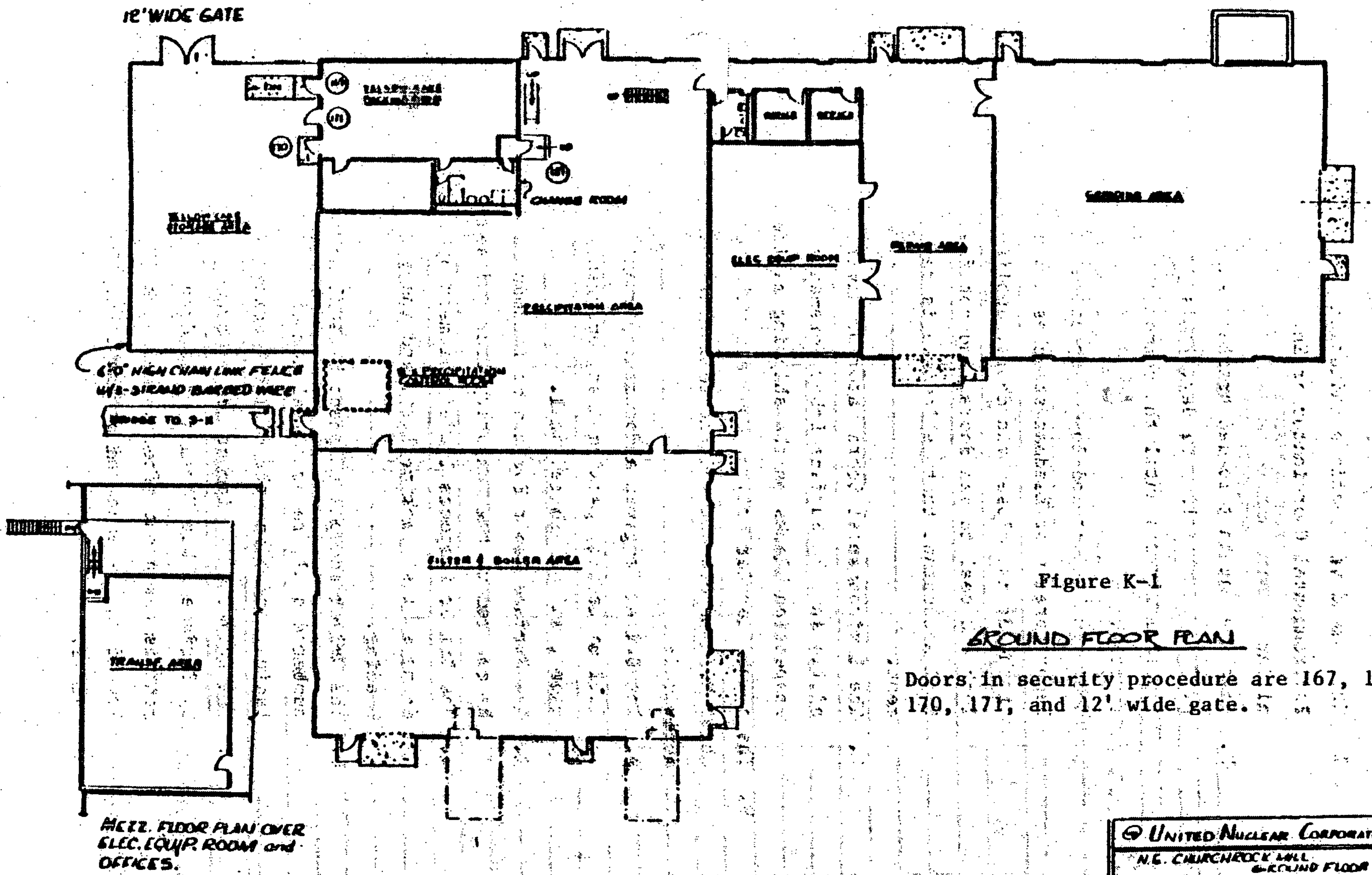


Figure K-1

GROUND FLOOR PLAN

Doors in security procedure are 167, 169, 170, 171, and 12' wide gate.

UNITED NUCLEAR CORPORATION

N.E. CHURCHROCK MILL GROUND FLOOR PLAN

PJF

Figure K-2

SHIPPING MANIFEST
UNITED NUCLEAR CORPORATION
CHURCHROCK MILL
P.O. BOX QQ, GALLUP, NEW MEXICO 87301

________ Date

Shippers Lot No. ________
Customer's Lot No. ________

Ship to: ________

Ship from: ________

Ship Via: ________
Truck Initial & Number: ________

P.O. Number: ________
Weight: ________

Drums: ________

URANIUM OXIDE

Lot No.: ________

Drum No.	Gross Weight	Tare Weight	Net Weight	Drum No.	Gross Weight	Tare Weight	Net Weight

Shipment Dispatched: ________ Time ________ Date

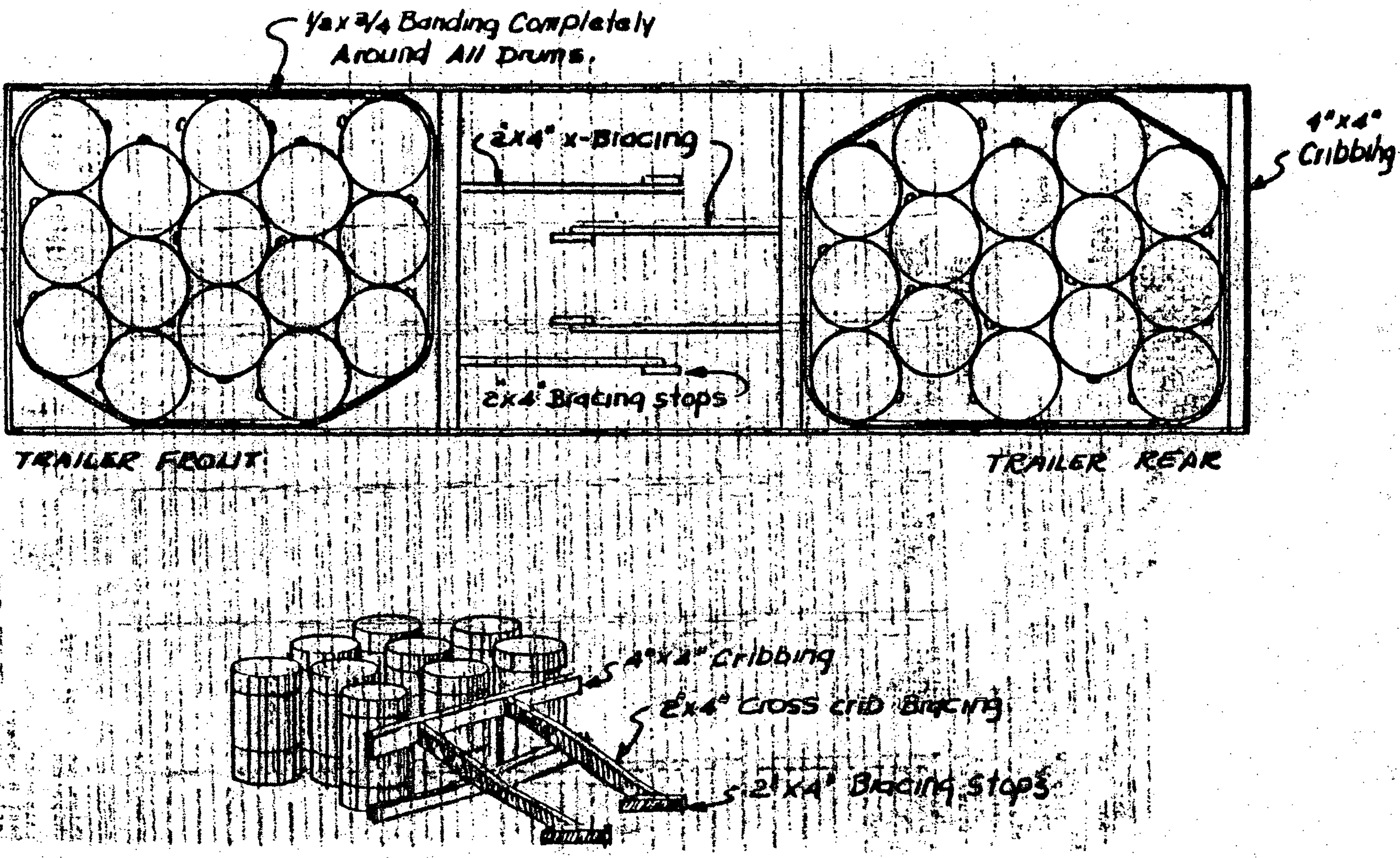
Radiation Inspection by: ________ Initials ________ Date

Seal Number: ________

Load Inspection by: ________ Initials ________ Date

Figure K-3

NORMAL LOADING CONFIGURATION FOR INTERSTATE SHIPPING



UNITED NUCLEAR CORP.
ALBQ. N.M.
PJF 3/5/79