WM-73

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

HEALTH PHYSICS MONITORING PLAN

UMTRA Project
Prime Contract No. DE-AC04-83AL18796

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UNITED STATES
DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

HEALTH PHYSICS MONITORING PLAN
TUBA CITY, ARIZONA SITE

Prepared by:

CHEM-NUCLEAR SYSTEMS, INC.
FOR MK-FERGUSON COMPANY
REMEDIAL ACTION CONTRACTOR

CONTRACT NO. DE-AC04-83AL18796

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1.0 INTRODUCTION

This Appendix I to the UMTRA Remedial Action Contractor (RAC) Health Physics Monitoring Plan comprises the Tuba City, Arizona site specific Health Physics Plan. Implementing methods and procedures are found in the RAC Health Physics Procedures manual.

The implementing procedures will be maintained by the Site Health Physics Manager or his designee, and will be available at the Tuba City field office.

All phases of this "Health Physics Monitoring Plan" are implemented by the Remedial Action Contractor (RAC) except for the non-operational water monitoring in Section 8.3. This portion is implemented by the Technical Assistant Contractor (TAC). A map of the Tuba City vicinity is shown in Figure 1.0.

2.0 TRAINING

2.1 Radiation Worker

All individuals who regularly enter a controlled area to perform work will receive radiation worker training as described in the RAC Health Physics Monitoring Plan. This training will be given on site by the Health Physics Manager or his designee. The Health Physics Manager will maintain the specific training procedure as well as individual training records. These records will be available at the Tuba City field office.

2.2 Industrial Safety

All individuals working on the Tuba City UMTRA Project shall periodically attend industrial safety indoctrination sessions. This training will be presented by the RAC Construction Safety and Health Manager or his designee. The RAC Site Manager will maintain documentation of these training sessions.

2.3 Health Physics Staff

The Health Physics Staff will meet the standards of the RAC Health and Safety Personnel Training Program. If not previously qualified, individuals will be trained and qualified by the site Health Physics Manager or Supervisor. The site Health Physics Manager will maintain training procedures and documentation regarding site Health Physics Staff. These records will be available for audit.

The anticipated organizational chart for Tuba City is included in Figure 2.0

3.0 ACCESS CONTROL

3.1 Boundary Establishment and Posting

Controlled areas shall be established for the mill site to protect the workers and the general public from unnecessary radiation exposure, and to prevent the spread of radioactive contamination. Controlled areas include, but are not limited to, any work areas which meet the following conditions:

Areas having significant quantities of surface soil contamination greater than 10 mCi Ra-226 total (approximately 40 cubic yards at 200 pCi/g).

The estimated external gamma dose to any individual in the work area may exceed 500 millirem/year (240 micro R/hr, 40 hours per week).

Airborne concentrations of radionuclides that may approach quantities provided in DOE Order 5480.1A, Attachment II.

Transferable surface contamination is likely to exceed 600 dpm per $100cm^2$ or total contamination (fixed and smearable) of 3300 dpm per $100cm^2$.

Initially, the site Health Physics Manager will establish access control areas as defined above. Periodic area exposure rate surveys will be required.

Access to these areas shall be controlled for people, vehicles, and equipment by barriers, ropes, signs or using other methods to prevent inadvertent exposure to contaminated material.

Smoking, drinking, chewing and eating are prohibited in controlled areas.

Controlled areas defined as above must be conspicuously marked at points of potential access with a sign or signs bearing the radiation caution symbol and the words:

CAUTION
RADIOACTIVE MATERIAL

All other applicable posting and labeling requirements set forth in 10 CFR 20 shall be followed.

3.2 Protective Clothing

Protective clothing requirements will be established by the site HP Manager on a case by case basis.

3.3 Respiratory Protection

Respiratory protection shall be required when airborne contamination projected exposure in an area may exceed 40 MPC hours per week. Training, and a determination of physical ability to wear a respirator is required, as defined in the RAC Respiratory Protection Procedure. The site HP manager shall make every effort to reduce personnel exposures to airborne radionuclides to levels as low as reasonably achievable.

3.4 Personnel Monitoring

All personnel shall thoroughly frisk for contamination each time they exit a controlled area. A rate meter with an audible alarm shall be utilized. Personnel shall be trained in self-monitoring by site HP staff during initial Health Physics Training.

3.5 Equipment Surveys

All equipment taken into a controlled area will be surveyed for contamination prior to release from the area. Any equipment having fixed or loose contamination levels exceeding free release limits as stated in RAC Contamination Control Procedure will be held for decontamination and resurvey. All trucks hauling contaminated material on public roads will be tarped and have a sealed tailgate to prevent spillage of contamination during transport. Surveys will be conducted as required by the health physics site manager.

3.6 Decontamination

Skin contamination will be removed by washing with luke warm water and mild soap. Contaminated equipment will be decontaminated by scraping, wire brushing, washing, etc. See RAC Decontamination of Personnel and Equipment Procedure for details.

4.0 DOSIMETRY AND BIOASSAY PROGRAMS

4.1 Thermoluminescent Dosimetry

Personnel requiring access to controlled areas for more than 120 hours in any three consecutive months shall be issued uniquely numbered thermoluminescent dosimeter badges (TLD's). Such personnel shall receive health physics indoctrination training as described in the RAC Health Physics Monitoring Plan. (Note: The Health Physics Manager may waive health physics indoctrination training for personnel with health physics backgrounds). Appropriate records shall be maintained by the Health Physics Manager. TLD's shall be issued daily and collected at the end of each shift by Health Physics. Appropriate control TLD's are required to determine contribution of background to accumulated dose.

Some key site personnel may be required to retain their TLDs for emergency response.

An individual under age 18 shall neither be employed in, nor allowed to enter, controlled areas.

TLD's will be exchanged and read quarterly by a properly qualified vendor.

4.2 Self Reading Dosimeters (SRD's)

Visitors may be issued SRD's prior to entry into radiologically controlled areas. A visitor log shall be maintained for personnel issued SRDs stating date, visitors name, social security number, time into controlled area, time out of controlled area, SRD reading in, SRD reading out, and total exposure received. The use of SRD's in general is not required, but is optional based on the site HP manager's evaluation of potential for measurable dose during a visit.

4.3 Bioassay Requirements

Prior to commencement of work in controlled areas and again upon completion of work or termination, radiation workers issued TLDs may be required to furnish specimens for analysis, as directed by the site HP Manager or his designee. Quantities of specimens shall be as established in the RAC Dosimetry Program Procedure.

Samples will be analyzed by a vendor for Ra-226, Th-230 and U-nat concentrations. Additional bioassay samples may be required on a quarterly basis for certain radiation workers, or if weekly average radionuclide air concentrations exceed any radionuclide MPC_a. Bioassay data may also be required upon worker termination, or transfer off the UMTRA Project. The need for additional bioassay will be determined by the Tuba City Health Physics Manager. In general, additional urinalysis will be required as per the following guideline:

- Th-230:
  - resample - 0.05 pCi/l
  - investigate work conditions - 0.1 pCi/l
  - prohibit employee from working in controlled areas - 0.2 pCi/l

- Ra-226
  - resample - 0.5 pCi/l
  - investigate work conditions - 0.7 pCi/l
  - prohibit employee from working in controlled areas - 1.0 pCi/l

- U-Nat
  - resample - 10 ug/l
  - investigate work conditions - 15 ug/l
  - prohibit employee from working in controlled areas - 30 ug/l

Other bioassay specimens, including fecal specimens, may be required as determined by the Site HP Manager.

The site HP Manager is responsible for review and action regarding Bioassay data, upon receipt. The Albuquerque EDV Manager and Operations Manager shall be immediately informed in writing whenever MK, CNSI, Subcontractor or other radiation workers are hired or terminated, in order to track bioassay sampling status. A permanent record of bioassay results shall be maintained. Samples and records shall be marked with unique identifications as per the RAC Systematic Sample Numbering System. Copies of all Tuba City staff and subcontractor bioassay records shall be forwarded to the CNSI/ALB EDV Manager each quarter.

4.4 Personnel Radon Monitoring

Where the potential exists for exposure of workers to significant concentrations of Rn-222 and its daughters, provision shall be made to monitor such exposure. Depending upon the anticipated exposure, one of the following monitoring procedures may be employed at the discretion of the site HP Manager: 1) Routine grab sampling for radon in close proximity to exposed workers; 2) Continuous monitoring with an Eberline RGM-2 or equivalent located in the immediate vicinity of exposed workers; 3) Use of Track Etch radon dosimeters, routinely worn by workers with maximum potential for radon exposure, and read on a quarterly basis. It is anticipated that worker annual average exposures approaching the limit of 30 pCi/l may be encountered at Tuba City. In such cases, monitoring for radon daughter exposures is also required.

5.0 INITIAL SURVEYS

5.1 Gamma Radiation Surveys (Surface)

Prior to demolition or excavation of the mill site and surrounding areas, a survey will be conducted with a gamma detection instrument to locate limits of contamination, and to identify potential health physics problems. Correlation to exposure rate is required to determine potential worker exposures. Health Physics procedures shall be utilized to generate and routinely check this correlation. Portable instruments used for this purpose must be routinely compared against a Pressurized Ion Chamber over the gamma exposure rate range of interest, if the USEPA (20 ur/hr) vicinity property standards are being verified. Otherwise, energy-compensated GM tube factory calibrations in ur/hr are acceptable, without routine PIC calibration in the field. Calibration curves shall be maintained, as well as calibration data. Delta-Gamma radium measurement and exposure rate measurement data collected prior to remedial action may be found in Tables 2.0 and 3.0, respectively.

5.2 Gamma Radiation Surveys (Borehole)

In addition to area surveys, areas with elevated gamma readings may be augered and boreholes logged using a gamma detection instrument coupled to a portable rate meter. Gamma measurements will be taken at 15 cm increments to estimate the contamination depth. All measurements will be recorded and borehole locations tied to the established grid system.

5.3 Gamma Radiation Surveys (Haul Roads)

Routes used for hauling excavated material from areas outside the mill site to the tailings pile will be gamma surveyed initially, and then routinely during transfer of material.

6.0 SURVEILLANCE AND RESPONSE DURING STABILIZATION

6.1 Exposure Rates

Calibrated, portable gamma detection instruments will be used to routinely measure area radiation exposure rates. Initial readings will be taken in the areas occupied by workers to characterize the gamma radiation field to which they are exposed. These readings will be recorded and submitted to the site Health Physics Manager. During demolition or excavation, area gamma radiation exposure rate surveys will be conducted on a routine basis specified by the Health Physics Manager. The frequency of these area surveys should be commensurate with anticipated significant changes in gamma exposure levels. Present exposure rates for the site are shown in Figure 3.0. Measured exposure rate data by location is presented in Table 3.0.

6.2 Air Samples

Area air samples will be taken in each designated area onsite with calibrated hi-volume air samplers at least twice per shift during excavation of large volumes of contaminated material as prescribed by the Health Physics Manager. Air samples will be counted with an alpha detection system capable of detecting gross alpha at 25% MPC_a for Th-230. Samples with at least 48-hour-decayed gross alpha activity in excess of the Th-230 MPC_a will be sent to an offsite laboratory for analysis for Th-230 and Ra-226.

Quarterly, all air sample filters from each sampling location shall be sent to an offsite laboratory as a group for composite analysis for Th-230, Ra-226, and gross alpha. The purpose of these analyses is to provide a record of potential airborne exposure for workers in specific areas.

Initially, solubility tests will be conducted to determine airborne radionuclide concentration limits. Worker protection against radioactive dusts shall be based on at least 48-hour decayed gross alpha results, conservatively assuming 100% of the count to be due to Th-230. After 10 or more hi-vol air samples have been analyzed by an independent laboratory, the Th-230/gross-alpha ratio established by these results may be used to control worker exposure to radioactive particulates. Records of the data and calculations used to establish this ratio shall be maintained by the site HP Manager. Samples shall be uniquely marked as per the RAC systematic sample numbering system. The Albuquerque Radiological Programs Manager shall be immediately notified when greater than 48 hour decayed air samples determined to be in excess of MPC_a (by onsite gross alpha) are found.

Whenever dust is generated within a controlled area, or whenever significant concentrations of airborne particulate or gaseous radionuclides are measured at the mill site, measures must be implemented to reduce such concentrations. For control of particulates, water sprays should routinely be applied to all areas potentially releasing radioactive dusts. In severe cases, including windstorms, advance planning to control release of radioactive dusts must be performed by the Site Manager. Measures such as covering of recently exposed, highly contaminated areas may be necessary to reduce the potential for radioactive dust release.

6.3 Contamination Surveys

Surveys of uncontrolled areas for loose contamination will be made by taking smears from floor areas, desk tops, etc., on a routine basis established by the Health Physics Manager. Loose alpha contamination exceeding 20 dpm/100sq cm will require decontamination of the area. Smears of loose contamination will be counted with alpha, and/or beta-gamma detection systems capable of detecting gross alpha and beta-gamma below levels for unrestricted release. Routine smears will be taken in eating areas, lab areas, access control, office areas, and on permanent support equipment.

6.4 Working Level Surveys

Working level measurements will be required when significant worker exposure is possible, in the judgment of the HP Manager.

Working levels will be measured by taking air samples and analyzing for radon daughters using a modified Kusnetz method, or by using Eberline WLM-1's or equivalent. Working level measurements will also be taken prior to remedial action in any poorly ventilated building.

7.0 EXCAVATION CONTROL

7.1 Gamma Radiation Scans

During excavation at Tuba City, health physics personnel will employ portable detectors to locate residual tailings material by gamma-ray emissions. Where gamma radiation levels due to interfering tailings material are excessive, shielded detectors or other methods, such as OCS soil sampling, shall be employed to guide excavation. Background Ra-226 concentrations are presented in Figure 5.0.

7.2 Soil Sampling

Where analysis of the Ra-226 concentration of soil samples is required to demonstrate compliance with USEPA, USDOE or USNRC standards, either the Opposed Crystal System (OCS) gamma spectrometer or independent analysis by an approved vendor, is acceptable. If Th-230 or other soil analysis is required, it shall be performed using approved onsite equipment, or by an approved vendor. An approved fraction of all soil samples shall be sent offsite for laboratory analysis for quality control purposes and for more detailed chemical analyses as required.

Soil Sampling procedures for verification shall be as per RAC health physics procedures based on the "Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings Site at Tuba City, Arizona." The design excavation plan is shown in Figure 4.0.

7.3 Post-Excavation Gamma Radiation Scans

Hauling routes, entry paths, and access points will be routinely spot-surveyed as directed by the site HP Manager with a gamma detector to ensure that transfer of contaminated material is being done in a controlled manner. This data will be compared to initial survey readings, at the completion of decontamination.

8.0 ENVIRONMENTAL MONITORING

8.1 Airborne Particulate Monitoring

Continuous air particulate sampling is required at points around the site boundary during periods of major activity. This requirement applies to piles being stabilized in place where large volumes of contaminated soils (10 mCi of Ra-226) or more are present and the potential exists for measurable increases in airborne radioactivity. Gross activity measurements shall be compared to the DOE Order 5480.1A, Attachment II, limit for Th-230. Continuous air particulate sampling will be required at five Tuba City locations: in the vicinities of the community of Tuba City (background); the village of Moenkopi; one mile northeast of the millsite near US Highway 160 (downwind); near the southwest millsite boundary; and at the site facitlities trailer area. Locations are identified on Figure 6 and shall be utilized as closely as practical. The site HP Manager in conjunction with the MK-F Site Manager will make arrangements with local residents and officials to locate the offsite monitors.

Sampling will commence at least 1 month prior to major onsite remedial action construction activities, will continue through major remedial action, and may be discontinued during winter shut down or completion of remedial action. Prior to any shut down, provision must be made to minimize windblown radioactive dust release. Table 1.0 lists the wind distribution frequencies for the Tuba City area.

Samples and records shall be marked with the RAC systematic sampling numbering system. At least 48 hours decay prior to counting shall be employed to exclude radon daughters when gross alpha analysis is performed. Samples exceeding applicable gross alpha activity after decay shall be sent to an offsite vendor for Th-230, Ra-226 isotopic and gross alpha analyses.

The RAC EDV Manager or designee shall be immediately notified when offsite or site boundary gross alpha analyses exceed applicable MPCa 10CFR20 Table 1 column II values. Air sampling and counting equipment shall be operated at an MDA (minimum detectable activity) averaging no higher that 25% of the most restrictive MPC_a (Th-230), unless specific approval to operate temporarily at a higher MDA is received from the RAC Radiological Programs Manager.

The set of air filters from each continuous monitor location shall be sent to an offsite vendor for compositing and analysis for Th-230, Ra-226, and gross alpha average air concentrations. Composite frequencies will be the same as those outlined in Section 6.2 of this plan.

8.2 Radon Monitoring

Mill site boundary radon monitoring is required. Real time (RGM or equivalent type) radon monitors will be placed in the vicinities of the community of Tuba City (background), at the site facilities trailer area, and one mile northeast of the mill site near US Highway 160. In addition, Track-Etch cups (2 per location) will be placed at each of the RGM locations and at the village of Moenkopi, the west, northeast, southeast (3 stations) and south property perimeter fencelines and immediately southwest of Greasewood Lake. Locations are identified on Figure 6.0 and shall be utilized as closely as practical. Track-Etch cups will be changed out on a quarterly basis during the construction season and data made available within approximately six weeks after change-out.

Modification of remedial activities to reduce Rn levels is necessary if results near the property perimeter fence exceed an average of 3 pCi/l weekly. For areas meeting or exceeding the above criteria, an initial, downwind measurement for radon should be taken following initial exposure of large quantities of contaminated material. If no significant Rn activity above background is found, radon concentrations downwind should be occasionally measured by grab sampling. If significant Rn activity is determined to exist as a result of remedial action, more frequent monitoring will be necessary, at a frequency to be determined by the Tuba City HP Manager. Environmental air monitoring locations are shown in Figure 6.0.

8.3 Water Monitoring

If significant dewatering is required at the site or surrounding area potentially contaminated water produced as a result of remedial activities will be analyzed for Th-230 and Ra-226 as necessary, prior to release off-site from the work area. On a quarterly basis during operations, Ra-226 and Th-230 analyses shall be required on water from any natural drainages associated with the mill site. This sampling is performed by the RAC.

The following groundwater monitoring program will be performed by the Technical Assistance Contractor.

A. Wells to be sampled:

Well I.D.	Location	Depth of Screened Internal (Ft.)	Formation
908	200 Ft. West of Ponds	52-67	Navajo Sandstone
909	600 Ft. South of Ponds	62-77	Navajo Sandstone
910	3,000 Ft. North of Pile	97-197	Navajo Sandstone
912	200 Ft. West of Ponds	123-163	Navajo Sandstone
913	200 Ft. West of Ponds	331-371	Navajo Sandstone

Monitoring wells 910 and 913 will monitor background concentrations for the Navajo Sandstone.

Monitoring wells 908, 909, and 912 will monitor contaminant concentrations in the Navajo Sandstone.

B. Frequency of Sampling:

Every six months, beginning at the start of remedial action, until remedial action is complete.

C. Analyses/Measurements

1. Field: ph, alkalinity, electrical conductance, temperature, water level.

2. Laboratory: Ca, Mg, Na, K, Cl, SO_4, NO_3, TDS, Fe, Mn, As, Cd, Mo, Se, U, Ra-226, Ra-228.

All wells with the exception of wells 906 and 907, shall be kept intact during and after remedial action as they may be sampled as part of the surveillance and maintenance plan. Wells 906 and 907 shall be abandoned by the RAC during remedial action. Well locations are shown on Figure 7.0.

REFERENCES

1. Engineering Assessment of Inactive Uranium Mill Tailings, Tuba City, Arizona; September 1981, Ford, Bacon, and Davis, Utah Inc.

2. Environmental Assessment-Remedial Action at the Tuba City Uranium Mill Tailings Site; Tuba City, Arizona; November 1986, DOE/EA-0317).

3. UMTRA Project Environmental Health and Safety Plan, August 1985, UMTRA-DOE/AL-150224.006 US DOE.

4. Title 10, Code of Federal Regulations, Part 20.

5. Draft Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings site at Tuba City, Arizona, December 1985.

6. Remedial Action Contractor Health Physics Monitoring Plan, April 1985 M-K/UMTRA-3.

7. Title 40, Code of Federal Regulations, Part 192.

8. Radiological Characterization of the Tuba City, Arizona Uranium Mill Tailings Remedial Action Site, Bendix Field Engineering Corporation, Grand Junction, Colorado, September 1984, GJ-33.

9. US DOE 5480.1A Environmental Protection, Safety, and Health Protection Program for DOE operations.

Table 1.0
Wind Information for Tuba City*

Direction (from)	Frequency of occurrence (%)	Average speed (mph)
N	3.5	8.1
NNE	1.4	6.7
NE	1.5	6.7
ENE	1.9	6.9
E	5.6	8.0
ESE	8.3	8.3
SE	6.3	7.5
SSE	2.9	7.9
S	6.9	11.1
SSW	7.4	12.6
SW	14.2	12.8
WSW	9.4	12.0
W	5.8	10.1
WNW	3.9	9.9
NW	4.4	10.1
NNW	3.3	10.0
Calm	13.3	--
Overall	100.0	8.8

* Information obtained from Winslow, Arizona NWS (Ref.2)

Table 2.0
Delta-Gamma Radium Measurement Data

Table 2.0 presents results of the pre-remedial in-situ delta-gamma radium measurements. The two-standard-deviation (2 σ) error reported in this table reflects only the uncertainty in the counting statistics; it does not include errors introduced through the use of a calibration factor and three correction factors.

An illustration of the grid coordinate system used for data in Tables 2.0 and 3.0 is shown below.

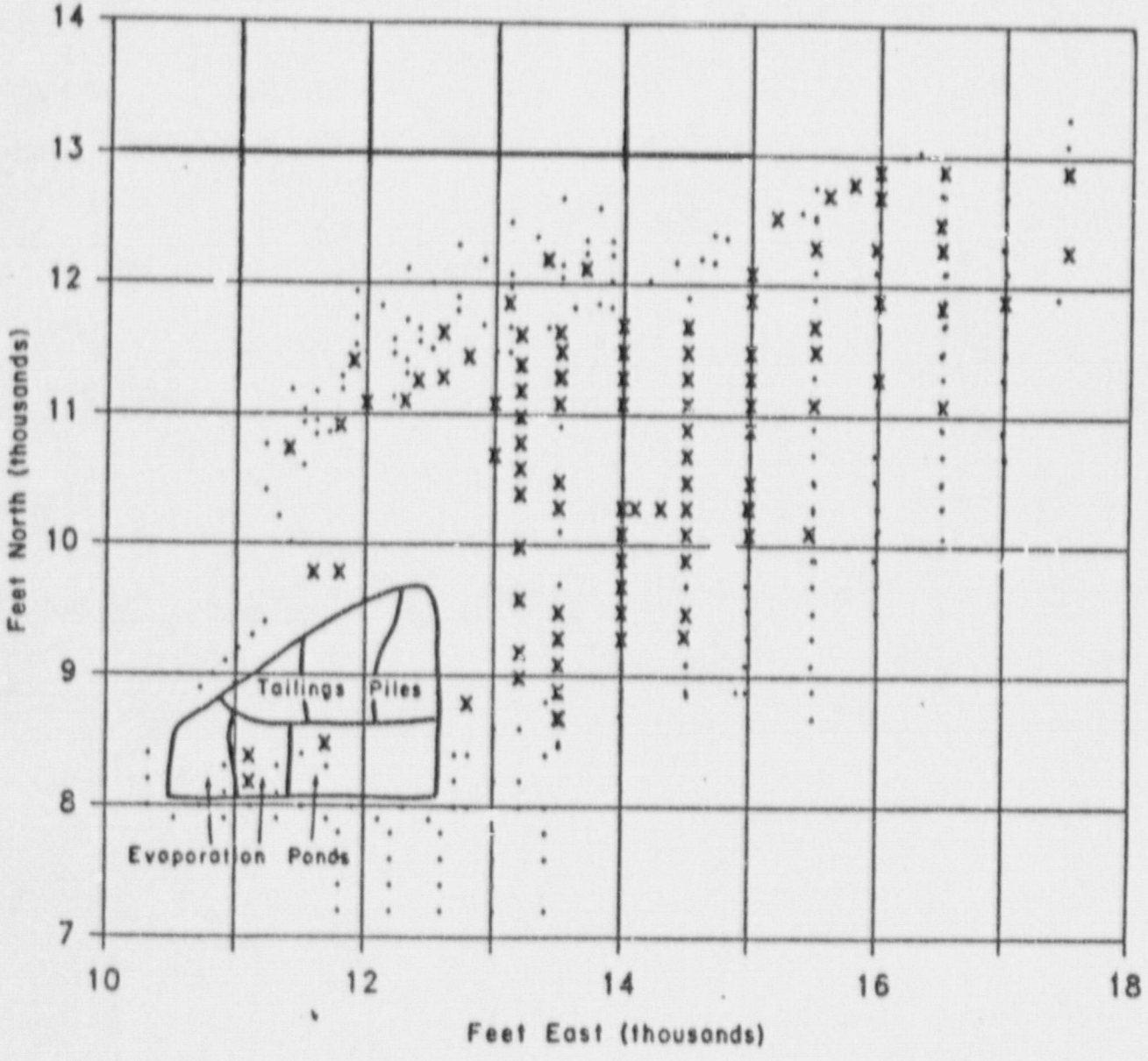

Table 2.0 (continued)

In-Situ Delta-Gamma Radium Measurement Results

Coordinates North	Coordinates East	Depth (in.)	eRa-226 (pCi/g)
13300	17500	0	2.1 ± 1.0
13300	17504	0	2.3 ± 1.1
13100	17000	0	4.2 ± 1.1
13100	17000	6	0.3 ± 0.8
13094	17488	0	2.6 ± 1.1
13087	16995	0	2.7 ± 1.1
13087	16995	6	1.4 ± 1.0
13030	16300	6	3.8 ± 1.3
12991	16200	6	3.6 ± 1.5
12900	16500	0	5.1 ± 1.2
12900	16500	6	0.3 ± 1.0
12900	16993	0	2.3 ± 0.8
12900	17000	0	2.0 ± 1.1
12900	17500	0	6.1 ± 1.4
12900	17500	6	2.1 ± 1.2
12895	16000	6	10.3 ± 2.4
12895	16000	12	1.8 ± 1.8
12797	15800	6	5.6 ± 2.0
12742	15500	6	1.0 ± 1.5
12708	15600	6	5.2 ± 2.3
12705	16474	0	5.0 ± 1.7
12705	16474	6	1.4 ± 1.4
12700	16000	0	6.4 ± 1.2
12700	16500	0	1.1 ± 1.4
12700	17000	0	2.0 ± 0.9
12690	17004	0	2.3 ± 1.0
12646	13500	0	1.8 ± 0.9
12581	13800	0	1.5 ± 0.9
12554	15400	6	2.6 ± 1.5
12531	15200	6	6.4 ± 1.9
12526	15500	6	0.8 ± 1.1
12500	15500	0	4.3 ± 1.3
12500	15500	6	2.4 ± 1.2
12500	16000	0	4.5 ± 1.2
12500	16500	0	1.5 ± 1.0
12500	17000	0	3.2 ± 1.0
12500	17000	6	0.7 ± 0.9
12493	16469	0	6.4 ± 1.6
12493	16469	0	6.0 ± 1.2
12493	16469	6	2.0 ± 1.5
12493	16469	6	1.8 ± 1.1
12468	13100	0	2.0 ± 1.0
12384	14700	6	* 0.6
12375	15000	6	* 1.4
12357	13300	0	0.7 ± 0.9
12357	14800	6	4.4 ± 2.3
12336	13700	0	2.8 ± 0.9
12336	13700	6	0.6 ± 0.8
12326	13900	0	3.0 ± 1.4
12308	15500	0	17.0 ± 1.8
12300	15500	6	2.3 ± 1.2
12300	15970	0	6.4 ± 1.4
12300	16000	0	2.1 ± 1.2
12300	16483	0	8.7 ± 1.3
12300	16483	6	1.1 ± 1.1
12300	16500	0	2.0 ± 1.0
12300	16973	0	4.8 ± 1.1
12300	16973	6	0.5 ± 0.6
12300	17000	0	2.5 ± 1.0
12290	17500	0	5.2 ± 1.2
12289	12700	0	1.2 ± 0.9
12236	13700	0	3.4 ± 1.1
12236	13700	6	1.6 ± 1.0
12223	13900	0	3.1 ± 1.1

*There is at least 95 percent confidence that the true value is less than the measurement reported.

Table 2.0 (continued)

Coordinates North	Coordinates East	Depth (in.)	eRa-226 (pCi/g)
12223	13900	6	1.4 ± 1.1
12202	13400	0	6.0 ± 1.4
12202	13400	6	1.3 ± 0.8
12200	14600	6	2.9 ± 2.1
12179	12900	0	1.2 ± 1.1
12171	14400	6	4.1 ± 1.9
12171	14700	6	2.2 ± 1.2
12147	13500	0	1.5 ± 0.8
12136	13700	0	5.2 ± 1.2
12136	13700	6	1.7 ± 1.1
12114	17008	0	2.8 ± 1.0
12114	17008	6	1.3 ± 0.9
12110	12300	0	1.9 ± 1.2
12110	16521	0	4.5 ± 1.5
12110	16521	6	1.9 ± 1.0
12110	16521	6	0.7 ± 1.1
12100	15000	0	5.9 ± 1.9
12100	15000	6	1.1 ± 1.0
12100	15500	0	3.4 ± 1.3
12100	15500	6	1.2 ± 0.8
12100	15969	0	4.6 ± 1.3
12100	16000	0	2.1 ± 1.1
12100	16500	0	1.1 ± 1.4
12100	17000	0	2.3 ± 1.0
12082	14000	6	4.8 ± 2.3
12068	13100	0	3.6 ± 1.1
12068	13100	6	1.0 ± 0.9
12047	13500	0	3.1 ± 1.4
12047	13500	6	1.4 ± 0.9
12028	14200	6	2.4 ± 1.3
12026	13900	6	1.2 ± 1.3
11999	12500	0	1.4 ± 1.3
11968	13100	0	4.8 ± 1.3
11968	13100	0	5.0 ± 1.0
11968	13100	0	3.0 ± 0.9
11968	13100	6	1.6 ± 1.1
11930	11900	0	2.8 ± 1.2
11915	17425	0	5.0 ± 1.1
11915	17425	6	2.4 ± 1.0
11903	17000	0	5.9 ± 1.2
11903	17000	6	0.6 ± 0.9
11900	14500	0	4.4 ± 1.9
11900	14500	6	1.9 ± 1.1
11900	15000	0	5.5 ± 2.0
11900	15000	6	1.0 ± 1.3
11900	15500	0	5.0 ± 1.4
11900	15500	6	2.3 ± 0.8
11900	16000	0	5.2 ± 1.2
11900	16500	0	3.7 ± 1.5
11889	12700	0	3.7 ± 1.4
11889	12700	6	1.4 ± 0.9
11868	13100	0	8.3 ± 1.4
11868	13100	6	7.3 ± 1.4
11868	13100	6	7.3 ± 1.4
11868	13100	12	5.1 ± 1.6
11868	13100	12	7.1 ± 1.5
11868	13100	18	3.3 ± 1.4
11868	13100	24	2.5 ± 1.4
11850	16492	0	7.4 ± 1.6
11850	16492	6	2.0 ± 0.9
11850	16492	6	* 1.3
11849	13800	6	2.4 ± 1.3
11823	13900	6	3.7 ± 1.8
11823	13900	12	1.1 ± 1.5
11820	12100	0	2.2 ± 1.4
11816	13600	6	2.7 ± 1.1
11789	12700	0	1.6 ± 0.9
11730	11900	0	4.9 ± 1.5
11730	11900	6	1.7 ± 1.2
11713	16516	0	4.3 ± 1.1
11713	16516	6	1.6 ± 1.0
11713	16516	6	1.5 ± 1.0
11710	12300	0	3.8 ± 1.1
11710	12300	6	0.9 ± 0.8
11700	14000	0	13.1 ± 2.2
11700	14500	0	11.1 ± 2.5
11700	14500	6	* 0.1
11700	15000	0	4.9 ± 1.2
11700	15000	6	0.6 ± 1.0
11700	15500	0	6.7 ± 1.4
11700	15500	6	1.9 ± 0.9
11700	16000	0	3.6 ± 1.2
11700	16000	6	1.2 ± 0.9
11700	16500	0	0.8 ± 1.0
11700	17000	0	2.9 ± 0.8
11700	17000	6	0.8 ± 1.0
11678	12900	6	2.2 ± 1.3
11668	13100	6	3.2 ± 1.9
11659	13400	6	0.5 ± 1.1
11654	12400	0	3.0 ± 1.3

*There is at least 95 percent confidence that the true value is less than the measurement reported.

Table 2.0 (continued)

Coordinates North	Coordinates East	Depth (in.)	eRa-226 (pCi/g)
11650	13500	0	5.3 ± 1.1
11644	12600	6	5.4 ± 1.1
11644	12600	12	3.5 ± 1.2
11644	12600	12	3.5 ± 1.5
11629	13200	6	8.2 ± 2.5
11565	12200	6	2.8 ± 1.2
11565	12200	6	0.4 ± 1.2
11554	12400	6	2.7 ± 1.1
11530	11900	0	2.1 ± 1.0
11512	15511	0	11.7 ± 1.3
11512	15511	6	2.4 ± 1.2
11500	13500	0	4.8 ± 1.1
11500	13500	6	1.6 ± 1.4
11500	13515	0	28.5 ± 1.8
11500	14000	0	17.0 ± 2.8
11500	14500	0	13.2 ± 2.7
11500	14500	6	2.5 ± 1.1
11500	15000	0	11.7 ± 1.8
11500	15000	0	10.1 ± 2.4
11500	15000	6	1.1 ± 1.4
11500	15500	0	2.4 ± 1.0
11500	15500	6	0.6 ± 0.7
11500	16000	0	3.9 ± 1.5
11500	16000	0	3.0 ± 1.4
11500	16000	6	1.2 ± 1.2
11500	16500	0	1.8 ± 1.4
11500	17000	0	2.4 ± 1.0
11499	12500	6	1.0 ± 1.4
11489	17005	0	1.9 ± 1.1
11481	16481	0	4.4 ± 1.5
11481	16481	6	2.3 ± 1.3
11478	13000	6	4.5 ± 1.8
11478	16488	6	1.4 ± 0.8
11476	13100	6	2.4 ± 1.6
11465	13200	6	0.9 ± 1.1
11458	12800	6	21.4 ± 3.2
11458	12800	12	5.2 ± 2.0
11458	12800	18	2.3 ± 1.5
11430	11900	0	6.7 ± 1.6
11430	11900	0	5.9 ± 1.5
11410	12300	6	1.1 ± 1.8
11400	13200	0	11.4 ± 2.0
11400	13200	6	1.2 ± 1.0
11310	12300	6	1.7 ± 1.6
11310	13510	0	15.8 ± 2.2
11310	16008	0	4.1 ± 1.5
11300	13500	0	13.1 ± 2.1
11300	13500	6	2.0 ± 1.5
11300	14000	0	28.1 ± 3.3
11300	14000	12	0.5 ± 0.7
11300	14500	0	22.9 ± 2.9
11300	14500	6	0.5 ± 1.0
11300	15000	0	10.9 ± 1.8
11300	15000	6	1.2 ± 1.1
11300	15500	0	3.8 ± 1.3
11300	15500	6	1.5 ± 0.8
11300	16000	0	• 0.6
11300	16000	0	7.2 ± 1.7
11300	16000	6	0.8 ± 1.4
11300	16500	0	4.0 ± 1.1
11300	16500	6	2.7 ± 1.0
11300	16500	6	1.5 ± 1.0
11300	16978	0	2.9 ± 0.8
11300	16978	6	1.6 ± 1.0
11300	17000	0	2.5 ± 1.1
11299	12600	6	11.0 ± 3.3
11299	12600	12	3.6 ± 2.2
11286	11800	6	1.0 ± 1.0
11278	12400	6	9.8 ± 3.7
11278	12400	12	8.7 ± 2.5
11200	13200	0	11.3 ± 2.4
11200	13200	6	1.5 ± 1.2
11186	11800	6	2.7 ± 1.8
11180	11400	0	3.0 ± 1.3
11170	11600	6	1.7 ± 1.0
11128	12200	6	2.6 ± 2.5
11125	16000	0	4.5 ± 1.2
11125	16000	0	3.5 ± 1.4
11125	16000	6	1.6 ± 1.1
11122	12300	6	11.2 ± 2.0
11122	12300	12	2.1 ± 1.6
11107	12000	6	8.8 ± 4.2
11107	12000	12	10.7 ± 2.8
11107	12000	18	8.7 ± 2.5
11100	13000	0	14.4 ± 2.5
11100	13000	6	0.8 ± 0.9
11100	13500	0	16.8 ± 2.3
11100	13500	6	1.3 ± 1.0
11100	14000	0	19.3 ± 3.3
11100	14000	12	• 0.1

*There is at least 95 percent confidence that the true value is less than the measurement reported.

Table 2.0 (continued)

Coordinates North	Coordinates East	Depth (in.)	eRa-226 (pCi/g)
11100	14500	0	7.8 ± 2.4
11100	14500	6	0.8 ± 0.9
11100	15000	0	9.3 ± 1.9
11100	15000	6	1.5 ± 1.1
11100	15500	0	7.8 ± 1.2
11100	15500	6	1.1 ± 0.9
11100	16000	0	2.1 ± 1.1
11100	16000	0	3.8 ± 1.3
11100	16500	0	6.5 ± 1.5
11100	16500	6	1.7 ± 1.4
11100	16500	6	1.5 ± 0.8
11100	17000	0	3.3 ± 1.0
11100	17000	6	0.7 ± 1.0
11025	11500	6	1.7 ± 1.3
11000	13200	0	23.1 ± 2.8
11000	13200	6	1.6 ± 1.3
10942	11600	6	1.9 ± 2.7
10929	11800	6	5.8 ± 2.3
10925	11500	6	* 1.2
10911	16490	0	4.4 ± 1.1
10911	16490	6	1.8 ± 1.0
10911	16490	6	1.3 ± 1.0
10900	13500	6	1.1 ± 1.0
10900	14000	6	0.7 ± 1.0
10900	14500	0	16.8 ± 2.9
10900	14500	6	3.5 ± 1.7
10900	14500	12	1.5 ± 0.9
10900	15000	0	7.6 ± 2.0
10900	15000	6	1.3 ± 1.1
10900	15500	0	4.7 ± 1.3
10900	15500	6	1.6 ± 0.8
10900	16000	0	3.9 ± 1.1
10900	16000	6	4.5 ± 1.4
10900	16000	6	2.3 ± 1.2
10900	16000	12	0.5 ± 1.2
10900	16500	0	2.8 ± 1.1
10900	17000	0	1.6 ± 1.0
10883	16982	0	1.5 ± 1.0
10855	11700	6	0.3 ± 1.2
10835	11600	6	3.7 ± 1.6
10835	11600	6	4.1 ± 2.0
10800	13200	0	69.3 ± 4.6
10800	13200	6	3.2 ± 2.0
10800	13200	12	0.9 ± 1.0
10756	11200	6	* 0.5
10751	11400	6	7.2 ± 1.2
10700	13000	0	22.2 ± 3.4
10700	13000	6	1.4 ± 1.0
10700	14000	6	1.9 ± 1.0
10700	14500	0	16.6 ± 2.7
10700	14500	6	2.1 ± 1.3
10700	15000	0	4.8 ± 1.8
10700	15000	6	2.0 ± 1.3
10700	15000	12	1.6 ± 1.1
10700	15000	18	0.5 ± 1.3
10700	15500	0	4.6 ± 1.2
10700	15500	6	2.0 ± 0.8
10700	15979	0	4.2 ± 1.4
10700	15979	6	0.5 ± 1.2
10700	15979	6	2.1 ± 1.0
10700	16000	0	3.3 ± 1.4
10700	16000	6	1.0 ± 1.0
10700	16500	0	3.7 ± 1.4
10700	16500	6	1.1 ± 0.8
10700	16500	6	* 1.0
10700	17000	0	* 0.1
10686	17009	0	0.7 ± 0.9
10600	11500	6	1.1 ± 1.2
10600	13200	0	104.6 ± 5.8
10505	15979	0	2.2 ± 1.3
10505	15979	6	* 0.2
10500	13500	6	17.8 ± 5.9
10500	13500	12	8.4 ± 3.8
10500	13500	18	* 0.8
10500	14000	6	1.4 ± 1.3
10500	14500	0	7.4 ± 2.2
10500	14500	6	2.0 ± 1.3
10500	15000	0	9.0 ± 1.6
10500	15000	6	1.9 ± 1.4
10500	15500	0	2.0 ± 1.2
10500	15500	6	2.0 ± 1.1
10500	16000	0	3.3 ± 1.3
10500	16000	6	* 0.8
10500	16000	6	1.0 ± 1.0
10500	16500	0	1.1 ± 1.0
10482	15508	0	3.3 ± 1.2
10480	16496	0	0.9 ± 0.8
10400	11200	6	1.6 ± 1.1
10400	13200	0	205.5 ± 7.4
10400	13200	6	9.0 ± 2.5

*There is at least 95 percent confidence that the true value is less than the measurement reported.

Table 2.0 (continued)

Coordinates North	Coordinates East	Depth (in.)	eRa-226 (pCi/g)
10400	13200	12	1.9 ± 1.5
10313	16513	0	1.9 ± 0.9
10310	14985	0	14.3 ± 1.8
10310	14985	6	5.5 ± 1.5
10300	13500	0	138.0 ± 6.8
10300	14000	0	19.6 ± 2.5
10300	14000	6	1.0 ± 1.1
10300	14100	0	17.3 ± 2.4
10300	14300	0	7.0 ± 1.9
10300	14500	0	6.1 ± 1.4
10300	14500	6	1.1 ± 1.1
10300	15000	0	6.2 ± 1.4
10300	15000	6	1.6 ± 1.0
10300	15000	6	2.0 ± 1.0
10300	15500	0	2.9 ± 0.9
10300	16000	0	3.6 ± 0.9
10300	16000	6	0.9 ± 0.9
10300	16500	0	0.2 ± 0.8
10294	16008	0	4.0 ± 1.5
10294	16008	6	1.0 ± 1.0
10270	15500	0	3.4 ± 1.0
10270	15500	6	2.3 ± 1.1
10200	11300	6	0.2 ± 0.9
10130	16011	0	0.9 ± 1.0
10114	15474	0	4.3 ± 1.2
10114	15474	6	5.2 ± 1.3
10114	15474	12	2.3 ± 1.2
10100	13500	6	1.9 ± 1.3
10100	14000	0	11.9 ± 2.9
10100	14500	0	6.9 ± 1.6
10100	15000	0	6.1 ± 1.5
10100	15000	6	1.3 ± 1.2
10100	15500	0	1.5 ± 1.1
10100	16000	0	0.7 ± 0.8
10070	16510	0	3.2 ± 1.0
10070	16510	6	2.2 ± 1.0
10000	11400	6	1.0 ± 0.8
10000	13200	0	338.7 ± 8.8
10000	13200	6	235.2 ± 9.0
10000	13200	12	14.7 ± 7.3
10000	13200	18	2.8 ± 2.5
9900	14000	0	24.1 ± 3.1
9900	14000	6	0.4 ± 0.9
9900	14500	0	7.6 ± 1.5
9900	14500	6	0.1 ± 0.7
9900	15000	0	3.8 ± 1.2
9900	15000	6	1.0 ± 1.0
9900	15500	0	2.5 ± 1.0
9900	15977	0	0.7 ± 0.8
9900	16000	0	0.8 ± 1.0
9896	15524	0	1.3 ± 0.8
9800	11600	6	8.1 ± 2.2
9800	11600	12	5.4 ± 1.5
9800	11600	18	3.5 ± 1.4
9800	11800	12	43.2 ± 2.9
9712	16002	0	1.7 ± 0.9
9700	13500	6	1.6 ± 1.4
9700	14000	0	13.6 ± 2.0
9700	14000	6	1.1 ± 0.9
9700	14500	0	3.0 ± 1.2
9700	14970	0	3.4 ± 1.1
9700	15000	0	4.2 ± 1.3
9700	15000	6	0.8 ± 0.9
9700	15500	0	1.4 ± 0.8
9700	16000	0	1.8 ± 1.1
9686	14503	0	4.3 ± 1.3
9600	13200	0	96.4 ± 5.4
9600	13200	6	7.0 ± 1.7
9600	13200	12	2.8 ± 1.1
9508	14987	0	3.1 ± 1.3
9508	14987	6	0.3 ± 1.1
9500	13500	0	14.9 ± 3.0
9500	14000	0	5.7 ± 1.4
9500	14500	0	4.0 ± 1.3
9500	15000	0	2.1 ± 1.2
9500	16000	0	0.8 ± 1.0
9492	14505	0	5.5 ± 1.3
9491	15505	0	1.4 ± 0.8
9400	11200	6	0.9 ± 0.6
9325	14490	0	5.4 ± 1.3
9300	11100	6	1.6 ± 0.8
9300	13500	0	9.4 ± 2.6
9300	13500	6	2.9 ± 1.7
9300	13500	12	1.7 ± 1.1
9300	14000	0	5.7 ± 1.5
9300	14000	6	1.1 ± 1.1
9300	14500	0	4.2 ± 1.2
9300	14988	0	0.4 ± 0.8
9300	15000	0	0.1 ± 0.9
9300	15000	6	* 0.9

*There is at least 95 percent confidence that the true value is less than the measurement reported.

Table 2.0 (continued)

Coordinates North	Coordinates East	Depth (in.)	eRa-226 (pCi/g)
9200	11000	6	0.7 ± 0.6
9200	13200	0	46.7 ± 4.0
9200	13200	6	6.8 ± 1.7
9200	13200	12	1.5 ± 1.1
9100	10900	6	1.9 ± 1.0
9100	13500	0	11.3 ± 2.5
9100	13500	6	2.8 ± 1.5
9100	13500	12	0.5 ± 0.9
9100	14000	0	3.7 ± 1.3
9100	14500	0	3.4 ± 1.1
9100	15000	0	3.1 ± 1.2
9100	15000	6	1.2 ± 1.0
9093	14962	0	2.9 ± 1.3
9093	15494	0	1.6 ± 0.9
9091	14503	0	3.7 ± 1.1
9000	10800	6	1.6 ± 0.8
9000	13200	0	21.6 ± 3.0
9000	13200	6	2.6 ± 1.0
8900	10700	6	0.9 ± 0.8
8900	13500	0	5.9 ± 2.1
8900	13500	6	1.5 ± 1.1
8900	14000	0	4.3 ± 1.2
8900	14000	6	1.6 ± 1.2
8900	14500	0	1.1 ± 0.9
8900	15000	0	1.8 ± 1.0
8897	15504	0	1.2 ± 0.9
8887	14970	6	0.5 ± 1.0
8887	14970	0	4.4 ± 1.0
8866	14511	0	1.7 ± 1.0
8800	12800	6	12.8 ± 2.4
8800	12800	12	4.0 ± 1.7
8800	12800	18	1.6 ± 0.9
8800	13400	0	4.6 ± 1.5
8800	13400	6	1.5 ± 1.0
8700	13500	0	9.3 ± 2.1
8700	13988	0	4.1 ± 1.1
8700	13988	6	1.0 ± 1.1
8700	14000	0	1.3 ± 1.0
8700	15000	0	4.1 ± 1.3
8700	15000	6	2.3 ± 1.2
8690	13514	0	13.7 ± 1.8
8690	13514	6	1.4 ± 1.2
8687	15505	0	1.9 ± 0.7
8600	13000	6	1.6 ± 1.1
8600	13200	6	2.3 ± 1.0
8500	11700	6	5.2 ± 2.8
8500	11700	12	2.8 ± 1.6
8500	13500	0	2.6 ± 1.9
8500	14000	0	2.3 ± 1.0
8466	13505	0	4.8 ± 1.8
8466	13505	6	0.2 ± 0.9
8400	10300	6	0.8 ± 0.8
8400	11100	6	4.1 ± 1.5
8400	11100	12	5.0 ± 1.3
8400	11100	18	6.3 ± 1.0
8400	11100	24	6.1 ± 1.5
8400	11500	6	0.8 ± 1.2
8400	12700	6	5.0 ± 2.1
8400	12800	6	1.8 ± 1.2
8400	13400	6	2.0 ± 0.9
8300	10900	6	3.8 ± 1.3
8300	11300	6	2.0 ± 1.1
8300	11700	6	2.6 ± 1.5
8200	10300	6	1.5 ± 0.7
8200	11100	6	5.4 ± 1.5
8200	11100	12	3.1 ± 1.4
8200	12700	6	1.2 ± 1.1
8200	13000	6	1.4 ± 1.0
8200	13200	6	2.0 ± 1.0
8100	10900	6	1.8 ± 1.2
8100	11300	6	2.9 ± 1.3
8000	10300	6	0.9 ± 0.9
8000	10700	6	1.1 ± 0.9
8000	11100	6	1.6 ± 0.9
8000	11500	6	1.2 ± 1.0
8000	11900	6	1.1 ± 1.2
8000	12300	6	1.5 ± 1.0
8000	12700	6	0.7 ± 0.8
8000	12800	6	1.4 ± 1.1
8000	13200	6	0.9 ± 0.8
8000	13400	6	0.8 ± 0.8
7900	10500	6	0.3 ± 0.9
7900	10900	6	0.7 ± 0.9
7900	11300	6	0.4 ± 0.9
7900	11700	6	1.3 ± 1.1
7900	12100	6	0.3 ± 0.8
7900	12500	6	4.1 ± 1.5
7900	12500	12	2.1 ± 0.8
7800	11800	6	2.9 ± 1.0
7800	12200	6	2.8 ± 1.0

Table 3.0
Exposure-Rate Measurement Data

Table 3.0 presents results of the exposure-rate measurements taken with Mt. Sopris SC-132 scintillometers. These data were generated by the computer program EXPOCALC.BAS, Version 1.0 (Ref. 8).

Table 3.0

Exposure-Rate Survey Data

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
13413	17000	10	10
13368	16900	11	11
13337	17000	15	14
13323	16800	11	11
13296	16900	14	12
13279	16700	11	11
13265	17000	11	11
13260	16600	17	14
13252	16800	13	12
13234	16600	11	12
13220	16900	14	12
13206	16700	19	15
13196	17000	11	11
13189	16500	12	12
13177	16800	14	13
13152	16900	11	11
13144	16400	12	12
13133	16700	14	14
13115	16500	19	16
13107	16800	11	11
13100	16300	13	13
13093	16600	14	14
13072	16400	18	14
13062	16700	11	11
13055	16200	15	14
13042	16500	13	12
13030	16300	22	21
13017	16600	12	12
13010	16100	14	13
12998	16400	15	14
12991	16200	18	17
12973	16500	14	12
12973	16500	14	13
12965	16000	15	15
12958	16300	15	14
12940	16100	16	15
12928	16200	13	12
12928	16200	12	12
12928	16400	13	12
12921	15900	16	16
12900	16500	13	12
12895	16000	24	23
12883	16300	12	13
12880	16100	14	14
12875	15800	18	17
12850	15900	25	21
12842	15500	13	14
12838	16200	14	14
12835	16000	15	13
12835	16000	17	14
12831	15700	18	17
12797	15400	15	14
12797	15800	24	21
12794	16100	12	12
12794	16100	14	12
12790	15900	13	12
12786	15600	21	19
12752	15300	15	14
12752	15700	27	21
12749	16000	18	18
12749	16000	19	18
12742	15500	16	19

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
12734	15800	15	15
12708	15600	27	22
12707	15200	14	13
12705	15900	12	12
12705	16474	15	15
12700	15979	16	16
12700	16000	13	14
12700	16500	11	11
12697	15400	16	19
12688	15700	16	16
12666	15500	28	24
12663	15100	17	15
12660	15800	15	14
12652	15300	22	18
12645	15600	16	17
12642	13500	9	9
12622	15400	27	25
12618	15000	16	15
12616	15700	16	15
12607	15200	22	19
12601	15500	22	19
12581	13800	10	10
12578	15300	25	22
12573	14900	16	16
12571	15600	17	17
12563	15100	18	19
12557	13300	10	11
12554	15400	27	22
12531	15200	32	25
12528	14800	16	15
12527	15500	15	16
12518	15000	21	19
12509	15300	26	21
12500	15500	16	16
12500	16000	16	15
12500	16500	11	10
12493	16469	15	15
12485	15100	39	27
12484	14700	16	15
12482	15400	21	20
12473	14900	25	22
12468	13100	10	9
12465	15200	27	21
12447	13500	11	11
12440	15000	38	28
12439	14600	15	15
12438	15300	19	19
12428	14800	21	20
12420	15100	28	23
12398	14900	35	30
12394	14500	14	14
12393	15200	23	21
12384	14700	21	19
12381	13800	12	12
12379	12900	10	11
12375	15000	27	23
12357	13300	11	11
12357	14800	32	27
12349	14400	12	13
12349	15100	21	21
12341	15500	16	16
12339	14600	21	21
12336	13700	12	12
12336	14900	28	22
12326	13900	12	13
12310	14700	36	31
12305	14300	17	16
12304	15000	23	21
12300	15000	22	21
12300	15500	18	17
12300	16000	14	14
12300	16483	17	15
12300	16500	11	10
12294	14500	20	19
12291	13600	10	11
12290	14800	25	21
12289	12700	10	10
12281	13800	11	12
12268	13100	13	12
12264	14600	33	28
12260	14200	15	14
12260	14900	18	18
12249	14400	20	21
12247	13500	12	12
12243	14700	28	23
12236	13700	12	13
12226	13900	13	13
12220	14500	36	28
12216	14800	25	24
12215	14100	14	15
12205	14300	19	19
12202	13400	13	12

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
12200	14600	27	22
12199	12500	10	11
12199	12500	10	10
12191	13600	14	14
12181	13800	15	14
12179	12900	11	11
12171	14400	32	30
12171	14700	21	21
12170	14000	16	15
12162	14500	22	18
12160	14200	19	19
12157	13600	12	13
12147	13500	13	13
12136	13700	14	16
12127	14600	28	24
12126	13900	15	15
12124	14300	28	27
12115	14100	19	19
12114	14400	18	18
12112	13200	12	14
12110	12300	12	13
12110	16521	14	14
12102	13400	14	12
12100	15000	20	21
12100	15500	18	17
12100	16000	14	14
12100	16500	10	10
12091	13600	15	15
12089	12700	12	12
12084	14500	24	24
12084	14500	24	22
12081	13800	13	14
12080	14200	32	28
12072	14300	20	17
12070	14000	21	19
12068	13100	14	14
12057	13300	12	13
12047	13500	14	13
12040	14400	23	23
12036	13700	16	16
12035	14100	33	28
12028	14200	20	17
12026	13900	19	19
12023	13000	14	14
12020	12100	11	12
12012	13200	13	13
12002	13400	18	17
11999	12500	12	12
11999	12500	12	12
11997	14300	22	22
11993	14000	32	25
11991	13600	16	15
11981	13800	18	18
11979	12900	14	14
11979	14100	20	18
11968	13100	14	14
11960	13100	16	14
11957	13300	18	18
11953	14200	24	23
11948	13900	25	22
11947	13500	16	15
11936	13700	21	20
11935	14000	21	19
11933	12800	15	14
11930	11900	11	11
11923	13000	17	15
11912	13200	19	20
11910	12300	10	10
11910	14100	24	23
11903	13800	25	22
11902	13400	15	15
11900	14500	22	25
11900	15000	23	22
11900	15500	17	17
11900	16000	13	14
11900	16500	11	11
11894	13900	17	21
11891	13600	16	17
11889	12700	14	13
11878	12900	12	12
11868	13100	18	18
11868	13100	18	19
11867	14000	18	18
11867	14000	25	22
11859	13700	22	21
11857	13300	16	16
11850	16492	17	14
11849	13800	17	18
11847	13500	18	16
11844	12600	14	14
11833	12800	16	12
11823	13000	17	17

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
11823	13900	31	24
11820	12100	13	12
11816	13600	18	18
11812	13200	14	15
11802	13400	20	20
11799	12500	14	14
11794	13700	19	17
11789	12700	12	13
11780	13800	22	22
11778	12900	19	16
11768	13100	17	17
11766	13500	19	18
11757	13300	23	21
11754	12400	16	15
11751	13600	19	18
11744	12600	16	16
11736	13700	22	21
11733	12800	17	17
11730	11900	14	12
11723	13000	15	14
11719	13400	28	25
11713	16516	14	14
11712	13200	22	21
11710	12300	14	14
11703	13500	18	18
11700	14000	24	28
11700	14500	30	32
11700	15000	24	24
11700	15000	26	36
11700	15500	20	19
11700	16000	14	14
11700	16500	11	11
11699	12500	18	17
11693	13600	22	21
11689	12700	17	15
11678	12900	20	20
11670	13300	30	25
11668	13100	23	22
11665	12200	13	14
11659	13400	16	18
11654	12400	17	16
11650	13500	19	19
11650	13500	20	21
11644	12600	17	17
11633	12800	18	17
11629	13200	33	30
11623	13000	23	21
11620	12100	14	14
11610	12300	18	17
11608	13300	23	23
11606	13400	24	24
11599	12500	18	18
11597	13100	35	30
11589	12700	22	22
11578	12900	21	20
11575	12000	14	13
11565	12200	18	18
11564	13200	29	27
11563	13300	21	21
11554	12400	18	18
11548	13000	35	30
11544	12600	21	21
11533	12800	22	23
11530	11900	14	14
11521	13100	30	28
11520	12100	17	16
11519	13200	25	25
11519	13200	26	25
11510	12300	17	20
11505	12900	33	30
11500	13500	21	24
11500	13515	39	29
11500	14000	50	41
11500	14500	38	44
11500	15000	21	24
11500	15500	16	16
11500	16000	14	13
11500	16500	11	13
11499	12500	21	21
11489	12700	27	27
11481	16481	13	14
11478	13000	31	30
11476	13100	25	24
11475	12000	17	16
11465	12200	17	18
11458	12800	50	38
11454	12400	27	24
11444	12600	32	30
11436	12900	33	28
11434	13000	21	23
11432	13000	21	21
11430	11900	16	15

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
11420	12100	15	16
11412	12700	50	47
11410	12300	24	22
11400	13200	26	27
11399	12500	30	30
11390	12800	36	34
11389	12900	24	25
11386	11800	15	15
11375	12000	14	17
11368	12600	53	49
[illegible]365	12200	24	23
11354	12400	27	27
11345	12700	38	37
11345	12800	32	31
11331	11900	15	16
11331	11900	15	16
11326	12300	58	52
11320	12100	17	20
11315	11700	14	15
11310	12300	28	25
11300	12700	36	34
11300	13000	31	28
11300	13500	42	38
11300	14000	50	58
11300	14500	36	41
11300	15000	25	26
[illegible]100	15500	16	16
[illegible]300	16000	14	14
11300	16500	13	12
11299	12600	46	43
11286	11800	19	20
11278	12400	59	50
11275	12000	25	25
11270	11600	15	15
11265	12200	25	26
11256	12600	51	44
11254	12500	30	30
11236	12300	67	58
11231	11900	23	23
11225	11500	14	14
11220	12100	28	30
11215	11700	20	20
11211	12500	157	126
11208	12400	25	31
11200	13200	37	40
11192	12200	73	69
11186	11800	31	27
11186	11800	29	27
11180	11400	13	13
11175	12000	22	24
11170	11600	16	17
11167	12400	59	48
11164	12300	61	56
11148	12100	87	72
11135	11300	12	12
11131	11900	38	38
11125	11500	16	16
11125	16000	16	16
11122	12300	63	65
11118	12200	51	53
11115	11700	23	24
11107	12000	99	72
11107	12000	94	59
11100	13000	37	45
11100	13500	75	58
11100	14000	63	68
11100	14500	30	38
11100	15000	21	22
11100	15500	19	21
11100	16000	12	12
11100	16500	12	11
11091	11200	12	12
11086	11300	35	37
11080	11400	17	16
11078	12200	72	61
11075	11900	59	51
11075	12100	57	51
11070	11600	18	20
11046	11100	12	12
11033	11800	42	41
11033	12300	58	48
11031	12000	52	52
11025	11500	17	19
11015	11700	35	31
11001	11000	11	11
11000	11400	16	15
11000	13200	51	53
10990	11900	58	61
10989	12000	55	58
10986	11700	46	38
10970	11600	25	27
10956	10900	10	10

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
10944	11900	78	72
10942	11600	36	33
10936	11300	14	14
10929	12800	85	70
10925	11500	22	23
10911	10800	10	10
10911	16490	14	14
10900	11800	330	119
10900	13000	67	64
10900	13500	72	89
10900	14000	75	81
10900	14500	39	41
10900	15000	26	22
10900	15500	16	16
10900	16000	12	12
10900	16500	11	10
10899	11500	23	23
10881	11700	53	52
10880	11400	21	21
10858	11400	20	20
10855	11700	48	59
10843	11674	140	106
10836	11300	19	19
10835	11600	30	33
10811	10800	11	11
10811	11600	41	55
10803	11[illegible]0	19	20
10800	11500	25	24
10800	13200	113	89
10791	11200	19	18
10766	11500	26	27
10756	11200	17	17
10751	11400	20	20
10746	11100	18	17
10721	11400	21	22
10711	10800	11	11
10711	11100	16	15
10710	11300	17	17
10701	11000	16	16
10700	13000	75	96
10700	13500	208	170
10700	14000	66	72
10700	14500	35	37
10700	15000	21	22
10700	15500	16	15
10700	16000	13	12
10700	16500	12	11
10676	11300	17	19
10666	11000	15	15
10663	11200	17	16
10656	10900	16	16
10631	11200	15	16
10617	10900	14	14
10616	11100	14	15
10611	10800	16	16
10611	10800	12	12
10600	13200	175	173
10586	11100	14	13
10574	10800	13	14
10571	11000	13	13
10566	10700	15	15
10542	11000	14	14
10532	10700	14	13
10528	10900	12	12
10522	10600	15	14
10505	15979	14	15
10500	13500	265	204
10500	14000	66	66
10500	14500	25	32
10500	15000	22	22
10500	15500	14	14
10500	16000	11	11
10500	16500	10	10
10497	10900	13	14
10494	10600	12	12
10483	10800	12	12
10480	16496	12	12
10477	10500	14	14
10452	10800	12	12
10444	10500	11	12
10439	10700	11	12
10432	10400	14	14
10407	10700	11	11
10400	13200	266	235
10398	10400	11	12
10394	10600	11	11
10387	10300	14	14
10362	10600	11	11
10357	10300	11	12
10344	10500	11	11
10342	10200	13	13
10317	10500	11	11

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
10310	14985	23	19
10306	10200	11	11
10300	12700	316	296
10300	12900	259	299
10300	13000	187	231
10300	13000	199	228
10300	13100	344	299
10300	13300	136	191
10300	13500	213	203
10300	13500	212	202
10300	13500	211	201
10300	13500	194	208
10300	13500	197	197
10300	13500	225	201
10300	13500	205	193
10300	13500	206	199
10300	13700	119	117
10300	13700	115	112
10300	13700	118	111
10300	13700	119	116
10300	13700	115	109
10300	13700	118	115
10300	13900	73	73
10300	13900	73	76
10300	13900	74	75
10300	13900	72	75
10300	13900	75	77
10300	13900	72	75
10300	14000	51	58
10300	14000	48	56
10300	14000	48	56
10300	14000	50	55
10300	14000	49	56
10300	14000	48	54
10300	14000	44	55
10300	14100	50	51
10300	14100	50	51
10300	14100	51	52
10300	14100	51	52
10300	14100	50	52
10300	14100	50	51
10300	14300	32	38
10300	14300	33	38
10300	14300	34	38
10300	14300	32	38
10300	14300	33	38
10300	14300	32	37
10300	14500	31	30
10300	14500	31	30
10300	14500	32	30
10300	14500	30	32
10300	14500	32	30
10300	14500	31	29
10300	14500	33	31
10300	14700	21	23
10300	14700	21	23
10300	14700	21	23
10300	14700	21	23
10300	14700	23	24
10300	14700	21	22
10300	14900	18	17
10300	15000	17	19
10300	15000	16	17
10300	15000	15	18
10300	15000	16	18
10300	15000	15	17
10300	15000	15	17
10300	15000	15	16
10300	15100	18	16
10300	15300	13	13
10300	15300	14	14
10300	15300	13	13
10300	15300	13	14
10300	15300	15	16
10300	15300	14	15
10300	15500	12	12
10300	15500	12	12
10300	15500	13	13
10300	15500	15	15
10300	15500	12	12
10300	15500	13	13
10300	15500	12	12
10300	15700	12	12
10300	15700	11	12
10300	15700	12	12
10300	15700	13	13
10300	15700	12	13
10300	15700	14	14
10300	15900	11	11
10300	16000	13	13
10300	16000	10	10
10300	16000	11	10

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
10300	16000	11	11
10300	16000	10	10
10300	16000	11	11
10300	16000	10	10
10300	16500	11	11
10300	16500	8	8
10300	16500	9	8
10300	16500	9	9
10300	16500	7	7
10300	16500	8	8
10299	10400	11	11
10297	10100	13	13
10272	10400	11	11
10270	15500	13	12
10262	10100	11	11
10253	10300	11	11
10252	10000	13	13
10227	10300	10	10
10223	10000	11	11
10208	10200	11	10
10200	13200	371	323
10182	10200	10	10
10163	10100	10	10
10137	10100	10	10
10119	10000	10	10
10100	13200	389	349
10100	13200	391	357
10100	13200	394	354
10100	13200	393	360
10100	13200	402	357
10100	13200	360	373
10100	13300	226	252
10100	13300	222	243
10100	13300	218	236
10100	13300	231	241
10100	13300	225	245
10100	13300	224	250
10100	13400	248	216
10100	13400	208	218
10100	13400	235	212
10100	13400	239	216
10100	13400	248	213
10100	13400	236	203
10100	13500	179	153
10100	13500	172	149
10100	13500	176	150
10100	13500	178	154
10100	13500	180	157
10100	13500	171	149
10100	13500	174	153
10100	14000	44	47
10100	14000	23	24
10100	14500	25	28
10100	15000	15	14
10100	15500	11	12
10100	16000	9	8
10100	16500	9	9
10093	10000	9	10
10000	13200	372	321
9900	13500	143	140
9900	14000	51	44
9900	14000	41	42
9900	14500	21	21
9900	15000	16	17
9900	15500	11	11
9900	16000	9	8
9900	16500	8	8
9800	13200	179	162
9700	13500	89	92
9700	14000	38	38
9700	14000	42	34
9700	14500	16	17
9700	15000	13	13
9700	15500	9	9
9700	16000	9	9
9700	16500	9	8
9686	14503	17	17
9600	13200	172	153
9500	13500	58	65
9500	14000	26	29
9500	14500	15	16
9500	15000	11	11
9500	15500	9	9
9500	16000	8	8
9500	16500	9	8
9492	14505	17	15
9400	13200	145	136
9325	14490	17	16
9300	13500	48	51
9300	14000	25	22
9300	14500	14	14
9300	15000	8	8

Table 3.0 (continued)

Grid Coordinates North	Grid Coordinates East	Surface Reading (μR/h)	Waist-High Reading (μR/h)
9200	13200	99	97
9100	13500	40	40
9100	14000	18	19
9100	14200	12	11
9100	15000	10	10
9091	14503	13	13
9000	13200	6[illegible]	71
8905	13400	37	39
8900	13500	29	32
8900	14000	15	15
8900	14500	10	10
8900	15000	10	10
8866	14511	10	10
8800	13200	48	54
8800	13400	33	36
8700	13500	29	28
8700	13988	14	13
8700	14000	12	13
8700	14500	8	9
8700	15000	12	10
8600	13200	38	45
8600	13400	29	30
8500	13500	24	24
8500	14000	10	12
8400	13200	38	37
8400	13400	24	24
8200	13200	28	29
8200	13400	21	21
8000	13200	24	25
8000	13400	18	18
7800	13200	18	19
7800	13400	14	15
7600	13200	15	14
7600	13400	15	15

Figure 1.0
Tuba City Location Map

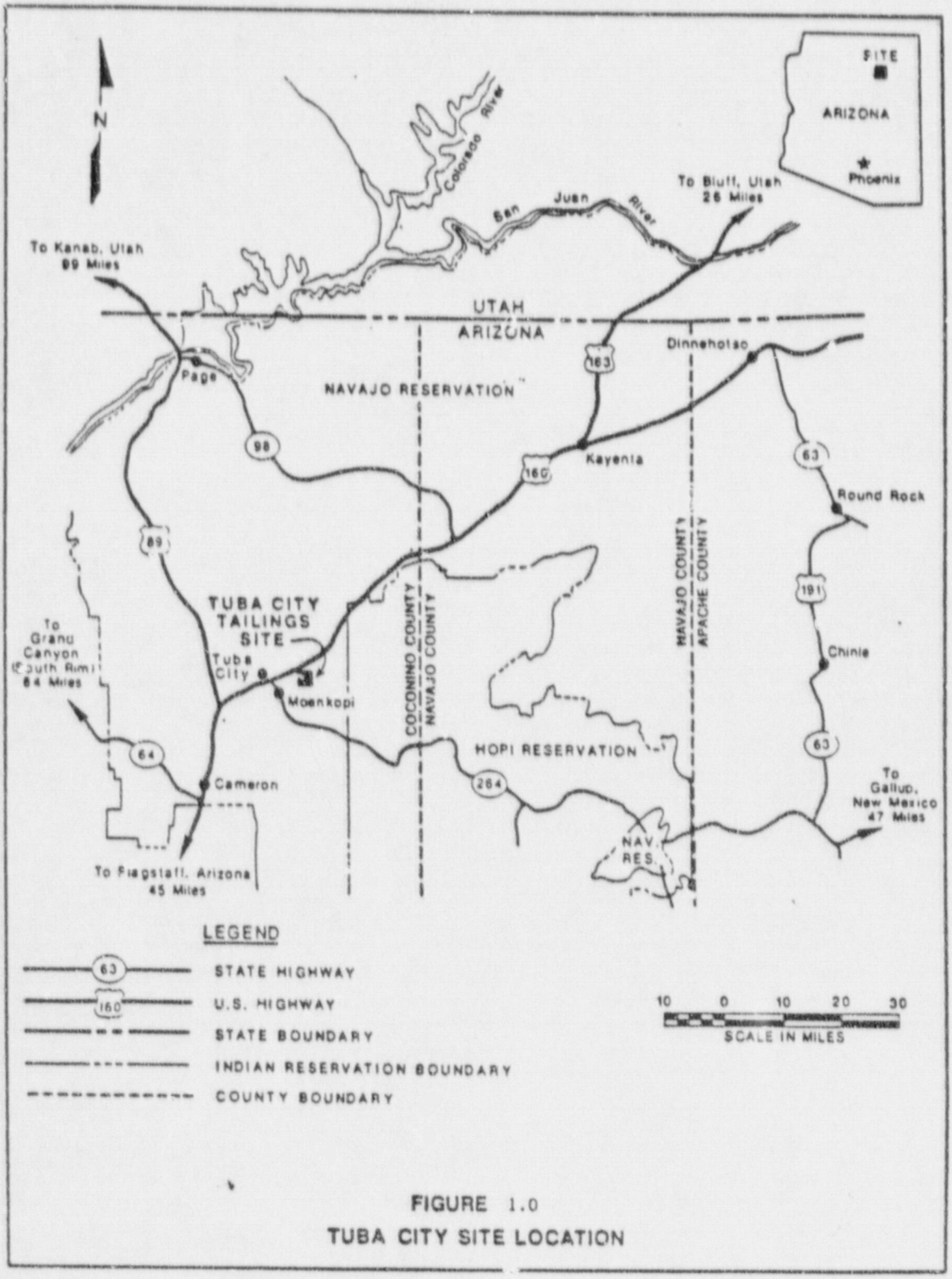

FIGURE 1.0
TUBA CITY SITE LOCATION

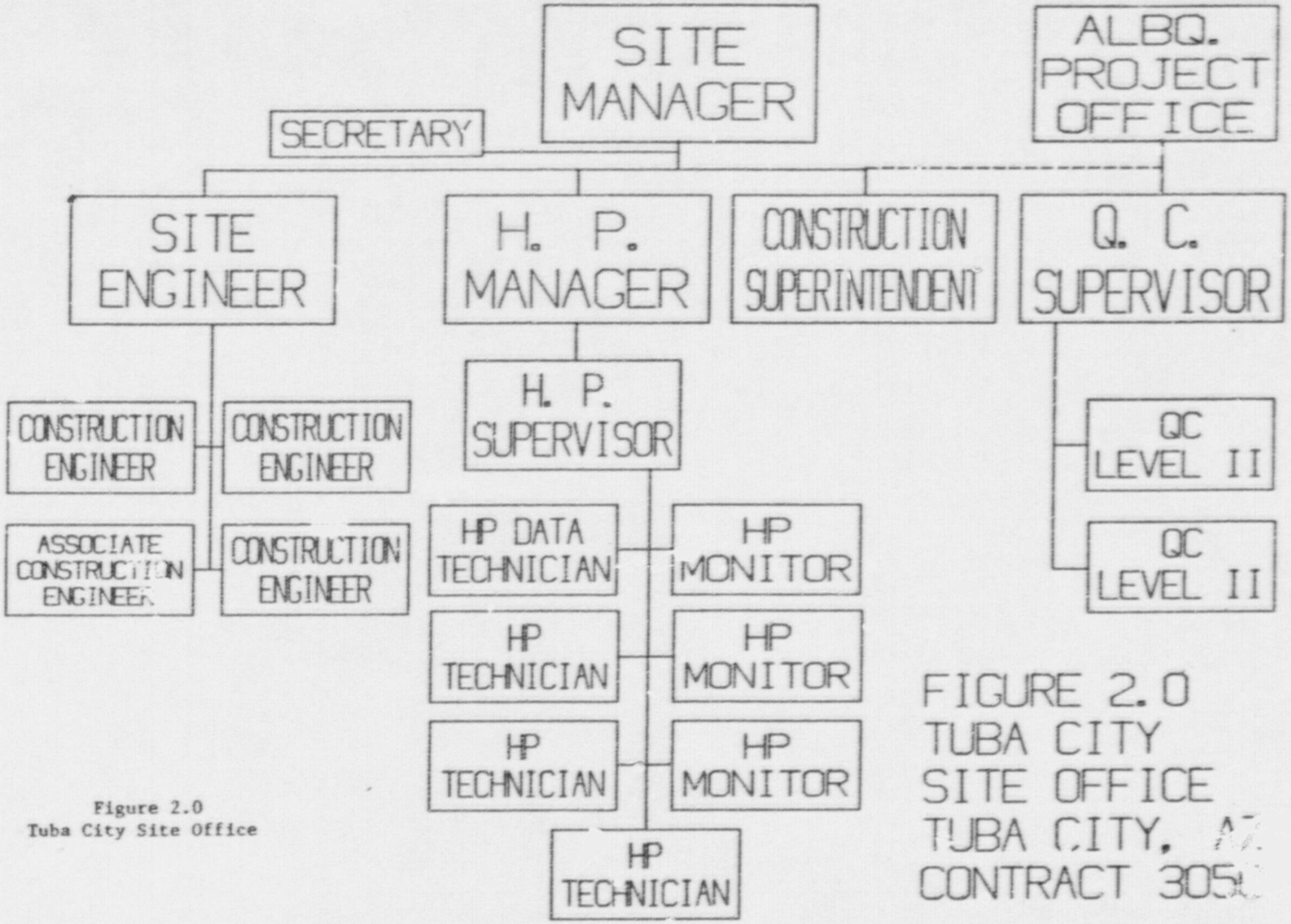

FIGURE 2.0
TUBA CITY
SITE OFFICE
TUBA CITY, A
CONTRACT 305

Figure 2.0
Tuba City Site Office

Figure 2.0
Tuba City Site Office

Figure 3.0
Gamma Levels 3 Feet Above Ground

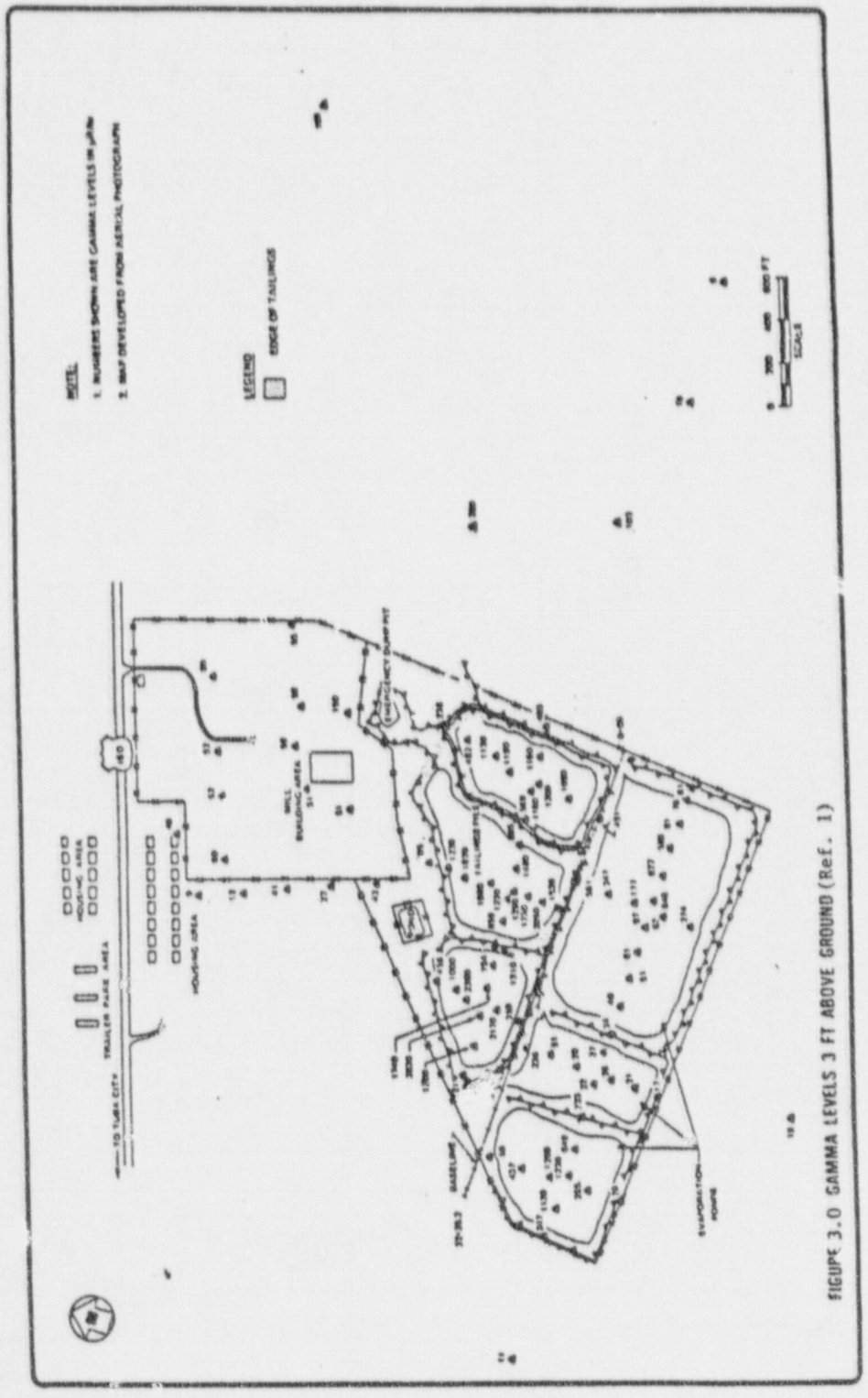

FIGURE 3.0 GAMMA LEVELS 3 FT ABOVE GROUND (Ref. 1)

Figure 4.0
Limits of Contamination Tuba City Site

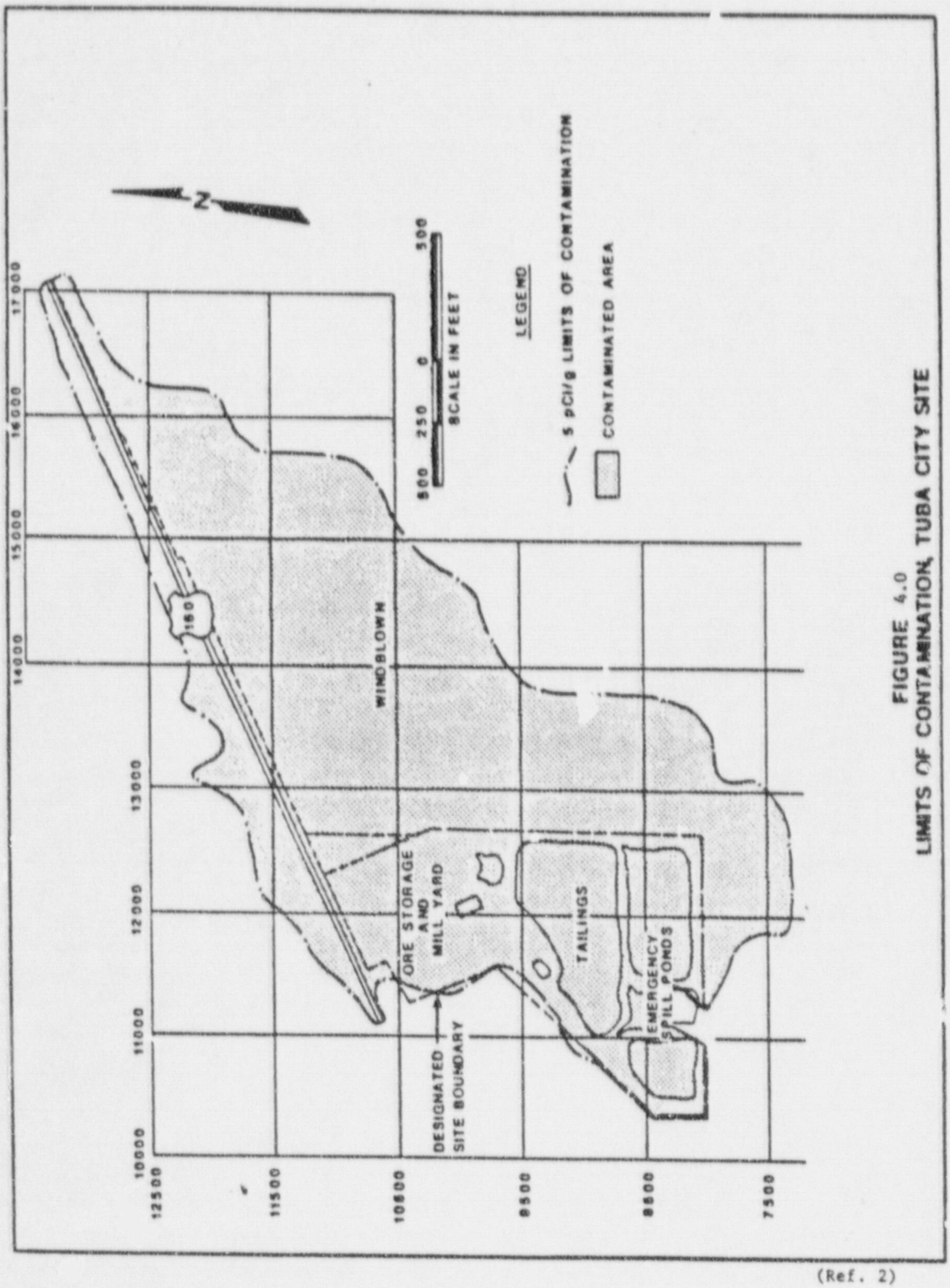

FIGURE 4.0
LIMITS OF CONTAMINATION, TUBA CITY SITE

(Ref. 2)

Figure 5.0
Ra-226 and Background Sample Locations

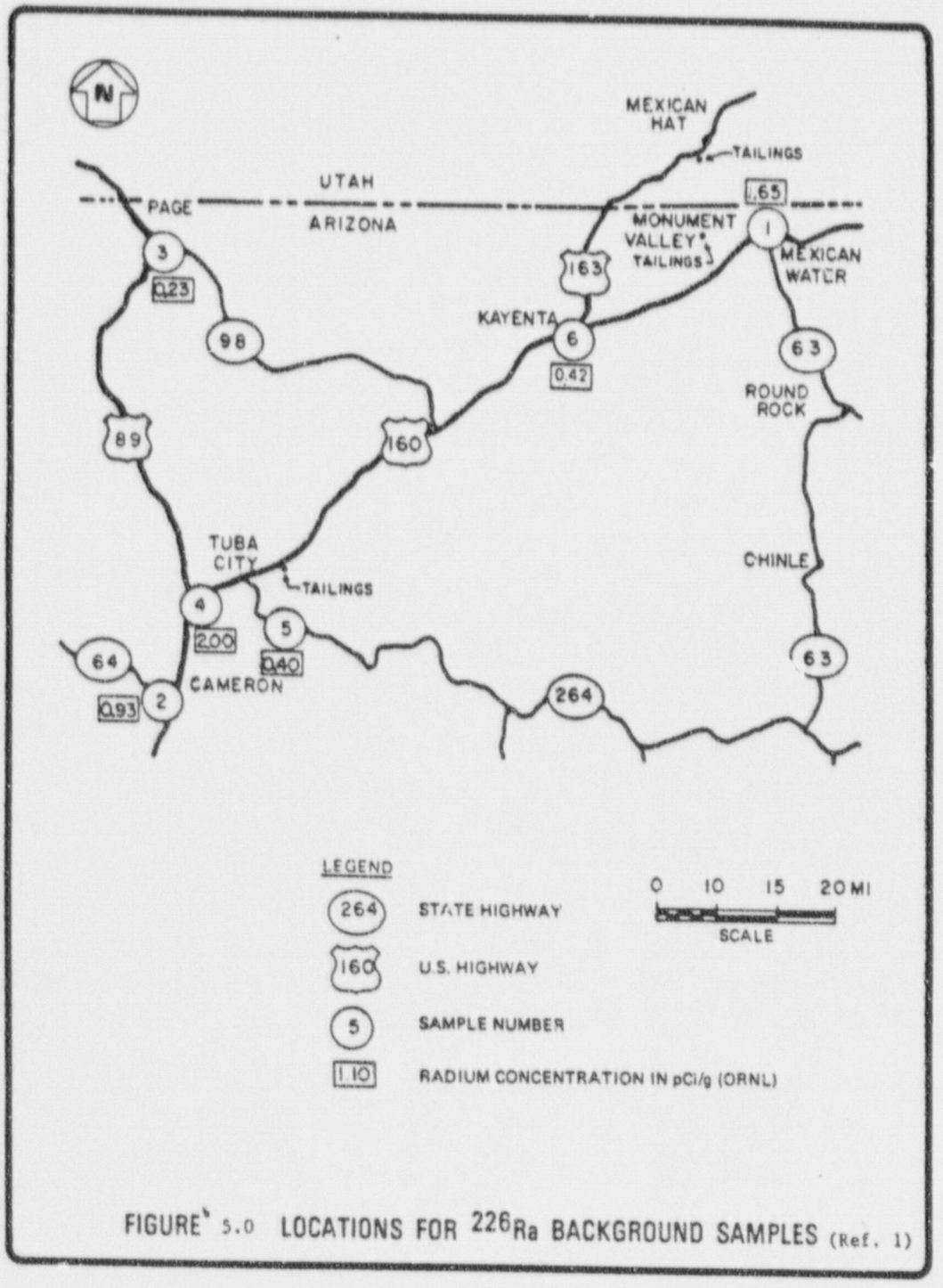

FIGURE 5.0 LOCATIONS FOR ^{226}Ra BACKGROUND SAMPLES (Ref. 1)

Figure 6.0
Environmental Air Monitoring Locations

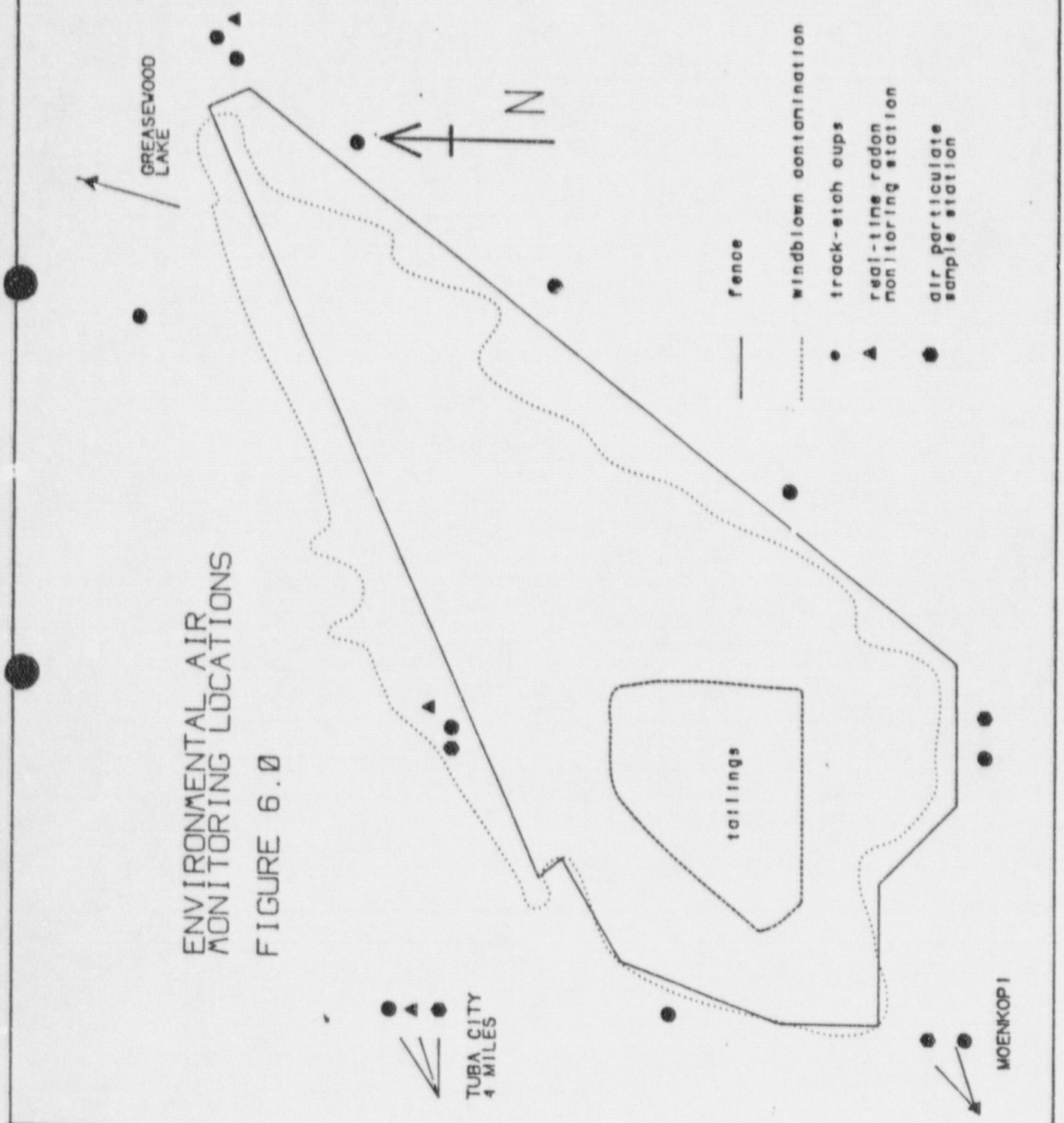

Figure 7.0
Ground-Water Monitoring Locations